TREASURY DEPARTMENT

Public Health and Marine-Hospital Service of the United States

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HYGIENIC LABORATORY.—BULLETIN No. 57

SEPTEMBER, 1909

I. THE PRESENCE OF TUBERCLE BACILLI IN THE CIRCULATING BLOOD IN CLINICAL AND EXPERIMENTAL TUBERCULOSIS

By

JOHN F. ANDERSON

II. THE VIABILITY OF THE TUBERCLE BACILLUS

By

M. J. ROSENAU

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CONTENTS.

I. THE PRESENCE OF TUBERCLE BACILLI IN THE CIRCULATING BLOOD IN CLINICAL AND EXPERIMENTAL TUBERCULOSIS.[a]

By John F. Anderson,

Passed Assistant Surgeon and Assistant Director Hygienic Laboratory, United States Public Health and Marine-Hospital Service, Washington. D. C.

INTRODUCTION.

Clinicians and laboratory workers have long sought for aids in the diagnosis of incipient cases of pulmonary tuberculosis and obscure infections with the tubercle bacillus in other parts of the body. It is frequently impossible in the early stages of phthisis to find the bacilli in the sputum and often the physical signs are not sufficiently definite to warrant a positive diagnosis, and an early diagnosis means a probable good prognosis.

The various tuberculin reactions in adults are not always conclusive. So that any method that would enable us to make an early and positive diagnosis in a large percentage of cases would be of almost untold value to the clinician, health officer, and patient.

A recent paper by Rosenberger,[b] in which he reports the finding of tubercle bacilli in the blood of all cases examined, has excited much interest. If Rosenberger's claims are substantiated, they will be of great value in the diagnosis of tuberculosis. His statements were based largely upon finding in the blood bacilli possessing the morphological and tinctorial properties of the tubercle bacillus.

The method employed by him was to draw about 5 c. c. of blood from a vein in the arm and at once to mix it with an equal quantity of 2 per cent sodium citrate solution in normal salt solution. The mixture was well shaken and placed in the refrigerator for twenty-four hours, when smears were made from the sediment. The smears were then dried with moderate heat, placed in distilled water until complete laking of the blood, dried, fixed in a Bunsen flame and stained by the usual technic for tubercle bacilli. In a later paper he states that he used Pappenheim's solution as a decolorizer and counter stain.

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[a] Manuscript submitted for publication July 8, 1909.

[b] Rosenberger, Randle C.: The presence of tubercle bacilli in the circulating blood in tuberculosis. Am. Journ. Med. Sci., vol. 137, No. 2, 1909, p. 267.

In his first paper Rosenberger reports positive results when 2 or 2.5 c. c. of the sediment were inoculated in two instances into guinea pigs.

Various observers since the time of Villemin have reported the finding of tubercle bacilli in the blood in tuberculosis.

Villemin [a] in 1868 reported the successful inoculation of a rabbit with tuberculosis by the blood collected from the femoral vein of a tuberculous rabbit; also, of a rabbit with the blood from a case of human tuberculosis.

I shall not attempt to give a review of the subject of tubercle bacilli in the blood, as the literature upon this subject up to 1904 has been well discussed by Bergeron [b] in his admirable thesis on the subject. In his paper Bergeron gives a fine critical review of previous work and in addition experiments by himself. In his conclusion he sums up the status of the subject so well that I shall quote the following from him:

1. The pathological anatomy shows that at a given moment the tubercle bacillus is able to pass into the general circulation, but the lesions capable of being interpreted as being the result of an infection in the blood are only to be encountered in acute tuberculosis.

2. Guinea pigs experimentally infected never present bacillemia either at the beginning of the infection or during the period of cachexia.

3. Rabbits experimentally infected usually present a kind of lesion which testifies to the passage of the bacilli into the blood at a given moment; but these bacillary discharges should be considered essentially transitory and ephemeral. In short, in spite of experiments to the contrary, it seems impossible to demonstrate the presence of the bacilli in the blood by means of the inoculation of guinea pigs as well in the beginning of the disease as later, when the infection has been made by subcutaneous or intraperitoneal injections.

In cases where the infection has been made intravenously the bacilli are localized more or less rapidly in the tissues and disappear from the circulation in a time which may not exceed four hours (Nocard), but may be as late as six days (Gaertner) or even later, though not much later.

4. The presence of tubercle bacilli in the blood of persons with miliary tuberculosis is a fact proved long ago, both by the pathological anatomy and autopsy and by examination of the blood during life. Researches, however, tend to show that the bacillemia of acute tuberculosis is a relatively rare phenomenon.

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[a] Villemin: Études sur la tuberculose. Paris, 1868.

[b] Bergeron, André: Étude critique sur la présence du bacille de Koch dans le sang. Thése, Paris, 1904.

5. The inoculation of guinea pigs shows that in the course of non-miliary tuberculosis, even when it has assumed a rapid form, febrile or hemorrhagic, the bacillemia does not exist. The only case which we know of (Ettlinger) perhaps may be explained by the existence of a short premiliary stage terminating abruptly in this observation by a hyperacute peritonitis.

6. The results by the use of the inoscopic method of Jousset and the method of homogenization are not to be admitted without great reserve. These methods, in order to preserve their value, ought to be followed with a perfect asepsis very difficult to realize.

7. The most grave causes of error which are attached to the methods recently proposed for the direct finding of tubercle bacilli in the blood reside in the fact of the existence in our surroundings:

a. Of acid-resistant bacilli, well studied by Koch, Petri, Möeller, etc.

b. Of common saprophytic bacteria, which have acquired in the organic media where they are accidentally found, an acid-resistant power more or less accentuated.

TECHNIQUE EMPLOYED IN THE COLLECTION AND EXAMINATION OF THE BLOOD.

In order to endeavor to find out why the results of the older observers differed from those of Rosenberger, I undertook a study of tubercle bacilli in the blood.

My studies have been made on 48 cases of human tuberculosis and 13 guinea pigs and 8 rabblits experimentally infected. The study consisted of the examination of smears, cultures, and the inoculation of blood into fresh guinea pigs. With a few exceptions, which are noted in the protocols, the following procedure was employed:

In the human cases the blood was drawn from the vein at the bend of the elbow. Usually 10 or 20 c. c. of blood were taken and mixed with sufficient sodium citrate solution to give approximately a 1 per cent solution of the citrate, and thoroughly shaken. As soon as the blood was received at the laboratory it was divided into two lots. One lot was at once centrifuged for one hour at high speed. Two smears were made from the sediment, using in every case drawn-out pipettes that had never been used. Five drops of the sediment were then planted in a fermentation tube of lactose-bouillon and 5 drops on glycerin-potato; 2.5 c. c. of the sediment was next injected into the peritoneal cavity of a young guinea pig.

The cultures were placed in the incubator at 37° C.; the fermentation tube was examined for growth in twenty-four, forty-eight, and seventy-two hours, and discarded after that time. The potato cultures were sealed with paraffin and kept under observation for two months. The guinea pigs were weighed at intervals of a week.

Those that died were carefully autopsied, and if any lesions suggestive of tuberculosis was found an emulsion of the suspicious material was injected into another guinea pig. All animals alive at the end of two months were killed and autopsied.

The other half of the citrated blood was placed in the ice chest and at the end of twenty-four hours exactly the same procedure was followed with it as detailed above for the centrifuged portion.

The blood from the experimentally infected guinea pigs and rabbits was taken directly from the exposed heart after the animal had been etherized and, except in a few instances, treated as that from the human cases, though as a rule fermentation tube cultures were not made.

All the smears were first dried by moderate heat, then the blood was laked in distilled water, air dried, fixed in the Bunsen flame, stained with hot carbol-fuchsin, decolorized in 20 per cent sulphuric acid, washed in alcohol, counterstained with Loeffler blue, and examined for acid-fast bacilli.

I wish to acknowledge my indebtedness to Dr. W. H. Frost, who kindly collected most of the specimens of blood from the cases of human tuberculosis, and to Doctor Smith, resident physician of the district tuberculosis hospital, and his assistants, for courtesies extended Doctor Frost in the collection of the blood from the cases of human tuberculosis.

The results will be seen from the following protocols:

Blood from cases of human tuberculosis.

Case No.	History of case from which blood was taken.	Amount blood taken in citrate soda solution (c. c.).	How blood was treated.	Acid-fast bacilli in sediment smears.	Growth tubercle bacilli on glycerin potato in 6 weeks.	Growth in fermentation tube in 72 hours.	Amount sediment intraperitoneally in guinea pig.	Result.			
								Guinea pig serial number.	Death, in days later.	Killed, days later.	Autopsy findings.
1 R. B.	Pulmonary tuberculosis, 2 months' duration; slight infiltration left apex; slight cough; very slight fever; bacilli in sputum.	*c. c.* 20	15 c. c. centrifuged.	—	—	....	*c. c.* 5	1	....	70	No evidence of tuberculosis.
			5 c. c. in ice chest 24 hours.	[a]+	—	....	2.5	2	27	....	Do.
2 G. S.	Pulmonary tuberculosis, 2 years' duration; infiltration at apex; temperature nearly normal; improving; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	[b]+	5	3	....	70	Do.
			5 c. c. in ice chest 24 hours.	—	—	—	2.5	4	....	72	Do.
3 L. T.	Pulmonary tuberculosis; 1 year duration; moderate involvement 1 lung; improving; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	5	5	....	70	Do.
			5 c. c. in ice chest 24 hours.	—	—	—	2.5	6	....	72	Do.
4 A. W.	Pulmonary tuberculosis; 6 months' duration; infiltration 1 apex; stationary; bacilli in sputum.	12	7 c. c. centrifuged.	—	—	[c]+	3	6x	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	7	....	72	Do.

[a] Many clumps of 3 to 30 acid-fast bacilli in smears.

[b] Hay bacillus.

[c] Coccus.

Blood from cases of human tuberculosis—Continued.

Case No.	History of case from which blood was taken.	Amount blood taken in citrate soda solution (c. c.).	How blood was treated.	Acid-fast bacilli in sediment smears.	Growth tubercle bacilli on glycerin potato in 6 weeks.	Growth in fermentation tube in 72 hours.	Amount sediment intraperitoneally in guinea pig.	Result.			
								Guinea pig serial number.	Death, in days later.	Killed, days later.	Autopsy findings.
5 E. N.	Pulmonary tuberculosis; 5 years' duration; infiltration 1 apex; temperature usually normal; bacilli in sputum.	c. c. 10	7 c. c. centrifuged.	—	—	—	c. c. 3	8	....	72	No evidence of tuberculosis.
6 S. G.	Pulmonary tuberculosis; 6 months' duration; infiltration 1 apex; mild case; temperature normal; improving; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	9	8	....	Do.
			5 c. c. in ice chest.	—	—	—	2.5	10	....	68	Do.
7 C. L.	Pulmonary tuberculosis; 5 months' duration, consolidation half 1 lung, fever 102° F.; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	11	....	68	Do.
			5 c. c. in ice chest.	—	—	—	2.5	12	....	68	Do.
8 L. T.	Pulmonary tuberculosis; 1 year duration; extensive involvement 1 lung; fever 101° F.; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	13	....	68	Do.
			5 c. c. in ice chest.	—	—	—	2.5	14	....	68	Do.
9 J. K.	Pulmonary tuberculosis; 6 months' duration; complete consolidation 1 lung, other infiltrated; temperature 102° F.; stationary; bacilli in sputum.	8	8 c. c. centrifuged.	—	—	—	2.5	15	....	68	Do.
10 A. G.	Pulmonary tuberculosis; 7 months' duration; consolidation 1 entire lung, other infiltrated; high temperature; bacilli in sputum.	7	7 c. c. centrifuged.	—	—	[a]+	2.5	16	....	68	Do.
11 H. F.	Pulmonary tuberculosis; 5 months' duration; infiltration most of left lung; occasional elevation of temperature; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	17	66	....	Do.
			5 c. c. in ice chest.	—	—	—	2.5	18	....	70	Do.
12 A. S.	Pulmonary tuberculosis; 3 months' duration; fairly extensive; high temperature; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	19	....	70	Do.
			5 c. c. in ice chest.	—	—	—	2.5	20	5	....	Do.
13 J. W. C.	Pulmonary tuberculosis; 15 years' duration; upper half 1 lung consolidated; temperature normal; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	21	....	70	Do.
			5 c. c. in ice chest.	—	—	—	2.5	22	2	....	Do.
14 A. C.	Pulmonary tuberculosis; 2 years' duration; marked infiltration both lungs; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	23	....	65	Do.
			5 c. c. in ice chest.	—	—	—	2.5	24	....	65	Do.
15 R. J.	Pulmonary tuberculosis; 1 year duration; infiltration half of 1 lung; temperature 98° to 100° F.; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	25	....	65	Do.
			5 c. c. in ice chest.	—	—	—	2.5	26	....	69	Do.

[a] Coccus.

Blood from cases of human tuberculosis—Continued.

Case No.	History of case from which blood was taken.	Amount blood taken in citrate soda solution (c. c.).	How blood was treated.	Acid-fast bacilli in sediment smears.	Growth tubercle bacilli on glycerin potato in 6 weeks.	Growth in fermentation tube in 72 hours.	Amount sediment intraperitoneally in guinea pig.	Result.			
								Guinea pig serial number.	Death, in days later.	Killed, days later.	Autopsy findings.
		c. c.					*c. c.*				
16 J. H. J.	Pulmonary tuberculosis; 8 months' duration; slight involvement; no consolidation; temperature normal; bacilli in sputum.	7	3.5 c. c. centrifuged.	—	—	—	3.5	27	....	69	No evidence of tuberculosis.
			3.5 c. c. in ice chest.	—	—	—	1.7	28	....	69	Do.
17 W. H.	Pulmonary tuberculosis; 2 years' duration; consolidation apex 1 lung; temperature nearly normal; bacilli in sputum.	5	2.5 c. c. centrifuged.	—	—	—	2.5	29	....	69	Do.
			2.5 c. c. in ice chest.	—	—	—	1.25	30	51	....	Do.
18 J. B.	Pulmonary tuberculosis; 2 years' duration; slight involvement; improving; bacilli in sputum.	5.5	2.5 c. c. centrifuged.	—	—	—	2	31	....	69	Do.
			3 c. c. in ice chest.	—	—	—	1.25	32	....	69	Do.
19 J. H.	Pulmonary tuberculosis; 1 year duration; cavity in left lung; infiltration right lung; temperature 99° to 102° F.; bacilli in sputum.	6	5 c. c. centrifuged.	—	—	—	2.5	33	....	69	Do.
20 G. L. N.	Pulmonary tuberculosis; 2 years' duration; moderate involvement; discharged as improved; bacilli in sputum.	7	5 c. c. centrifuged.	—	—	—	2.5	34	....	69	Do.
21 C. S. F.	Pulmonary tuberculosis; 2 years' duration: 1 lung consolidated; temperature 100° F.; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	35	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	36	....	70	Do.
22 B. M.	Pulmonary tuberculosis; 6 months' duration: infiltration right apex; temperature 98° to 100° F.; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	37	3	....	Do.
			5 c. c. in ice chest.	—	—	—	2.5	38	....	69	Do.
23 J. D.	Pulmonary tuberculosis; 3 months' duration: infiltration half 1 lung; no fever; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	39	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	40	....	69	Do.
24 S. C.	Pulmonary tuberculosis; 3 months' duration; pneumopyothorax; temperature normal to 101° F.; improving; bacilli in sputum.	5	5 c. c. centrifuged.	—	—	—	2.5	41	....	69	Do.
25 I. G.	Pulmonary tuberculosis; 1 year duration; infiltration one-third 1 lung; no fever; discharged from hospital; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	42	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	43	....	69	Do.
26 E. B.	Pulmonary tuberculosis: 1 year duration; infiltration half 1 lung; no fever; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	44	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	45	....	69	Do.
27 L. R.	Pulmonary tuberculosis; 9 months' duration; consolidation half left lung; fever 100° F.; improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	46	....	69	Do.
			5 c. c. in ice chest.	—	—	—	2.5	47	....	68	Do.

Blood from cases of human tuberculosis—Continued.

Case No.	History of case from which blood was taken.	Amount blood taken in citrate soda solution (c. c.).	How blood was treated.	Acid-fast bacilli in sediment smears.	Growth tubercle bacilli on glycerin potato in 6 weeks.	Growth in fermentation tube in 72 hours.	Amount sediment intraperitoneally in guinea pig.	Result.			
								Guinea pig serial number.	Death, in days later.	Killed, days later.	Autopsy findings.
		c. c.					*c. c.*				
28 T. L.	Pulmonary tuberculosis; 2 months' duration; slight infiltration left lung; discharged as improved; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	48	....	68	No evidence of tuberculosis.
			5 c. c. in ice chest.	—	—	—	2.5	49	....	68	Do.
29 S. P.	Pulmonary tuberculosis; 3 years' duration; half 1 lung consolidated; temperature normal; improving; bacilli in sputum.	7	3.5 c. c. centrifuged.	—	—	—	2.5	50	....	68	Do.
			3.5 c. c. in ice chest.	—	—	—	2.5	51	....	67	Do.
30 P. D.	Pulmonary tuberculosis; 2 years' duration; 1 lung infiltrated; temperature 101° F.; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	52	....	68	Do.
			5 c. c. in ice chest.	—	—	—	2.5	53	....	67	Do.
31 B. K.	Pulmonary tuberculosis; 3 years' duration; consolidation and cavity upper third 1 lung; arrested; no fever; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	54	....	67	Do.
			5 c. c. in ice chest.	—	—	—	2.5	55	....	67	Do.
32 E. K.	Pulmonary tuberculosis; 3 years' duration; infiltration both apices; temperature 98° to 100° F.; bacilli in sputum.	8	4 c. c. centrifuged.	—	—	—	2.5	56	....	68	Do.
			4 c. c. in ice chest.	—	—	—	2.5	57	....	67	Do.
33 H. F.	Pulmonary tuberculosis; 8 years' duration; extensive infiltration; quiescent; fever 100° F.; bacilli in sputum.	5	5 c. c. centrifuged.	—	—	—	2.5	58	41	....	Do.
34 T. J. M.	Pulmonary tuberculosis; advanced; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	59	....	67	Do.
			5 c. c. in ice chest.	—	—	—	2.5	60	....	67	Do.
35 C. W. S.	Pulmonary tuberculosis; 4 years' duration; extensive; tubercle bacilli in sputum; died 7 days later.	7	3.5 c. c. centrifuged.	—	—	—	2.5	61	....	67	Do.
			3.5 c. c. in ice chest.	—	—	—	2.5	62	....	67	Do.
36 J. C.	Pulmonary tuberculosis; 6 months' duration; 1 lung consolidated; other infiltrated; not improving; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	63	....	67	Do.
			5 c. c. in ice chest.	—	—	—	2.5	64	....	67	Do.
37 W. H.	Pulmonary tuberculosis; 1 year's duration; extensive involvement; cavity formation; bacilli in sputum; died 16 days later.	7	7 c. c. centrifuged.	—	—	—	2.5	65	....	67	Do.
38 F. S.	Pulmonary tuberculosis; 2 years' duration; extensive involvement; bacilli in sputum; died 24 days later.	15	5 c. c. centrifuged.	—	—	—	2.5	66	....	67	Do.
			5 c. c. in ice chest.	—	—	—	2.5	67	28	....	Do.
			5 c. c. in ice chest after adding tubercle bacilli.	+	+	—	2.5	68	10	....	General tuberculosis.[a]

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[a] The result from the blood in the citrate solution to which the tubercle bacilli were added was a control upon a possible bactericidal action of the blood and also upon the germicidal action of the citrate solution. As will be seen, these influences were not sufficient to prevent the growth of tubercle bacilli on glycerin potato or the infection of the guinea pig with tuberculosis.

Blood from cases of human tuberculosis—Continued.

Case No.	History of case from which blood was taken.	Amount blood taken in citrate soda solution (c. c.).	How blood was treated.	Acid-fast bacilli in sediment smears.	Growth tubercle bacilli on glycerin potato in 6 weeks.	Growth in fermentation tube in 72 hours.	Amount sediment intraperitoneally in guinea pig.	Result.			
								Guinea pig serial number.	Death, in days later.	Killed, days later.	Autopsy findings.
		c. c.					c. c.				
39 McC.	Tuberculosis of knee and elbow joints; tubercle bacilli not demonstrated.	20	5 c. c. centrifuged.	—	—	—	2.5	69	....	67	No evidence of tuberculosis.
			5 c. c. in ice chest.	—	—	—	2.5	70	....	67	Do.
40 P. B. J.	Pulmonary tuberculosis; slight; incipient; bacilli in sputum.	10	5 c. c. centrifuged.	—	—	—	2.5	71	....	64	Do.
			5 c. c. in ice chest.	—	—	—	2.5	72	6	....	Do.
41 E. H.	Pulmonary tuberculosis; 3½ years' duration; extensive involvement; bacilli in sputum; died 10 days later.	10	5 c. c. centrifuged.	—	—	—	2.5	73	31	....	Do.
			5 c. c. in ice chest.	—	—	—	2.5	74	....	65	Do.
42 J. D.	Pulmonary tuberculosis; 6 months' duration; cavities both lungs; temperature 100° to 103° F.; bacilli in sputum.	8	4 c. c. centrifuged.	—	—	—	2.5	75	....	65	Do.
			4 c. c. in ice chest.	—	—	—	2.5	76	....	65	Do.
43 G. V.	Pulmonary tuberculosis; 6 months' duration; moderately advanced; both lungs consolidated; temperature 98° to 101° F.; bacilli in sputum.	5	5 c. c. centrifuged.	—	—	—	2.5	77	....	64	Do.
44 D. F.	Pulmonary tuberculosis; 1½ years' duration; extensive; considerable temperature; bacilli in sputum.	5	5 c. c. centrifuged.	—	—	—	2.5	78	....	64	Do.
45 S. C.	Pulmonary tuberculosis; 5 months' duration; infiltration half 1 lung; bacilli in sputum; died 12 days later.	5	5 c. c. centrifuged.	—	—	—	2.5	79	....	65	Do.
46 J. McG.	Pulmonary tuberculosis; 3 years' duration; slight involvement; no consolidation; temperature normal; bacilli in sputum.	20	15 c. c. centrifuged.	—	—	—	2.5	80	....	64	Do.
47 W. R.	Pulmonary tuberculosis; 5 months' duration; general infiltration; fever 100° F.; bacilli in sputum.	25	10 c. c. centrifuged.	—	—	—	2.5	81	....	64	Do.
			5 c. c. in ice chest.	—	—	—	2.5	82	....	64	Do.
48 C. L.	Pulmonary tuberculosis; 6 months' duration; very extensive involvement; bacilli in sputum; died 2 days later.	6	6 c. c. centrifuged.	—	—	—	2.5	83	....	64	Do.

BLOOD FROM RABBITS EXPERIMENTALLY INFECTED.

All the following rabbits from which blood was taken were inoculated subcutaneously with 0.5 c. c. of an emulsion of a glycerin potato growth of bovine tubercle bacilli. The rabbits were etherized at varying intervals after infection, the heart exposed and the blood drawn directly from the heart into a sterile syringe. In most instances a guinea pig was given 5 c. c. of the rabbit's heart blood intraperitoneally.

About 10 c. c. of the blood was added to sterile citrate of soda solution and placed in the ice chest overnight. Cultures were made on glycerin potato both from the whole heart's blood and from the sediment of the citrated blood. With a few exceptions two smears were made from the sediment of the citrated blood alone. After the blood was drawn from the heart the rabbit was killed and a careful autopsy made to determine if the animal was tuberculous. The details will be seen from the following protocols:

Rabbit No. 1.—Blood drawn fourteen days after infection. No naked-eye evidence of tuberculosis at autopsy. No cultures made from the blood.

Five c. c. whole heart's blood injected into guinea pig No. 1A, weight 310 grams; killed seventy days later, weight 415 grams; generalized tuberculosis.

Rabbit No. 2.—Blood drawn twenty-one days after infection. No naked-eye evidence of tuberculosis at autopsy.

Five c. c. whole heart's blood injected into guinea pig No. 2A, weight 290 grams; died two days later; no evidence of tuberculosis at autopsy. Glycerin potato culture of whole blood negative.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli found in sediment smears; no growth on glycerin potato in six weeks; 2.5 c. c. sediment intraperitoneally in guinea pig No. 2B, weight 285 grams; killed 64 days later, weight 350 grams; no evidence of tuberculosis at autopsy.

Rabbit No. 3.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave growth of tubercle bacilli. Six c. c. whole heart's blood injected into guinea pig No. 3A, weight 300 grams; killed fifty-eight days later, weight 490 grams; general tuberculosis at autopsy.

Fourteen c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Growth of tubercle bacilli from sediment on glycerin potato. Two and five-tenths c. c. sediment intraperitoneally into guinea pig No. 3B, weight 310 grams; died fifty-seven days later, weight 365 grams; general tuberculosis at autopsy.

Rabbit No. 4.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Four c. c. whole heart's blood into guinea pig No. 4A, weight 310 grams; killed fifty-nine days later, weight 480 grams; general tuberculosis at autopsy.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Two and five-tenths c. c. sediment intraperitoneally into guinea pig No. 4B, weight 300 grams; killed fifty-eight days later, weight 475 grams; no evidence of tuberculosis at autopsy. No growth tubercle bacilli on glycerin potato in six weeks.

Rabbit No. 5.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 5A, weight 320 grams; killed fifty-nine days later, weight 530 grams; general tuberculosis at autopsy.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Three c. c. sediment into guinea pig No. 5B, weight 295 grams; killed fifty-eight days later, weight 290 grams; general tuberculosis at autopsy. Growth of tubercle bacilli on glycerin potato from sediment.

Rabbit No. 6.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 6A, weight 305 grams; killed fifty-nine days later, weight 550 grams; no evidence of tuberculosis at autopsy.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Two and five-tenths c. c. sediment intraperitoneally in guinea pig No. 6B, weight 310 grams; killed fifty-eight days later, weight 480 grams; general tuberculosis. No growth of tubercle bacilli from sediment on glycerin potato.

Rabbit No. 7.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave growth of tubercle bacilli. Four c. c. whole heart's blood into guinea pig No. 7A, weight 315 grams; died fifty-seven days later, weight 420 grams; general tuberculosis at autopsy.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Two and five-tenths c. c. sediment intraperitoneally into guinea pig No. 7B, weight 300 grams; died fifty-seven days later, weight 310 grams; general tuberculosis at autopsy. Growth of tubercle bacilli from sediment on glycerin potato.

Rabbit No. 8.—Blood drawn twenty-seven days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 8A, weight 300 grams; killed fifty-nine days later, weight 415 grams; general tuberculosis at autopsy.

Ten c. c. blood in citrate soda solution in ice chest twenty-four hours. No tubercle bacilli in sediment smears. Four c. c. sediment intraperitoneally in guinea pig No. 8B, weight 300 grams; died fifty-seven days later, weight 420 grams; general tuberculosis at autopsy. No growth of tubercle bacilli from sediment on glycerin potato.

BLOOD FROM GUINEA PIGS EXPERIMENTALLY INFECTED.

All the following guinea pigs from which blood was taken were inoculated subcutaneously with five-tenths c. c. of an emulsion of a glycerin potato growth of bovine tubercle bacilli. The guinea pigs were etherized at varying intervals after infection, the heart exposed and the blood drawn directly from the heart into a sterile syringe with citrate of soda solution. Usually about five c. c. of the whole citrated blood was at once injected into the peritoneal cavity of a fresh guinea pig.

The remainder of the blood in the syringe was placed in the ice chest over night.

Cultures were made on glycerin potato both from the whole heart's blood and from the sediment of the citrated blood. With a few exceptions two smears were made from the sediment of the citrated blood alone. After the amount of blood desired had been taken from the heart the guinea pig was killed and a careful autopsy made to determine if the animal was infected with tuberculosis. The details will be seen from the following protocols:

Guinea pig No. 100.—Blood drawn fourteen days after infection. General tuberculosis at autopsy. No cultures made from the blood.

Five c. c. whole heart's blood injected into guinea pig No. 100A, weight 305 grams; killed sixty-seven days later, weight 450 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 101.—Blood drawn fourteen days after infection. General tuberculosis at autopsy. No cultures made from the blood.

Four c. c. whole heart's blood into guinea pig No. 101A, weight 340 grams; killed sixty-seven days later, weight 540 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 102.—Blood drawn sixteen days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Four c. c. whole heart's blood into guinea pig No. 102A, weight 290 grams; died ten days later; no evidence of tuberculosis at autopsy.

Five c. c. blood in citrate solution in ice chest over night. Five c. c. sediment into guinea pig No. 102B, weight 310 grams; killed sixty-nine days later, weight 530 grams; no evidence of tuberculosis at autopsy. No growth of tubercle bacilli from sediment on glycerin potato. No tubercle bacilli found in sediment smears.

Guinea pig No. 103.—Blood drawn sixteen days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Four c. c. whole heart's blood into guinea pig No. 103A, weight 300 grams; killed sixty-nine days later, weight 435 grams; no evidence of tuberculosis at autposy.

Five c. c. blood in citrate solution in ice chest over night. Five c. c. sediment into guinea pig No. 103B, weight 275 grams; killed sixty-eight days later, weight 525 grams; no evidence of tuberculosis. No growth of tubercle bacilli from sediment on glycerin potato. No tubercle bacilli in sediment smears.

Guinea pig No. 104.—Blood drawn eighteen days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 104A, weight 285 grams; died eleven days later; no evidence of tuberculosis at autopsy.

Five c. c. blood in citrate solution in ice chest over night.

Two and five-tenths c. c. sediment into guinea pig No. 104B, weight 280 grams; died eleven days later; no evidence of tuberculosis at autopsy. No growth on glycerin potato. Tubercle bacilli not found in sediment smears.

Guinea pig No. 105.—Blood drawn eighteen days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood in guinea pig No. 105A, weight 280 grams; killed sixty-seven days later, weight 500 grams; tubercles in spleen, liver, lungs, and on peritoneum.

Five c. c. heart's blood in citrate solution in ice chest over night. No tubercle bacilli in sediment smears. No growth from sediment on glycerin potato.

Two and five-tenths c. c. sediment into guinea pig No. 105B, weight 280 grams; killed sixty-six days later, weight 530 grams; general tuberculosis at autopsy.

Guinea pig No. 106.—Blood drawn twenty-one days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 106A, weight 280 grams; killed sixty-five days later, weight 560 grams; no evidence of tuberculosis at autopsy.

Five c. c. blood in citrate solution in ice chest over night. No tubercle bacilli in sediment smears. No growth from sediment on glycerin potato. Two and five-tenths c. c. sediment in guinea pig No. 106B, weight 240 grams; killed sixty-two days later, weight 335 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 107.—Blood drawn twenty-one days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood in guinea pig No. 107A, weight 300 grams; killed sixty-three days later, weight 460 grams; no evidence of tuberculosis at autopsy.

Five c. c. blood in citrate solution in ice chest over night. No tubercle bacilli in sediment smears. No growth from sediment on glycerin potato. Two and five-tenths c. c. sediment in guinea pig No. 107B, weight 290 grams; killed sixty-three days later, weight 480 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 108.—Blood drawn twenty-five days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato showed no growth of tubercle bacilli. Eight c. c. whole heart's blood in guinea pig No. 108A, weight 290 grams; killed sixty days later, weight 485 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 109.—Blood drawn twenty-five days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato showed no growth of tubercle bacilli. Five c. c. whole heart's blood in guinea pig No. 109A, weight 280 grams; died seven days later; no evidence of tuberculosis at autopsy.

Guinea pig No. 110.—Blood drawn twenty-five days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 110A, weight 290 grams; killed sixty days later, weight 525 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 111.—Blood drawn twenty-five days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Five c. c. whole heart's blood into guinea pig No. 111A, weight 285 grams; killed sixty days later, weight 540 grams; no evidence of tuberculosis at autopsy.

Guinea pig No. 112.—Blood drawn twenty-five days after infection. General tuberculosis at autopsy.

Whole heart's blood on glycerin potato gave no growth of tubercle bacilli. Eight c. c. whole heart's blood into guinea pig No. 112A, weight 280 grams; died sixty days later, weight 450 grams; general tuberculosis at autopsy.

SUMMARY AND DISCUSSION.

An examination of the above experiments shows that there were 47 cases of pulmonary tuberculosis in which tubercle bacilli were found in the sputum and one case of joint tuberculosis in which the bacilli were not found. From these 48 cases of human tuberculosis glycerin-potato cultures, guinea-pig inoculations, and smears were made from the sediment obtained by centrifugation; but in not a single instance were tubercle bacilli demonstrated either by the examination of the smears, cultures, or animal inoculations.

Glycerin-potato cultures, guinea-pig inoculations, and smears were made in 35 of the 48 cases from the sediment obtained by placing the citrated blood in the ice chest for twenty-four hours. In one instance (case No. 1) the smears showed an organism that had the morphological and tinctorial appearances of tubercle bacilli; but the glycerin-potato culture and guinea-pig inoculations were negative. The smears made from the centrifugalized sediment in the same case were negative.

Thirty-five of the 48 cases had smears, cultures, and animal inoculations made from the sediment obtained both by the centrifuge and by gravity for twenty-four hours in the ice chest.

In only a few instances was there a growth in the fermentation tubes in seventy-two hours, showing that by care in the collection and handling of the blood contamination may be avoided in the great majority of cases.

If tubercle bacilli had been present in sufficient numbers in the blood to be detected in smears, it would certainly seem that they should have been found in more than one instance in this series of 48 cases, in 47 of which tubercle bacilli had been found in the sputum. In most cases 2.5 c. c. of the sediment, either obtained by the centrifuge or by gravity, or both, were inoculated into guinea pigs, and this amount was many times the amount used to make the smears, yet all the animals inoculated were negative.

The glycerin-potato cultures were also uniformly negative. That the failure to find tubercle bacilli in the blood from these cases by animal inoculation, even when not found in smears, was not due to a bactericidal action of the serum is negatived by case No. 38 and by the experiments with the blood of rabbits experimentally infected. To a portion of the citrated blood from case No. 38 a very small amount of an emulsion of tubercle bacilli was added; tubercle bacilli were demonstrated by smears, culture, and guinea-pig inoculations, showing that the bactericidal action, if any, was very slight.

The smears in every instance were carefully examined by two and a portion of them by three different observers. I am satisfied that if acid-fast bacilli had been present they would not have escaped detection.

The blood from 8 rabbits experimentally infected was examined for tubercle bacilli. The blood from 7 of the 8 was examined by glycerin-potato cultures and guinea-pig inoculations of the whole heart's blood and of the sediment from the citrated blood in the ice chest for twenty-four hours. The blood from one rabbit (No. 1) was examined only by injection of 5 c.c. into a guinea pig.

Smears were made from the sediment of the citrated blood in the ice chest of 7 of the rabbits. As the blood of a number of the rabbits was proved by cultures and guinea-pig inoculations to contain tubercle bacilli, an unusually thorough search was made for acid-fast bacilli in the sediment smears of these cases. Two smears were made from the blood of each rabbit. The smears were examined by three trained laboratory men, but not in a single instance were tubercle bacilli found, though the blood contained tubercle bacilli in sufficient numbers to grow on potato and to infect guinea pigs.

Six of the 8 rabbits showed naked-eye appearances of tuberculosis at the autopsy made after the blood was taken. The blood of 1 of the 2 remaining was infective, even though there were no naked-eye lesions of tuberculosis.

Tubercle bacilli grew on the glycerin potato in 3 of the 6 cases, both from the whole heart's blood and from the citrated sediment. The blood was infective for guinea pigs by both methods in 4 of the 6, yet tubercle bacilli could not be found in the smears.

These results with the blood of rabbits are strongly against the idea that the blood serum of individuals with tuberculosis has a bacteriolytic power sufficient to lessen or destroy the virulence of tubercle bacilli in the blood stream so that, while they may be found in smears, they will not grow on cultures or infect animals.

The blood from only one guinea pig (No. 105) experimentally infected was found to contain tubercle bacilli by inoculation into fresh animals. The blood from all the others was negative, both culturally and by inoculation. No tubercle bacilli were found in the smears made from the citrated blood of No. 105 in the ice chest over night, though it was infective for the fresh animal.

It is of interest to note that the blood of only 1 guinea pig out of 13 contained tubercle bacilli, while that of 7 out of 8 rabbits experimentally infected contained them in sufficient numbers to be demonstrated either culturally or by inoculation.

There are several interesting points that come out of the above results. The first is that acid-fast bacilli were found only once in smears made from the blood of the 48 cases of human tuberculosis, although the bacilli had been demonstrated in the sputum of 47 of them. In the one case (case No. 1) acid-fast bacilli were not found in the centrifugalized sediment, but were found in the sediment of the citrated blood that had remained in the ice chest over night.

The question is, Were these acid-fast bacilli tubercle bacilli? If so, why did they not grow on cultures and infect guinea pigs? I must confess that I am unable to answer these questions, but am inclined to the opinion that they were not tubercle bacilli for the following reasons: The acid-fast bacilli were present in the smears in such numbers as to be seen in practically every field; they were most frequently seen in clumps consisting of 3 to 30 or more bacilli; most of the individual bacilli were shorter than the usual type of human tubercle bacilli. Now, the smear was made from one large drop of the citrated sediment and from the numbers seen in the portion of the slide examined there must have been many hundreds of bacilli in each drop of the sediment. Five drops of the same sediment were planted on glycerin potato, but no growth resulted, and 2.5 c. c. of the same sediment was inoculated into a guinea pig (guinea pig No. 2), but with negative results for tuberculosis. These amounts were many times that used to make the smear and, of course, must have contained a great many more bacilli; but tubercle bacilli were not demonstrated by cultures or animal inoculation.

As mentioned before, the acid-fast bacilli were not found in the smears made from the centrifugalized sediment. The case from which the blood was taken was in a very early stage and was improving at the time the blood was taken; had no fever, no night sweats, very slight cough, and was gaining in weight, but still had bacilli in the sputum at that time.

His occupation being that of a stableman, and being employed as such at the time the blood was taken, might suggest a possible contamination of the blood with an acid-fast grass or hay bacillus on the skin, which developed in the citrated blood in the ice chest over night and was found in the smears made from the sediment. This possibility emphasizes the great care necessary to avoid the entrance of acid-fast bacilli from any source, such as the skin, air, water, and citrate of soda, etc., into the blood when it is drawn, and is, perhaps, in harmony with the latter part of Bergeron's conclusions.

The second point is, that in my hands the finding of tubercle bacilli in smears made from the blood of known cases of tuberculosis on account of almost uniformly negative results seem to be of little value as an aid in the diagnosis of tuberculosis. These negative results could not have been due to the tubercle bacilli being overlooked, for all the smears were examined by at least two observers and a part of them by three, and, moreover, cultures and animal inoculations were negative.

The third point brought out by the experiments is that tubercle bacilli were demonstrated in the blood of 7 of the 8 rabbits experimentally infected. In 3 of the 7 they were found both by cultures and by animal inoculations. From this it would seem that when rabbits are infected by subcutaneous inoculation of tubercle bacilli the latter are found in the circulating blood in a large proportion of the cases, but not in sufficient numbers to be detected in smears. It is of especial interest to note that the blood of a rabbit (No. 1), which at the autopsy did not present any naked-eye evidences of tuberculosis, was infective for a guinea pig.

Tubercle bacilli were found in the blood of only 1 guinea pig experimentally infected. It seems, therefore, that whereas tubercle bacilli are frequently found in the blood of tubercular rabbits, it is unusual to find them in the blood of tubercular guinea pigs and humans in numbers or virulence sufficient to infect fresh animals.

The culture of tubercle bacilli from the blood of the experimentally infected rabbits is one of the few, if not the first, recorded instances in which tubercle bacilli have been grown from the blood of tubercular animals.

II. THE VIABILITY OF THE TUBERCLE BACILLUS.

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Practically all observers agree with Koch that human sputum is the main source of human tuberculosis. Whether the tubercle bacillus is usually transferred directly or indirectly, in moist or in dry state, by inhalation or ingestion, are questions still at issue.

The viability of the tubercle bacillus, therefore, assumes a special significance in aiding the solution of problems concerning the channels of infection and methods of transmission of this disease. Further, a correct understanding of the vitality of the tubercle bacillus is of first importance in carrying out many of our prophylactic measures.

No one questions that many of the tubercle bacilli are still alive and virulent in the droplets that are sprayed from the mouths of consumptive persons. Likewise many of the bacilli must be fresh and active when deposited by consumptives upon drinking cups, spoons, towels, or other articles mouthed by well persons shortly afterwards and without intervening cleansing. Whether the bacilli remain alive and virulent in dried and pulverized sputum in sufficient numbers to frequently form a dangerous part of the dust of rooms and streets is a question still open for solution.

Two principal destructive agencies act on the tubercle bacillus in sputum expectorated on streets and out-of-door places: (1) Desiccation and (2) the action of light. The bacillus also has to contend with other destructive agencies, such as the putrefactive and other organisms in the sputum or gaining access to it.

THE TUBERCLE BACILLUS AND ITS SUPPOSED SPORE.

Koch at first believed that the tubercle bacillus contained spores. He was led into this error by the beaded appearance of the rod. We now know that the tubercle bacillus does not possess an endogenous spore, such as that of the anthrax bacillus, the tetanus bacillus, or the hay bacillus.

Two circumstances led early investigators into wrong conclusions as to the viability of the tubercle bacillus. One was this belief that the organism contained spores. The other was ignorance of the role played by dead tubercle bacilli. Some of the earlier workers spent much time in trying to differentiate the resistance of the tubercle bacillus with and without spores. These earlier results are still quoted, without qualification, in many of the recent text-books and writings upon the subject. The notion that the tubercle bacillus has a spore is not altogether dead and has created an exaggerated idea of its hardiness and resistance.

THE TUBERCLE BACILLUS AND ITS WAXY SUBSTANCE.

It was soon found that although the tubercle bacillus does not have a true spore, it contains an unusually large quantity of waxy substance fats and fatty acid.[a] It is supposed that these fatty substances surround the rod, thus affording it a protecting covering. This envelope is supposed to hinder drying and also to protect the bacillus against the direct injurious influences of various external agencies.

The presence of the unusual amount of fatty and waxy substances led to a revision of our views upon the subject of the viability of the bacillus by placing it in an isolated and intermediate position between the spore-bearing and the nonspore-bearing rods. As to just how far this view is justified will be discussed subsequently.

ACID-FAST PROPERTY.

The difficulty with which the tubercle bacillus takes the basic aniline dyes and the great tenacity with which it holds them are noteworthy. True spores also stain with difficulty and resist the decolorizing action of acids. The analogy between the staining and decolorizing property of spores and the tubercle bacillus is not infrequently mentioned in the literature as indicating far greater resistance on the part of the tubercle bacillus to heat, dryness, putrefaction, chemicals, etc., than is the case with the great run of nonspore-bearing organisms. Except for the analogy, there is no indication that there is a definite relation between the viability of an organism and the ease or difficulty with which it stains and decolorizes. In fact, some protozoa, certain spirochetes, and other frail micro-organisms stain with more or less difficulty or require special technique.

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[a] Twenty-six and two-tenths per cent according to Hammerschlag; 22 per cent, Klebs; 37 per cent, de Schweinitz and Dorset; 20 to 25 per cent, Koch and Aronson; from 8 and 10 to 25 and 26 per cent, Ruppel, expressed in terms of alcohol-ether extract. This consists of fatty acids and neutral fat and a waxy substance. In contrast to the tubercle bacillus, other bacteria contain only 1.7 to 7 and 10.1 per cent alcohol-ether extractives. According to Aronson the tubercle wax is, for the most part, not in the bacillus, but between the bacilli as a product of secretion.

THE TRUE POSITION OF THE TUBERCLE BACILLUS.

Some of the more recent work upon the viability of the tubercle bacillus indicates that it has little if any greater resistance to heat, dryness, putrefaction, chemicals, sunlight, and other injurious agencies than the great bulk of nonspore-bearing bacteria. Its usual habitat in albuminous, mucoid, or fatty substances, such as pus, mucopus, necrotic material, milk, etc., protects it to a certain extent. This protection, however, is an accident of its environment rather than an inherent vital property.

We now know that 60° C. for twenty minutes is sufficient to kill the tubercle bacillus in milk, bouillon, water, and other fluids.[a] At one time it was believed that the tubercle bacillus resisted boiling temperatures. Experiments have resulted in gradually reducing the accepted thermal death point, until now we can state with considerable confidence that the tubercle bacillus has very little more resistance than a number of other nonspore-bearing bacteria; for instance, the typhoid bacillus, the dysentery bacillus, and the colon bacillus.

Some writers seem to consider it rather remarkable that the tubercle bacillus—an organism without a spore—should live several months in dust, in water, on fabrics, in sputum, etc. For instance, Schill and Fischer found it alive one hundred and eighty-six days in dried sputum; Toma virulent up to ten months; Sawizky dead after two and a half months; Twitchell found it virulent on a handkerchief seventy days but dead in one hundred and ten days; Rickards, Slack, and Arms found it virulent after eighty-five days, kept dark and dry; and Feltz found dried sputum in a room virulent up to seven and nine months.

It is possible, however, to cite from the literature instances of other nonspore-bearing organisms living similar periods of time under like conditions. For instance, observers have found that the cholera spirillum may live for one hundred and fifty to two hundred days when dried under favorable conditions. Sirena and Alessi report that such a frail organism as the *Diplococcus pneumoniæ* did not die until after one hundred and ninety-two days when dried on silk threads and kept in a moist room, and one hundred and sixty-four days in a dry room.

In some experiments on the plague bacillus I found it to live over four months on a piece of dry sponge and over three months in water under laboratory conditions.[b] Similar instances might be multiplied.

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[a] Rosenau, M. J.: The thermal death points of pathogenic microorganisms in milk. Hyg. Lab. Bull. No. 42, U. S. Public Health and Marine-Hospital Service, Washington, 1908, pp. 85. 8°.

[b] Rosenau, M. J.: Viability of the *Bacillus pestis*. Hyg. Lab. Bull. No. 4, U. S. Marine-Hospital Service, Washington, 1901.

On the other hand, the following instances are given of experimenters who report a relatively short vitality for the tubercle bacillus dried in sputum not exposed to direct sunlight: Cadéac found it dead in ten days and sometimes less; Hill, sixteen days; Ransom and Delepine, nineteen days; and Galtier, after thirty days.

The question at issue from a practical standpoint is not how long a few tubercle bacilli may occasionally survive in dried sputum, but how soon they usually die or become harmless. In order to determine this point much more data will be required than are now available.

All authorities who have worked upon the subject seem agreed that the tubercle bacillus loses its virulence before it finally dies. This is also the case with other pathogenic nonspore-bearing bacteria.

It seems that the more carefully the tubercle bacillus is studied the nearer its viability is seen to approach that of other bacteria of its class.

CRITERION OF DEATH.

It is difficult to determine just when a microorganism dies. This difficulty is increased in the case of the tubercle bacillus. The reluctance with which this organism grows upon artificial media makes cultural methods totally inapplicable; it is necessary to resort to animal inoculations. Here again we meet an unusual difficulty, for the dead tubercle bacillus may produce lesions indistinguishable from those which are caused by live cultures.

A study of the literature shows that much of the work upon the viability of the tubercle bacillus has little value for lack of a clear criterion of death. Many experiments will be found recorded in which the tubercle bacillus is exposed to various influences, such as drying, heat, chemicals, sunlight, putrefaction, etc., and after a certain period of time the dried material is inoculated into rabbits or guinea pigs. In about two months after the inoculation the animal is usually killed, and if caseous abscesses and other lesions about the site of inoculation are found and the tubercle bacillus is rediscovered on stained smears made from the local lesions, the conclusion is drawn that the tubercle bacillus is alive, and the results are recorded as positive.

It is now well known that the dead tubercle bacilli may cause lesions characterized by giant cells, caseous necrosis, etc. I have found that moderately large amounts of tubercle cultures surely killed by heat (100° for one hour) may cause very extensive lesions when injected into the peritoneal cavities of guinea pigs. So closely do these lesions sometimes resemble those produced by the living bacteria that unless the portions of the spleen, liver, lungs, glands, and local processes are inoculated into another animal it is not possible to know whether we are dealing with the effects of living or of dead bacteria. When the lesions are plainly generalized throughout the substance of the liver, spleen, lungs, etc., these secondary inoculations may not be necessary.

The various organs (whether they contain macroscopic lesions or not), bits of tissue, and parts of lesions should be ground up with salt solution and the extract injected into the peritoneal cavity of a normal ("secondary") guinea pig; if the bacteria are alive there will develop a generalized fatal tuberculosis; if dead, only a trifling slight localized process. This method is time consuming and expensive, but is often indispensable as a final test.

It is well known that tuberculin can not distinguish the lesions produced by live tubercle bacilli from those produced by dead ones. In a series of experiments on this point I found that three out of eight guinea pigs with lesions produced by dead tubercle bacilli died as the result of a subcutaneous injection of 2 c. c. of tuberculin (O. T.).[a]

AN EXPLANATION OF DISCREPANCIES IN PUBLISHED REPORTS.

When one reads the literature upon the subject of the viability of the tubercle bacillus he is struck first by the extravagant claims made by some investigators for the prolonged life and unusual resistance of the tubercle bacillus. There are also marked discrepancies in the results obtained by different experimenters with apparently well-planned and carefully controlled work.

It seems that one of the main reasons for these variations is the failure to take note of the pathogenic power of the dead tubercle bacillus. In 1884 Schill and Fischer studied the action of a temperature of 100° C. upon tuberculous sputum. They reported that 100° C. of dry heat did not surely destroy the virulence of tuberculous sputum, whether dry or moist. These experiments are frequently quoted to show that the tubercle bacillus resists boiling temperatures; but we now know that the thermal death point of the tubercle bacillus is considerably less than that indicated by earlier work.

Schill and Fischer also found that the bacillus retained life in sputum dried one hundred and forty-three days, but was not infective after one hundred and seventy-nine days. The method used consisted in inoculating guinea pigs, but the authors do not give the details of the experiments.

In view of the fact that earlier investigators fell into error concerning the thermal death point of the tubercle bacillus, it may be assumed that a repetition of their work upon the viability of the organism when dried in sputum, etc., may cause us to revise our views upon the subject.

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[a] Rosenau, M. J.: The thermal death points of pathogenic microorganisms in milk. Hyg. Lab. Bull. No. 42, U. S. Public Health and Marine-Hospital Service, Washington, 1908, pp. 85. 8°.

According to the work of Kitasato most of the tubercle bacilli in sputum, in cavities, and even in the tissues, are dead. This opinion was based largely upon negative results obtained by cultural methods. As our present cultural methods do not give trustworthy evidence upon the viability of the tubercle bacillus, further work upon the subject is necessary, especially as Straus confirmed the inadequacies of such methods, particularly in obtaining first cultures of tubercle bacilli. A certain acclimatization is necessary for their ready growth upon artificial media. It is true that Kitasato claims to have seen, in some cases, inoculation into guinea pigs fail, but Straus and Park have made analogous experiments with opposite results.

THE SHORT LIFE OF CULTURES CONTRASTED WITH THE LONG LIFE UNDER UNFAVORABLE CONDITIONS.

The comparatively short life of pure cultures of the tubercle bacillus under most favorable conditions contrasts strangely with the long life claimed for the organism under unfavorable conditions. It appears that the life of the tubercle bacillus in cultures is shorter the more rapid and more luxuriant the growth.

Cornet states that serum cultures remain alive about six months; glycerin-agar cultures are often partially or wholly dead in six to eight weeks. It appears that cultures of avian tubercle retain their vegetability and pathogenic power much longer; according to Maffucci, even two years. Straus states that cultures of human tubercle are only exceptionally capable of reproduction after five to six months; after eight to twelve months they fail regularly. The virulence of the cultures likewise diminishes with age. According to Theobald Smith, tubercle cultures are usually dead after three months.

THE THERMAL DEATH POINT.

In a recent publication[a] I reported the results of my experiments upon the thermal death points of pathogenic micro-organisms in milk. Nine experiments were made with five different cultures of the bovine tubercle bacillus. The conclusion was drawn that the tubercle bacillus in milk loses its infective properties for guinea pigs when heated to 60° C. and maintained at that temperature for twenty minutes, or to 65° C. for a much shorter time.

It should be remembered that the milk in these tests was very heavily infected with virulent cultures, as indicated by the prompt death of the control animals. Milk would practically never contain such an enormous amount of infection under natural conditions. It

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[a] Hyg. Lab. Bull. No. 42, U. S. Public Health and Marine-Hospital Service. A complete review of the literature upon the subject will be found upon pp. 34–47 of the above publication.

is justifiable to assume that if 60° C. for twenty minutes is sufficient to destroy the infectiveness of such milk when injected into the peritoneal cavity of a guinea pig, any ordinary market milk after such treatment would be quite safe for human use by the mouth so far as tubercle bacilli are concerned.

It is difficult, if not impossible, to summarize the work of others upon the thermal death point of the tubercle bacillus. The following table necessarily leaves out many factors:

Showing the thermal death point of the tubercle bacillus as found by various investigators.

Investigator.	Killed at—	Not killed at—
Martin, 1882		80°.
May, 1883	By cooking	
Sormani, 1884	Boiling, 5 minutes	90° for 10 minutes.
Schill and Fisher, 1884		100°.
Voelsch, 1887		100°, boiling twice.
Yersin, 1888	60°, 10 minutes (—spores) 60°, 10 minutes (+ spores)	
Bitter, 1890	68°, 20 minutes	
Bang, 1891	70°, 5 minutes (enfeebles) 60°, 5 minutes (sometimes enfeebles) 80°, (sometimes kills) 85° (always kills)	
Bonhoff, 1892	60°, 20 minutes	50°, 60 minutes.
Grancher and Ledeux-Lebard, 1892	60°, 5 minutes (attenuates) 70°, 1 minute (kills)	
Forster, 1892	60°, 6 hours 95°, momentary	55°, 3 hours. 60°, 45 minutes. 80°, momentary.
De Man, 1893	55°, 4 hours 60°, 1 hour	60°, 45 minutes.
Schroeder, 1894	60°, 15 minutes	
Woodhead, 1895	50°, 15 hours 60°, 8 hours 60°, 45 minutes 70°, 45 minutes 70°, 2½ minutes	90° (results contradictory).
Marshall, 1899	68°, 20 minutes	60°, 10 minutes.
Th. Smith, 1899	60°, 15 to 20 minutes	
Morgenroth, 1900	55°, 3 hours	70°, 10 minutes. 100°, momentary.
Kobrak, 1900	50°, 4 hours	
Beck, 1900	100°, 3 hours	100° 80°, 30 minutes.
Galtier, 1900		85°, 6 minutes.
Russell and Hastings, 1900	60°, 20 minutes	
Herr, 1901	65°, 15 minutes	80°, 5 seconds.
Hesse, 1901	60°, 20 minutes	
Levy and Bruns, 1901	65°, 15 minutes	
Barthel and Stenström, 1901		70°, 15 minutes.
Bang, 1902		60°, 15 minutes.
Tjaden, 1903	85°, 1 to 2 minutes	
Rullmann, 1903	65°, 30 minutes	60°, 20 minutes.
Barthel and Stenström, 1904	80°, 1 minute (uncoagulated)	80°, 1 minute (coagulated).
Russell and Hastings, 1904	71°, 1 minute	
Zelenski, 1906		76°, 20 minutes.
Rosenau, 1907	60°, 20 minutes	

The above tabular statement shows that my results agree with the work of Yersin, Bonhoff, Schroeder, Th. Smith, Russell and Hastings, and Hesse in that 60° C. for twenty minutes and less is sufficient to kill the tubercle bacillus.

I am now conducting a further series of experiments upon the thermal death point of the tubercle bacillus in butter and milk, naturally and artificially infected, and while this work is not yet completed, the indications again are that 60° C. for twenty minutes is quite sufficient to kill the organism under these conditions.

VIABILITY IN DRIED SPUTUM.

There seems to be a general agreement that the tubercle bacillus may remain alive and virulent in dried sputum for several months. Stone's unusual figure of three years does not stand the light of criticism. The main point established, however, is that the tubercle bacillus may survive in sputum after it dries and is reduced to dust, so that its inhalation may be a danger—how much of a danger depends upon other questions not yet solved.

It is well known that when nonspore-bearing bacteria are dried all but a few soon perish; but these few sometimes survive for unusually long periods of time. This rule probably holds in the case of the tubercle bacillus, but unfortunately we have no quantitative method of determining the number of tubercle bacilli remaining alive. The survival of a few bacilli which are virulent for experimental animals when injected in enormous quantities (as is usually done in laboratory work) would not necessarily mean that human beings are in very great danger from such material under natural conditions.

The following is a tabular abstract of the literature upon the viability of the tubercle bacillus dried in sputum:

Dried tuberculous sputum under different conditions.

Author.	Conditions.	Not killed.	Killed.
Villamin, 1869	Dried tuberculous sputum	Several hours.	
Koch, 1882	do	8 weeks	
Malassez and Vignal, 1883	Alternate drying and moistening eight times of tuberculous sputum.	12 days	
Schill and Fischer, 1884	Sputum containing tubercle bacilli with "spores" dried on glass plates.	126 days	179 days.
	Same, without "spores"	186 days	226 days.
De Thoma, 1886	Dried tuberculous sputum		10 months.
Sormani, 1886	do	2 months	Virulence decreases after 2 months.
	Same, on linen	6 months	Virulence lost at end of 4 months.
Cadéac and Malet, 1888	Pieces dried tuberculous lung on paper exposed in laboratory.	43 days	102 days.
	Dried tuberculous lung allowed to decompose in outer air.	76 days	
	do	80 days	
	do	150 days	After 150 days.
De Souza, 1889	Dried walls of cavities insufflated; caused tuberculosis in 12 of 14 guinea pigs; time of drying not stated.		
Galtier, 1889	Dried tuberculous "material" exposed to air and light at 30° C.	38 days	After 30 days.
	Same, at room temperature	30 days	Do.
Feltz, 1890	Dried tuberculous sputum in road dust, exposed to weather.	Over 7 months	
	Same, exposed to sun	About 140 days	
	Dried sputum in rooms	7 to 9 months	
Sawizky, 1891	Tuberculous sputum dried under ordinary conditions of living rooms.	2½ months	
Stone, 1891	Dried tuberculous sputum	3 years	
Ransome and Delepine, 1894	Tuberculous sputum exposed in watch glasses to:		
	(*a*) Air and light 4 days, then 15 days in the dark.	19 days	
	(*b*) Air and darkness 8 days, then 11 days in darkness.		19 days.
	(*c*) Close cupboard 19 days	19 days	

Dried tuberculous sputum under different conditions—Continued.

Author.	Conditions.	Not killed.	Killed.
Hill, 1903	Tuberculous sputum exposed on glass rods in drying box to diffused daylight and slow diffusion of air.		16 days.
Cadéac, 1905	Tuberculous sputum spread on glass, exposed to air and light.	2 days 4 days 6 days	4 days. 6 days. 10 days.
	Tuberculous sputum in thick layers dried on marble slab.		14 days.
Twitchell, 1905	Tuberculous sputum	Produced lesions at end of:	No lesion after:
	In paraffined bottles in dark moist box.	170 days	188 days.
	In paraffined bottles in dark closet	160 days	188 days.
	In paraffined bottles in diffused light	124 days	175 days.
	In paraffined bottles in thermostat	33 days	100 days.
	Cotton stoppered bottles, in dark moist box.	157 days	172 days.
	Cotton stoppered bottles, in dark closet.	100 days	141 days.
	On ice	102 days	153 days.
	On handkerchief	70 days	110 days.
	On towel	70 days	110 days.
	On carpet	39 days	70 days.
	In sand, in moist light place	123 days	148 days.
	In sand, in dry light place	30 days	70 days.
	In open bottles, out doors, winter	110 days	132 days.
Sormani, 1906	Dried tuberculous excretion at 35°C	15 days	
Rickards, Slack, and Arms, 1908.	Dried tuberculous sputum in tenement house:		
	(*a*) Sunlight and dry	Experiments under way.	
	(*b*) Diffused light and dry	1 month	
	(*c*) Dark and dry	85 days	
	(*d*) Dark and damp basement	Experiments under way.	

THE EFFECT OF SUNLIGHT.

Koch's dictum that direct sunlight kills the tubercle bacillus within a few minutes to several hours has been confirmed by all workers except Feltz. The time required depends upon the brightness of the ray, the time of the year, the latitude, the temperature, the thickness and opacity of the layers, the medium in which the bacilli are embedded, and other conditions.

This action of light corresponds to the well-known germicidal power of the ultra violet rays of the spectrum upon other nonspore-bearing bacteria, and must play an important rôle in diminishing the danger from tuberculous sputum and dust out of doors and in sunny rooms.

The following table gives the data in brief upon the subject:

Effect of direct sunlight upon the tubercle bacillus.

Author.	Conditions.	Not killed.	Killed.
Koch, 1890	Tubercle bacilli		Few minutes to several hours.
Feltz, 1890	Tuberculous sputum in road dust exposed to sun.	About 140 days.	
Ransome and Delepine, 1894	Pure culture dried on paper in thin layers.		12¼ hours.
Migneco, 1895	Tuberculous sputum on linen and woolen cloth.		24 to 30 hours; virulence diminishes in 10 to 15 hours.
Gardiner, 1898	Tuberculous sputum on:		
	Sand	1¾ hours.	
	Stone	2 hours 5 minutes.	
	Wood	24 hours (localized tuberculosis).	
Mitchell and Crouch, 1900	Tuberculous sputum placed upon sterilized soil.	35 hours; virulence diminished after 20 hours.	45 hours.
Jousset, 1900	Tuberculous sputum, exposed to dust and sunlight.		4 hours.
Annett, 1903	Dried muco-purulent sputum in small masses about size of one expectoration.	2 to 24 hours.	48 hours.
Cadéac, 1905	Tuberculous sputum on a board		24 hours.
	Tuberculous sputum on glass plates exposed to artificial light.	24 hours	48 hours.
Twitchell, 1905	Tuberculous sputum exposed to direct sun rays.	1 hour	7 hours.
Di Donna, 1907	Pure cultures	6 days	8 days.
Koch, 1890	Cultures of tubercle bacilli exposed to dispersed daylight near window.		5 to 7 days.
Ransome and Delepine, 1894	Pure culturers dried on paper in thin layers, exposed to air and light.		4 days.
	Same exposed to sunlight		12¼ hours.

THE TUBERCLE BACILLUS IN WATER.

The tubercle bacillus may probably live and remain virulent in water for several months. We have indications of this in the work of Straus and Dubarry, 1899; Muschold, 1900; Galtier, 1889; Chantemesse and Widal, 1888; and Cadéac and Malet, 1888.

Since the danger of ingesting the tubercle bacillus is now well established, its presence in drinking water assumes a special significance. Tuberculous cattle, as well as tuberculous individuals, discharge large numbers of tubercle bacilli in their dejecta. Sewage-polluted water used for drinking purposes may, therefore, harbor dangers other than the intestinal order of diseases, such as typhoid, cholera, etc. Dixon found acid-fast organisms morphologically resembling the tubercle bacillus in the sewage from hospitals in Philadelphia. Sedgwick and MacNutt,[a] 1908, have examined the theorem first enunciated by Hiram F. Mills and others, but first definitely formulated and published by Allen Hazen, that "for

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[a] Sedgwick, W. T., and MacNutt, Scott: Typhoid fever and the purification of public water supplies. Science, vol. 27, Aug. 14, 1908, p. 215.

every death from typhoid fever avoided by the purification of public water supplies two or three deaths are avoided from other causes." Sedgwick and MacNutt studied the influence of the purification of polluted water supplies in Lowell and Lawrence, Mass., compared with similar data for Manchester, N. H. The theorem was proved true not only for the cities mentioned, but also for certain other cities, including Hamburg, Germany. Among the causes other than typhoid fever for which the death rates are diminished pulmonary tuberculosis, pneumonia, and infant mortality are prominent. The occurrence and the viability of the tubercle bacillus in water, therefore, becomes a fertile field for research.

The following is a brief abstract of the work done to date upon the subject:

Tubercle bacillus in water, putrefaction and miscellaneous.

Author.	Conditions.	Not killed.	Killed.
Sormani, 1886	Tubercle bacillus in water	12 months attenuated.	
Straus and Dubarry, 1899	Tubercle cultures in water of the river Ourcq:		
	At 20° C	27 days	
	At 38° C	95 days	
	At 35° C	30 days	
	Tubercle cultures in distilled water:		
	At 30° C	24 days	
	At 38° C	115 days	
	At 35° C	25 days	
Galtier, 1889	Tuberculous spleen in water, 3° to 8° C	17 days	
	Tuberculous products of pigs and cows in running and stagnant water; 17°, 13°, 0° C.	14 days	
	Tuberculous products of cow in running water; 4° to 10° C.	2 months	
Muschold, 1900	Tuberculous sputum in water, sewage, etc.	A number of months.	
	In sewage polluted water	6 months	
Cadéac and Malet, 1888	Tuberculous lung, buried	77 days	
		124 days	
		159 days	
		167 days	Results negative after 167 days.
	Fragment of tuberculous lung in running water.	25 days	
	Piece of tuberculous lung in bowl of water exposed on outer window sill.	76 days	
	Piece of tuberculous lung in bowl of water exposed on outer window sill.	120 days	150 days.
	Tuberculous lung triturated with water, exposed to air in bowl.	16 days	67 days.
Lösener	Tuberculous organs placed in cadavers of hogs and buried.	3 months	4 months.
Hance, 1898	Tuberculous sputum, kept fluid in well-corked bottle.		17 months.
Kirstein, 1905	Dust from papers and books infected with fine spray containing tubercle bacilli.	8 days	4 months.
	Sputum dust	4 days	7 months.
	Cloth fibers containing tubercle bacilli	5 days	10 months.
	Street dust containing tubercle bacilli	3 days	8 months.
Petri, 1890	Portions of exhumed human bodies	3 months	
Schotellius, 1890	Buried phthisical lungs	Several years	

SUMMARY.

We have no easy method of determining the death of the tubercle bacillus; its virulence fades before it dies. The criterion of death depends upon animal experimentation.

The tubercle bacillus may be classed with the nonspore-bearing organisms so far as its viability is concerned.

It is doubtful whether the waxy substance protects the bacillus against external harmful influences to any unusual extent.

The thermal death point is 60° C. for twenty minutes. This is much less than was once considered.

Further work upon the viability of the dried tubercle bacillus in dust, sputum, etc., may change our views as to its hardiness and danger under these conditions.

The comparative short life upon artificial culture media contrasts strangely with the long life claimed for it under unfavorable conditions.

Failure to recognize the lesions produced by the dead tubercle bacillus is responsible for some of the false conclusions reached by experimenters upon this subject.

In all cases where the lesions in the test animal are doubtful, inoculations into secondary animals are necessary to determine whether we are dealing with living or dead tubercle bacilli.

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HYGIENIC LABORATORY BULLETINS OF THE PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

The Hygienic Laboratory was established in New York, at the Marine Hospital on Staten Island, August, 1887. It was transferred to Washington, with quarters in the Butler Building, June 11, 1891, and a new laboratory building, located in Washington, was authorized by act of Congress, March 3, 1901.

The following *bulletins* [Bulls. Nos. 1–7, 1900 to 1902, Hyg. Lab., U. S. Mar.-Hosp. Serv., Wash.] have been issued:

*No. 1.—Preliminary note on the viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 2.—Formalin disinfection of baggage without apparatus. By M. J. Rosenau.

*No. 3.—Sulphur dioxid as a germicidal agent. By H. D. Geddings.

*No. 4.—Viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 5.—An investigation of a pathogenic microbe (*B. typhi murium* Danyz) applied to the destruction of rats. By M. J. Rosenau.

*No. 6.—Disinfection against mosquitoes with formaldehyde and sulphur dioxid. By M. J. Rosenau.

No. 7.—Laboratory technique: Ring test for indol, by S. B. Grubbs and Edward Francis; Collodium sacs, by S. B. Grubbs and Edward Francis; Microphotography with simple apparatus, by H. B. Parker.

By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

Since the change of name of the Service the bulletins of the Hygienic Laboratory have been continued in the same numerical order, as follows:

*No. 8.—Laboratory course in pathology and bacteriology. By M. J. Rosenau (Revised edition, March, 1904.)

*No. 9.—Presence of tetanus in commercial gelatin. By John F. Anderson.

No. 10.—Report upon the prevalence and geographic distribution of hookworm disease (uncinariasis or anchylostomiasis) in the United States. By Ch. Wardell Stiles.

*No. 11.—An experimental investigation of *Trypanosoma lewisi*. By Edward Francis.

*No. 12.—The bacteriological impurities of vaccine virus; an experimental study. By M. J. Rosenau.

*No. 13.—A statistical study of the intestinal parasites of 500 white male patients at the United States Government Hospital for the Insane; by Philip E. Garrison, Brayton H. Ransom, and Earle C. Stevenson. A parasitic roundworm (*Agamomermis culicis* n. g., n. sp.) in American mosquitoes (*Culex sollicitans*); by Ch. Wardell Stiles. The type species of the cestode genus *Hymenolepis;* by Ch. Wardell Stiles.

No. 14.—Spotted fever (tick fever) of the Rocky Mountains: a new disease. By John F. Anderson.

No. 15.—Inefficiency of ferrous sulphate as an antiseptic and germicide. By Allan J. McLaughlin.

*No. 16.—The antiseptic and germicidal properties of glycerin. By M. J. Rosenau.

*No. 17.—Illustrated key to the trematode parasites of man. By Ch. Wardell Stiles.

*No. 18.—An account of the tapeworms of the genus *Hymenolepis* parasitic in man, including reports of several new cases of the dwarf tapeworm (*H. nana*) in the United States. By Brayton H. Ransom.

*No. 19.—A method for inoculating animals with precise amounts. By M. J. Rosenau.

*No. 20.—A zoological investigation into the cause, transmission, and source of Rocky Mountain "spotted fever." By Ch. Wardell Stiles.

No. 21.—The immunity unit for standardizing diphtheria antitoxin (based on Ehrlich's normal serum). Official standard prepared under the act approved July 1, 1902. By M. J. Rosenau.

*No. 22.—Chloride of zinc as a deodorant, antiseptic, and germicide. By T. B. McClintic.

*No. 23.—Changes in the Pharmacopœia of the United States of America. Eighth Decennial Revision. By Reid Hunt and Murray Galt Motter.

No. 24.—The International Code of Zoological Nomenclature as applied to medicine. By Ch. Wardell Stiles.

No. 25.—Illustrated key to the cestode parasites of man. By Ch. Wardell Stiles.

No. 26.—On the stability of the oxidases and their conduct toward various reagents. The conduct of phenolphthalein in the animal organism. A test for saccharin, and a simple method of distinguishing between cumarin and vanillin. The toxicity of ozone and other oxidizing agents to lipase. The influence of chemical constitution on the lipolytic hydrolysis of ethereal salts. By J. H. Kastle.

*No. 27.—The limitations of formaldehyde gas as a disinfectant with special reference to car sanitation. By Thomas B. McClintic.

*No. 28.—A statistical study of the prevalence of intestinal worms in man. By Ch. Wardell Stiles and Philip E. Garrison.

*No. 29.—A study of the cause of sudden death following the injection of horse serum. By M. J. Rosenau and John F. Anderson.

No. 30.—I. Maternal transmission of immunity to diphtheria toxine. II. Maternal transmission of immunity to diphtheria toxine and hypersusceptibility to horse serum in the same animal. By John F. Anderson.

No. 31.—Variations in the peroxidase activity of the blood in health and disease. By Joseph H. Kastle and Harold L. Amoss.

No. 32.—A stomach lesion in guinea pigs caused by diphtheria toxine and its bearing upon experimental gastric ulcer. By M. J. Rosenau and John F. Anderson.

No. 33.—Studies in experimental alcoholism. By Reid Hunt.

No. 34.—I. *Agamofilaria georgiana* n. sp., an apparently new roundworm parasite from the ankle of a negress. II. The zoological characters of the roundworm genus *Filaria* Mueller, 1787. III. Three new American cases of infection of man with horsehair worms (species *Paragordius varius*), with summary of all cases reported to date. By Ch. Wardell Stiles.

*No. 35.—Report on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle. (Including articles contributed by Ch. Wardell Stiles, Joseph Goldberger, and A. M. Stimson.)

No. 36.—Further studies upon hypersusceptibility and immunity. By M. J. Rosenau and John F. Anderson.

No. 37.—Index-catalogue of medical and veterinary zoology. Subjects: Trematoda and trematode diseases. By Ch. Wardell Stiles and Albert Hassall.

No. 38.—The influence of antitoxin upon post-diphtheritic paralysis. By M. J. Rosenau and John F. Anderson.

No. 39.—The antiseptic and germicidal properties of solutions of formaldehyde and their action upon toxines. By John F. Anderson.

No. 40.—1. The occurrence of a proliferating cestode larva (*Sparganum proliferum* in man in Florida, by Ch. Wardell Stiles. 2. A reexamination of the type specimen of *Filaria restiformis* Leidy, 1880=*Agamomermis restiformis*, by Ch. Wardell Stiles. 3. Observations on two new parasitic trematode worms: *Homalogaster philippinensis* n. sp., *Agamodistomum nanus* n. sp., by Ch. Wardell Stiles and Joseph Goldberger.

4. A reexamination of the original specimen of *Tænia saginata abietina* (Weinland, 1858), by Ch. Wardell Stiles and Joseph Goldberger.

*No. 41.—Milk and its relation to the public health. By various authors.

No. 42.—The thermal death points of pathogenic micro-organisms in milk. By M. J. Rosenau.

No. 43.—The standardization of tetanus antitoxin (an American unit established under authority of the act of July 1, 1902). By M. J. Rosenau and John F. Anderson.

No. 44.—Report No. 2 on the origin and prevalence of typhoid fever in the District of Columbia, 1907. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle.

No. 45.—Further studies upon anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 46.—*Hepatozoon perniciosum* (n. g., n. sp.); a hæmogregarine pathogenic for white rats; with a description of the sexual cycle in the intermediate host, a mite (*lelaps echidninus*). By W. W. Miller.

No. 47.—Studies on Thyroid: I. The relation of iodine to the physiological activity of thyroid preparations. By Reid Hunt and Atherton Seidell.

No. 48.—The physiological standardization of digitalis. By Charles Wallis Edmunds and Worth Hale.

No. 49.—Digest of comments on the United States Pharmacopœia. Eighth decennial revision for the period ending December 31, 1905. By Murray Galt Motter and Martin I. Wilbert.

No. 50.—Further studies upon the phenomenon of anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 51.—Chemical tests for blood. By Joseph H. Kastle.

No. 52.—Report No. 3 on the origin and prevalence of tyhpoid fever in the District of Columbia (1908). By M. J. Rosenau, Leslie L. Lumsden, and Joseph H. Kastle.

No. 53.—The influence of certain drugs upon the toxicity of acetanilide and antipyrine. By Worth Hale.

No. 54.—The fixing power of alkaloids on volatile acids and its application to the estimation of alkaloids with the aid of phenolphthalein or by the Volhard method. By Elias Elvove.

No. 55.—Quantitative pharmacological studies: adrenalin and adrenalin-like bodies. By W. H. Schultz.

No. 56.—Milk and its relation to the public health. (Revised edition of Bulletin No. 41.) By various authors.

No. 57.—I. The presence of tubercle bacilli in the circulating blood in clinical and experimental tuberculosis. By John F. Anderson. II. The viability of the tubercle bacillus. By M. J. Rosenau.

In citing these bulletins, beginning with No. 8, bibliographers and authors are requested to adopt the following abbreviations: Bull. No. ——, Hyg. Lab., U. S. Pub. Health & Mar. Hosp. Serv., Wash., pp.——.

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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

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HYGIENIC LABORATORY.—BULLETIN No. 58
DECEMBER, 1909

DIGEST OF COMMENTS
ON THE
PHARMACOPŒIA OF THE UNITED STATES OF AMERICA
[*EIGHTH DECENNIAL REVISION*]
AND THE NATIONAL FORMULARY
[*THIRD EDITION*]

FOR THE CALENDAR YEAR ENDING DECEMBER 31
1906

BY
MURRAY GALT MOTTER
AND
MARTIN I. WILBERT

WASHINGTON
GOVERNMENT PRINTING OFFICE
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PREFACE.

The calendar year covered by the present bulletin was one of unusual interest and activity in matters relating to the Pharmacopœia of the United States. The enactment of "The Food and Drugs Act, June 30, 1906," followed, as it was, by the signing of the "Agreement between the United States and other Powers respecting the unification of the Pharmacopœial formulas" by a diplomatic representative of the United States Government, involves the evolution of an independent, more or less local, and purely academic book into an officially recognized legal standard, for the development of which the Federal Government itself has by treaty incurred obligations which are international in character.

The recognition of the Pharmacopœia of the United States and of the National Formulary as the legal standards under the provisions of The Food and Drugs Act, June 30, 1906, the importance of pure drugs in the development and maintenance of the public health, and the tremendous financial interests involved in the manufacture and sale of medicinal agents, present a problem that will require careful study and a maximum amount of disinterested information.

If the Pharmacopœia of the United States is to maintain its present status as the official standard for determining the purity and strength of widely used medicaments, it would appear desirable that the greatest possible amount of consideration be given to practices in other countries, and an effort has been made in the present series of comments to collate from foreign pharmaceutical and chemical journals such data as relate to the articles official in the U. S. P. and those widely used in this country.

The need for the compilation of this material from foreign journals and the consideration of the contents of foreign pharmacopœias is further emphasized by the treaty negotiated by a diplomatic representative of the United States Government in signing the "Agreement between the United States and other Powers respecting the unification of the Pharmacopœial formulas for potent drugs" at Brussels, November 29, 1906.

On that occasion the Government of the United States formulated a reservation stating that:

> The Government of the United States does not assume, by the fact of signing the present Agreement, any other obligation beyond that of exercising its influence in order that, at the next revision of the American Pharmacopœia, the latter may be brought into harmony with the said Agreement.

It is probably true that with a pharmacopœia owned and controlled, as the Pharmacopœia of the United States is, by representatives of the professions more directly interested, the government of the country could exercise its influence in no better way than by the collection and publication of facts bearing on the need for taking cognizance of practices in foreign countries and the desirability of bringing our own standards into harmony with generally accepted standards in other portions of the world.

The same reasoning would appear to hold good, so far as the need for improving the Pharmacopœia and the National Formulary as standards under The Food and Drugs Act, June 30, 1906, is concerned. For this purpose it must appear evident that the convention, and through it the Committee of Revision of the Pharmacopœia, should bear in mind the need of efficient and active medicaments for the conservation of the public health, without losing sight of the desirability of equitable standards from an economic point of view.

Few features of national pharmacopœias are more irksome to the student or more likely to mislead the medical practitioner than variations in official nomenclature, and the possibility that the same title may be applied to widely different substances. As pointed out in the abstracts under the heading "Nomenclature," on page 31, this has attracted considerable attention abroad, and those who are familiar with the early editions of the Pharmacopœia of the United States will recall that some of the earlier revision committees also paid considerable attention to this subject.

The present-day catholicity of medical literature and the rapidity with which medical discoveries become public property would serve to indicate that some concerted attempt should be made to correct existing abuses in connection with the variability of the Latin titles of official articles.

At the meeting of the American Pharmaceutical Association in Hot Springs, Ark., September 7 to 12, 1908, the following resolution was adopted:

> *Resolved*, That the Council of the American Pharmaceutical Association request the Surgeon-General of the United States Public Health and Marine-Hospital Service to include in the Digest of Comments on the United States Pharmacopœia, now under way, a report of "Comments on the National Formulary" and that the general secretary be requested to send Surgeon-General Wyman a copy of this resolution.

In view of the fact that the Hygienic Laboratory of the Public Health and Marine-Hospital Service is by law charged with the study of matters relating to public health, and the acknowledged importance of medicaments in the prevention and cure of diseases, and in view of the fact that the National Formulary is recognized, by The

Food and Drugs Act, June 30, 1906, and by a number of state laws, as the equal of the Pharmacopœia of the United States as a standard for the medicaments described, the Surgeon-General, with the approval of the Secretary of the Treasury, agreed to accede to this request and to publish the material in a common volume as "Comments on the Pharmacopœia and National Formulary."

As in the comments for the year 1905, embodied in Bulletin No. 49, purely commendatory notices have not been included because they have little or no value as incentives to research or investigation. The value of a compilation of comments on the officially recognized standards must be largely in the direction of recognizing shortcomings to be corrected and errors to be eliminated.

As an indication of the conditions now existing, it has been thought advisable to take cognizance of the reports of state boards of health, the committees on adulteration of the several pharmaceutical associations, and of such annual laboratory reports of manufacturing concerns and wholesale dealers as were available. These reports, in addition to calling attention to the kind of adulteration and substitution now in vogue, also go to show the need for constant watchfulness on the part of the pharmacist, and the physicians' imperative need of assurance that their sources of supply for medicaments are controlled in an efficient and honest manner.

As the work of compiling these comments progresses it becomes increasingly evident that the resulting material will be of inestimable value as a source of information regarding the correction of standards and also, to no less degree, as an indication of the uses, or the usefulness of the several articles included in the Pharmacopœia of the United States and the National Formulary. The reports on the usefulness of an official article, considered with reference to their source and the frequency of their occurrence, should be a valuable indication of the right of an article to continued official recognition.

In this same connection it will no doubt be interesting to learn that the abstracts from eclectic and homœopathic journals indicate that many, if not all, of the more important pharmacopœial medicaments are mentioned quite as frequently in the pages of these journals as in the pages of the journals of the so-called regular medical practitioner; moreover, there is, in the matter of dosage, no such distinction between the several schools as tradition would lead one to expect.

In reviews of Bulletin 49 it has been suggested that an additional use to which these comments on the pharmacopœia might be put is in connection with the teaching of materia medica in medical and pharmaceutical colleges. The several bulletins will afford an extensive bibliography of official substances, and this feature should be of value to teachers of materia medica in keeping their literature up to date.

The difficulties mentioned in Bulletin 49, in connection with securing access to representative files of pharmaceutical and chemical periodicals, have not as yet been overcome. The local libraries, while perhaps second to none in some departments, appear to be quite deficient in matters relating to pharmacy and pharmaceutical chemistry.

Through the courtesy of the librarians of the Philadelphia College of Pharmacy, the Philadelphia College of Physicians, the Franklin Institute, Philadelphia, and the University of Wisconsin, the compilers have had access to a number of periodicals not on file in the city of Washington. Even with these several libraries to draw from, however, they have failed to find a number of representative foreign journals. Thus they have been unable to find a file of the Pharmaceutisch Weekblad for 1906, one of the acknowledged authorities in pharmaceutic matters, and a journal in which many of the best pharmacists in Holland and northern Europe generally publish their work.

In addition to the libraries enumerated above, the thanks of the compilers are due to the librarians of the United States Department of Agriculture, the Office of the Surgeon-General, U. S. Army, and the Library of Congress for uniform courtesy and many kindnesses in connection with the loan of files of the several periodicals consulted.

Dr. Robert A. Hatcher, professor of pharmacology, Cornell University, New York, while temporarily connected with the Hygienic Laboratory, United States Public Health and Marine-Hospital Service, compiled many of the abstracts from the regular medical publications and otherwise assisted in the preparation of this bulletin.

In conclusion, the compilers would again call attention to the fact that they have endeavored to collect all of the available suggestions without comment and would reiterate the statement made in the preface of Bulletin 49 that while they appreciate the fact that many of the suggestions and claims here presented are not practicable, they are nevertheless valuable in that they are suggestions and serve to emphasize the care that must be exercised in the final utilization of these suggestions in connection with the revision of the National standards.

They also wish to express their appreciation of the shortcomings of the compilation as presented and to assure members of the medical and pharmaceutical professions that, in so far as they may be able, they will endeavor to profit by any suggestions that may be offered for improving the style or the content of future bulletins.

M. I. W.
M. G. M.

DIVISION OF PHARMACOLOGY,
HYGIENIC LABORATORY,
September 1, 1909.

LIST OF THE LITERATURE REVIEWED.

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Am. Druggist, N. Y.—American Druggist and Pharmaceutical Record, New York, 1906, v. 48, 49.

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Monatsh. f. Chem. Wien—Monatshefte für Chemie, Wien, 1906, v. 27.
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Pharm. Ztg., Berl.—Pharmazeutische Zeitung, Berlin, 1906, v. 51.
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2. TITLE ABBREVIATIONS—PHARMACOPŒIAS AND NON-OFFICIAL STANDARDS.

Ph. Austr. VIII.—Pharmacopoea Austriaca, editio octava, 1906.
Ph. Belg. III.—Pharmacopœia Belgica, editio tertia, 1906.
Ph. Brit. IV.—British Pharmacopoea, 1898.
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Ph. Fr. V.—Codex Medicamentarius Gallicus, Pharmacopée Française, 1908.
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Ph. Helv. IV.—Pharmacopoea Helvetica, editio quarta, 1907.
Ph. Hisp. VII.—Farmacopea oficial española, séptima edición, 1905.
Ph. Hung. II.—Pharmacopoea Hungarica, editio secunda, 1888.
Ph. Ital.—Farmacopoea ufficiale del regno d'Italia, 1892.
Ph. Japon. III.—Pharmacopoea Japonica, 1906 (English Translation, 1907).
Ph. Ndl. IV.—Pharmacopoea Nederlandica, editio quarta, 1905.
Ph. Norv. III.—Pharmacopoea Norwegica, editio tertia, 1895.
Ph. Port.—Pharmacopoea Portugueza, 1876.
Ph. Rom. III.—Pharmacopoea Romana, editio tertia, 1893.
Ph. Russ. IV.—Pharmacopoea Rossica, editio quarta, 1891.
Ph. Svec. IX.—Svenska Farmakopén (Pharmacopoea Svecica, ed. IX), 1908.
U. S. P. VIII.—Pharmacopœia of the United States of America, 8th Dec. Rev., 1905.

N. F. III.—The National Formulary of Unofficial Preparations, Baltimore, 1906.
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DIGEST OF COMMENTS ON THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA VIII, AND ON THE NATIONAL FORMULARY III.

1. GENERAL COMMENTS.

1. LEGAL STATUS AND DEVELOPMENT.

1. PURE FOOD AND DRUG LAW.

Wiley, H. W., discusses the scope of the Federal Food and Drugs Act, June 30, 1906, and points out that this act introduces for the first time into this country a national control over interstate and foreign commerce in foods and drugs. Two standards for drugs entering into interstate commerce are specifically noted in the act—namely, standards set forth or indicated in the United States Pharmacopœia and the National Formulary; second, standards which are placed on the drugs themselves. Under the terms of the act it appears that any drug bearing a name recognized in the U. S. P. or the N. F. shall be held to conform in strength and purity to the standards therein established or indicated, whether they are marked U. S. P. or N. F. or not.—N. York M. J., 1906, v. 48, pp. 1233–1234.

Circular No. 21, Bureau of Chemistry, United States Department of Agriculture, includes the law and rules and regulations for the enforcement of the food and drugs act and a reprint of the Food and Drugs Act, June 30, 1906. Some additional decisions bearing on the enforcement of the food and drugs act are published in circular form as Food Inspection Decisions, 40–48, for 1906.

Wilbert, M. I., comments on the Food and Drugs Act and points out that this law holds that drugs shall be deemed adulterated:

First. If, when a drug is sold under or by a name recognized in the United States Pharmacopœia or National Formulary, it differs from the standard of strength, quality, or purity as determined by the tests laid down in the United States Pharmacopœia or National Formulary official at the time of investigation: *Provided*, That no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality, or purity be plainly stated upon the bottle, box, or other container thereof, although the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

Second. If its standard or purity fall below the professed standard or quality under which it is sold.

An article, in case of drugs, shall also be deemed to be misbranded:

First. If it be an imitation of or offered for sale under the distinctive name of another article.

Second. If the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such package, or if the package fail to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any of such substances contained therein.—Am. J. Pharm., Phila., 1906, v. 78, pp. 428–432.

Wiley, H. W., discusses the use of preservatives in foods and the need for legislation regulating the production and sale of foods and drugs. He quotes at some length from an official document entitled, "Hearings before the Committee on Interstate and Foreign Commerce of the House of Representatives on the Pure Food bills H. R. 3044, 4527, 7018, 12071, 13086, 13853, and 13859."—*Ibid.*, pp. 153–169.

Beal, J. H., presents a synopsis, with comments, of the principal provisions of the Federal Pure Food and Drugs Law.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 202–215.

Patch., E. L., believes that this legislation is along the lines of a higher civilization and greater public safety.—*Ibid.*, v. 54, p. 331.

An editorial discussing laws governing the quality of drugs points out that the Food and Drugs Act of June 30, 1906, has been indorsed by all branches of the drug trade and that apart from the imperfections of our pharmacopœia which are expected will be corrected no difficulties will be encountered in the enforcement of the law.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 387–388.

Schimmel & Co., in discussing the Food and Drugs Law, June 30, 1906, say:

> This kind of legislation is surely in the right direction, and it is to be hoped that said law will be rigidly enforced. The standard for raw materials entering into food products, drugs, and medicines to be imported into the U. S. will surely be raised to a preeminent degree, and it is to be expected that the employment of pure essential oil and related articles which we have advocated in these reports for so many years will now become predominant.—Semi-Ann. Rep., 1906, Oct.–Nov., p. 7.

An editorial discusses the sections of the Food and Drugs Law, referring particularly to drugs, and says:

> Properly enforced, it is capable of bringing about great good to the drug trade and to the public. Unwisely executed, it may prove even a greater nuisance than the war revenue law of 1898.—New Idea., Detroit, 1906, v. 28, pp. 166–168.

Oldberg, Oscar, in discussing the adoption of the U. S. P. and N. F. as standards by the Food and Drug Law, says:

> This recognition of the pharmacopœia and the formulary should prompt us in the future revisions of these two works to carefully consider their added importance.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 123.

An editorial comments on the provisions of the Food and Drugs Law, and asks:

> Will the sale of articles, containing stated amounts of alcohol, by pharmacists be permitted except they take out rectifier's licenses? The rules of the Internal Revenue Department require this.—Am. Druggist, N. Y., 1906, v. 49, p. 1.

A news item presents a review of pure drug legislation and recounts a number of reasons for the enactment of the so-called narcotic provisions of the Food and Drugs Laws.—Oil, Paint, and Drug Rep., 1906, v. 70, July 9, p. 9.

Hallberg, C. S. N., asserts that section 7 of the Pure Food and Drugs Act, June 30, 1906, because of the variation permitted, will make a farce of the law and render it worse than useless because of the false security its passage has engendered.—Western Druggist, 1906, v. 28, p. 480.

A number of opinions from members of the wholesale drug trade are offered on the enactment of the Food and Drugs Act. The sentiment appears to be uniformly friendly to the act, and the general consensus is that its practical working will be found to entail little, if any, hardship to any branch of the trade.—*Ibid.*, v. 28, pp. 725–733.

A circular relating to the Rules and Regulations on the Food and Drugs Act, sent to members of the National Wholesale Druggists' Association, is reprinted.—Drug Topics, N. Y., 1906, v. 21, pp. 355–356.

An abstract discusses the dangers, indefiniteness, and incongruities of the Pure Food and Drugs Law.—Nat. Druggist, St. Louis, 1906, v. 36, pp. 277–279.

An unsigned article comments on the rules and regulations adopted for the enforcement of the Food and Drugs Act.—*Ibid.*, v. 36, pp. 351–356.

Hinrichs, Gustavus D., discusses the relations of the U. S. P. VIII, and the Food and Drugs Act of June 30, 1906, and makes some rather positive statements in connection therewith.—*Ibid.*, v. 36, pp. 403–404.

An editorial calls attention to the publication, in another column, of the Food and Drugs Act of June 30, 1906, and points out that the ethical principles which underlie this law are of the utmost importance and are now firmly established in national legislation. The law itself is said to be better in every respect than its most ardent supporters could reasonably have expected. The law is characterized as being strong in its definitions and not very weak in its concessions, and, if properly supported, will protect our people against the evils of misbranded, adulterated, and palpable frauds in, foods and drugs.—J. Am. M. Ass., 1906, v. 47, p. 116.

An editorial calls attention to the essential features of the Food and Drugs Act and points out that it constitutes a long step toward supervision of interstate commerce in food and drugs. The regulations adopted are for the most part easy of comprehension and readily complied with by honest manufacturers.—N. York M. J., 1906, v. 84, p. 1238.

The regulations for the new Food and Drugs Law, with the complete text of the law, are reprinted.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 423–425.

The regulations promulgated by the Pure Food and Drug Commission, with the approval of the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor, are reprinted in full.—Oil, Paint, and Drug. Rep., 1906, v. 70, Oct. 22, p. 25.

Kline, Mahlon N., in the report of the Committee on Legislation of the N. W. D. A., outlines the history of pure-food legislation and particularly of the bill now in force.—*Ibid.*, v. 70, Oct. 17, p. 17.

A news item reproduces a number of questions propounded by Schieffelin and the answers that were given by Wiley in regard to some little-understood points in the rulings on the Pure Food and Drugs Act.—*Ibid.*, v. 70, Nov. 12, p. 8.

Some additional regulations bearing on the filing of guaranties, the approval of labels, and the relabelling of goods are published as a news item.—*Ibid.*, Nov. 26, p. 25.

A communication from the chairman of the Committee on Legislation of the National Wholesale Druggists' Association bearing on the regulations that have been promulgated in connection with the Pure Food and Drugs Law is reprinted.—*Ibid.*, Nov. 26, p. 54.

The text of the Food and Drugs Law is included entire.—Pharm. Era, N. Y., 1906, v. 36, pp. 101–103.

Hearings before the commission.—*Ibid.*, 294–298, 302.

Rules and Regulations for the Enforcement of the Pure Food and Drugs Law.—*Ibid.*, 388–392.

The Pure Food and Drugs Law.—Meyer Bros., Drug., St. Louis, 1906, v. 27, pp. 408–409.

Rules and Regulations for the Enforcement of the Food and Drugs Law.—*Ibid.*, pp. 348–354, 412–418.

The New York hearings on the Food and Drugs Law.—*Ibid.*, pp. 356–357.

The text of the Food and Drugs Law is reprinted.—Merck's Rep., N. Y., 1906, v. 15, p. 279.

The Rules and Regulations for the Enforcement of the Food and Drugs Law are reprinted.—*Ibid.*, 338.

An editorial points out the need for state legislation along the lines of the Federal Pure Food and Drugs Act and points out that each State is left to regulate its own internal affairs. The legislation needed is that which shall enforce the principle, "Let the label tell."—J. Am. M. Ass., v. 48, p. 365.

2. THE PHARMACOPŒIA AS A LEGAL STANDARD.

An editorial points out that pharmacists have long clamored for recognition of the pharmacopœia. Now that it is recognized legally we find that many of the standards set therein are so high as to be impracticable. In the hearing before the pure food and drug commission a committee, representing sixteen of the leading manufacturers of pharmaceutical preparations and chemicals in the United States, asserted that the standards set by the pharmacopœia are irrational and wholly impracticable.—Am. Druggist. N. Y.. 1906. v. 49. p. 159.

An editorial, in commenting on corrections and emandations of the U. S. Pharmacopœia, expresses the belief that it is a matter of serious doubt whether the pharmacopœia, to be issued with amendments and corrections January 1, 1907, will be the "official standard" or not.—Nat. Drug., St. Louis, 1906. v. 36. p. 350.

An editorial raises the question, How is the druggist to know which revision of the pharmacopœia he must take as his official guide? and cites an opinion of the supreme court of Ohio and a similar opinion by the attorney-general of Illinois to the effect that the pharmacopœia official at the time of the enactment of the law is the one intended, whereas the interpretation in New York takes that which is official at the time of construing and applying the law.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 40.

England, Joseph W., discusses the legal recognition of the U. S. P. and questions the legality of future issues unless each new issue is recognized by specific legislation.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 215–218.

Leffman, Henry, commenting on the U. S. P. as a legal standard, says:

> Its errors of omission and commission in analytic methods can be supplemented by the knowledge of the worker or by regular analytical manuals, and. as a last resort, by special circulars and journal articles; but its errors as a work of authority must stand until remedied by the parent body. I regard the work as dangerous in its legal relations * * * The manner of publication of the book gives it a factitious authority and the use of the word "official" adds to this.—Am. J. Pharm., Phila., 1906, v. 78, p. 85.

Cliffe, W. L., discussing the pharmacopœia as a legal standard, says that in the opinion of the Pennsylvania State Board of Pharmacy it is the best available standard for their purpose without framing enactments for every article; it is regarded as a standard for drugs only, not for foods.—*Ibid.*, v. 78, p. 99.

Wilbert, M. I., in discussing Leffman's paper on "The U. S. P. from the point of view of the analyst and as a legal standard," noted the fact that on September 1, 1905, the date on which the pharmacopœia became official, less than 5 per cent of the physicians and pharmacists of the country were supplied with the book.—*Ibid.*, v. 78, p. 98.

Dohme, A. R. L., contributes an article on the pharmacopœia as a legal document, in which he controverts some of the criticisms that have been made of the U. S. P., VIII.—Am. Druggist, N. Y., 1906, v. 49, p. 267.

An editorial comments on the paper presented by Dohme and points out that at least some of the suggestions regarding motives actuating the criticisms of the U. S. P. VIII are not based on fact.—*Ibid.*, p. 266.

The Department of Agriculture has republished a compilation of the several state laws showing the restrictions placed on the use and sale of adulterated or contaminated products.—Oil, Paint, and Drug Rep., 1906, v. 70, Sept. 24, p. 10.

An abstract (Hospital) expresses the opinion that it is not sufficient to say that the essential ingredient, both in quality and quantity, satisfies the official claims. All other ingredients must also satisfy these demands, and no substitutes or alteration can for a moment be defended.—Pharm. J., Lond., 1906, v. 23, p. 154.

An editorial points out that rule No. 20 of the New York State Board of Pharmacy provides that no license shall be issued for any store which is not equipped with a copy of the latest revised edition of the Pharmacopœia of the United States, or some other publication embodying its text in full, and that pharmacists in the State of New York may be deprived of their license for not complying with this rule.—Am. Druggist, N. Y., 1906, v. 48, p. 1.

3. SUPPLEMENT TO THE PHARMACOPŒIA.

At the annual meeting of the National Wholesale Druggists' Association, Albert Plaut offered a resolution bearing on the desirability of issuing pharmacopœial revision supplements. This resolution, after some discussion, was adopted in the following form:

> Whereas the United States Pharmacopœia, through the Pure Food and Drugs Law, to go into effect January 1, 1907, having acquired legal authority, it has

become necessary to revise and correct the pharmacopœia at more frequent intervals than heretofore: Be it

Resolved by the National Wholesale Druggists' Association, in annual convention assembled, That the committee on revision of the United States Pharmacopœia shall issue annually a supplement thereto, in which changes in standards and tests shall be published, so that the pharmacopœia may at all times be abreast of the latest scientific requirements.

Resolved, That this matter be referred to a special committee of five, with Thomas F. Main, of New York, as chairman, for consideration and with power to act for this association, the chairman to have authority to select his associates on the committee.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 422.

Manufacturing pharmacists and chemists, in a brief filed with the Commission on Rules and Regulations, say:

In applying the standards of the Pharmacopœia and National Formulary, it is a matter of the utmost importance that the limitations and perhaps the lack of accuracy of some official assay methods be recognized, and also of the correctness of specifications as to tests for purity and strength, as indicated by solubility, melting point, percentage of ash, etc. The assay processes and tests of the United States Pharmacopœia, eighth revision, because of their inherent limitations, because of the special skill and experience required by the analyst for their proper application, and because of their lack of accuracy in some instances, are liable to cause the commission to arrive at false conclusions. It will be found in some instances that the standards set by the pharmacopœia are irrational and wholly impracticable. Already in one or two instances it has been found necessary to make changes in the specifications, and many others will develop as we gain more experience.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 257.

Schieffelin, William Jay, urges that the commission intrusted with the enforcement of the food and drugs law request the Committee on Revision of the Pharmacopœia of the United States to correct any processes which may appear faulty and to bring the processes of assay into accord with the most modern practices and use.—Pharm. Era, N. Y., 1906, v. 36, p. 294.

An editorial comment on pure food and drugs law regulations points out that owing to the fact that the new national law recognizes the U. S. P. as the standard it is important that every U. S. P. test should be absolutely accurate. It may seem strange to question the accuracy of any test prescribed in the U. S. P., but as a matter of fact in at least one instance a certain test has been found inaccurate. There is a feeling in certain quarters that some provision should be made whereby such inaccuracies can be corrected at once, or, say, at least every year, instead of waiting until the next revision of the U. S. P.—Am. Druggist, N. Y., 1906, v. 49, pp. 109–110.

An editorial comments on the more or less complaint heard regarding the unnecessarily rigid, and sometimes unattainable, requirements of the pharmacopœia. The chairman of the U. S. P. subcommittee on alkaloidal assays, however, has recently insisted in print that the assay processes, for instance, are entirely proper and adequate in every respect, but he discloses and confesses the weakness of his argument when he takes the ground that the Government should allow greater variations in the alkaloidal standards. * * * If it is just and necessary for the Government to widen the latitude of the alkaloidal standards, why should not the pharmacopœia widen them, since it is the pharmacopœial standards by which the Government is guided? Chairman Remington announces that the pharmacopœia is to be corrected wherever necessary and a new issue printed soon after January 1.—Bull. Pharm., Detroit, 1906, v. 20, p. 488.

Remington, J. P., announces to the editors:

> The Pure Food and Drugs Law, which goes into effect on January 1, 1907, and which provides that the United States Pharmacopœia, *official at the time of the investigation*, is the standard, has created considerable activity and in many cases apprehension with regard to some of the tests contained in the pharmacopœia. I would ask you to give publicity in your columns to the following statement: "The work of revision was placed in the hands of subcommittees, which were appointed by the late Dr. Charles Rice, to deal with the different parts of the work. The work of the subcommittees was finally passed upon by the whole Committee of Revision. The latter is a continuous body, the members remaining in office until their successors are appointed in 1910, and its duties did not cease, as many suppose, with the publication of the last revision of the pharmacopœia. Since the publication of the pharmacopœia the chairman of the committee has received from various manufacturers and others suggestions for corrections here and there in the text. Most of these have been investigated or are now in process of investigation by the subcommittee in charge of that part of the work. It is the intention to carefully consider every suggested correction, to alter such part of the plates of the pharmacopœia if found necessary, and to issue after January 1, 1907, the pharmacopœia so amended."—*Ibid.*, v. 20, p. 516.

The committee of the N. W. D. A. issued the following invitation:

> Your Committee on Standards and Tests of the United States Pharmacopœia and National Formulary invites you to forward as promptly as possible information in regard to such tests or standards, including properties and solubilities, as in your opinion need correction. Criticisms of tests should be accompanied by the following data: (1) Fault found with test (specially state solubilities of articles tested); (2) manner in which test was applied; (3) suggestions as to corrections. Criticisms of standards should give reasons in detail why a change would be desirable, stating, when possible, the comparative cost of article of the present and proposed standards, bearing in mind that both U. S. P. and N. F. aim to secure a high medical efficiency at a reasonable cost. In view of the fact that the Committee on Revision of the U. S. P. is at present investigating suggestions for corrections, it is desirable that any criticisms you may have to offer should be sent to your committee at the earliest possible date.—Drug Topics, N. Y., 1906, v. 21, p. 337.

An editorial discusses the proposed revision of the U. S. P. VIII, at the instance of manufacturing pharmacists and suggests that it might be advisable to consider the wishes of the retail druggists in this same connection.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 147.

A news item gives an account of the hearing given by the Committee of Revision of the U. S. P. to manufacturers of medicinal chemicals and of pharmaceutical preparations. Upward of 200 changes were suggested.—Am. Druggist, N. Y., 1906, v. 49, pp. 346–347.

Schieffelin, W. J., is quoted as having suggested that the Committee of Revision of the U. S. P. issue supplemental notes from time to time embodying the changes and corrections agreed upon.—*Ibid.*, v. 49, p. 159.

Main, Thos. F., as chairman of the Committee on Standards and Tests of the U. S. P., VIII, and the N. F. for the N. W. D. A., calls attention to resolutions adopted relating to corrections in the U. S. P. and outlines a number of specific questions.—Nat. Druggist, St. Louis, 1906, v. 36, p. 404.

Schieffelin, W. J., is reported as suggesting that the Committee on Revision of the U. S. P. should have an expert authoritative chemical commission constantly at work investigating processes, testing drugs, and fixing the standards, and not allow the manufacturer to find out the mistakes by being held up.—Am. Druggist, N. Y., 1906, v. 49, p. 251.

4. THE PHYSICIAN AND THE PHARMACOPŒIA.

An editorial states that there is a prospect of more interest being taken by the medical profession in the next revision than has been the case heretofore, and the hope is expressed that practitioners will take more interest in the book and make suggestions for its improvement, to the end that it may become useful to them, as it has long been to pharmacists.—J. Am. M. Ass., 1906, v. 47, p. 2164.

Whelpley, Henry M., in discussing the increasing interest that is being evidenced by physicians in connection with the U. S. P., points out that the action of some of the larger pharmaceutical and chemical firms in issuing for free distribution an epitome of the Pharmacopœia and National Formulary is an unmistakable evidence of the tendency of the times, for the commercial pulse is quick to feel the effect of changed conditions.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 334.

Stewart, F. E., discusses the reasons why the medical profession should support the pharmacopœia, and asserts that the medical profession, being a privileged class, is responsible to the State for the advancement of medical practice, including pharmacy and the maintenance of a pharmacopœia.—Trans. Am. Therap. Soc., 1906, pp. 122–125.

Wilbert, M. I., points out that the history, the uses, and the needs of the pharmacopœia all indicate the desirability of the medical profession taking a more active interest in the content and in the revision of the pharmacopœia with the view of making that book, as it really should be, a reflection of the practice and the ideals of the science of medicine in the United States.—J. Am. M. Ass., 1906, v. 47, p. 1990.

Holzhauer has found out that the reason the physicians do not use the pharmacopœia is because it does not give them what they need and what they want. He has pointed out to them some of the things that were put into the pharmacopœia for the express purpose of relieving them of prescribing proprietary medicines.—Proc. New Jersey Pharm. Ass., 1906, p. 103.

Arny, H. V., points out that for literature concerning the content of the pharmacopœia he had recommended Bulletin 23 of the Hygienic Laboratory, Public Health and Marine-Hospital Service, a government publication obtainable for 10 cents, and a reprint entitled "The Pharmacopœia and the Physician," published by the Journal of the American Medical Association.—Midland Drug., Columbus, 1906, v. 7, pp. 1034–1035.

Wheatley, Frank G., in the course of an address says:

> The last national pharmacopœia has just been issued, and the dispensatory which accompanies it treats of all the agents we need to use. If we will confine our prescribing to articles recognized by this national authority, we shall confer one of the greatest boons upon the public, and, incidentally, upon ourselves, that the annals of medicine record.—Boston M. & S. J., 1906, v. 44, p. 236.

Hutchinson, Woods, is reported in a discussion of papers to have requested that his hearers would "all look at that medical barbarism, the United States Pharmacopœia." He stated that at least one-half of its pages should be cut out; instead, somewhere in the neighborhood of 1,500 or 2,000 remedies had been added. He believed that the pharmacopœia should be revised.—J. Am. M. Ass., 1906, v. 47, p. 983.

Beard, Richard O., says the Pharmacopœia and the National Formulary are very old and very respectable publications. Unfortunately, the men who had the revision of them at the last opportunity missed the opportunity, and they are not only very old and respectable, but they are very old fashioned.—Proc. Minnesota Pharm. Ass., 1906, p. 99.

Schumaker asks whose fault it is. If the pharmacopœia is antiquated, why does not the doctor take it up with the medical society and see that it is brought up to date?—*Ibid.*, p. 102.

Reilly, T. F., says in his address as chairman of the section on pharmacology of the American Medical Association that that association, with its Council on Pharmacy and Chemistry, its laboratory force, and its Journal as a mouthpiece of the entire profession, is better equipped for the revision of the pharmacopœia than anybody selected by the Pharmacopœial Convention could possibly be.—J. Am. M. Ass., 1906, v. 47, p. 650.

Stephens comments editorially on the decennial changes in the strength of remedies and their doses officially recognized by the U. S. P. He asks, How does the doctor stand, who depends upon the pharmacopœial standards? What effect has an ever-changing standard upon the value of remedies? To be authentically correct, one must change his skin, so to speak, every ten years.—Eclectic Med. J., Cincin., 1906, v. 66, pp. 155–156.

An editorial asserts that the physician refuses to buy the pharmacopœia because to him it is an utterly useless book.—Critic and Guide, N. Y., 1906, v. 6, p. 180.

An editorial discussing the comments made on the U. S. P., VIII, at the Boston meeting of the American Medical Association, says:

> Let us not be cast down that the physician criticises the pharmacopoeia, but let us rather be overjoyed that he has at last awakened to the consciousness of the existence of such a work. If the pharmacopoeia is not what the physician needs, the fault is his own.—Am. Druggist, N. Y., 1906, v. 48, p. 316.

Kremers, Edward, describes an exhibit of pharmacopœias made at the Boston meeting of the American Medical Association.—Proc. Am. Pharm. Ass. 1906, v. 54, p. 529.

5. U. S. P. CONVENTION REPRESENTATION.

An editorial points out that medical societies have been slow in appointing and sending delegates to the Pharmacopœial Revision Convention. In 1900 the St. Louis Medical Society and the Missouri Medical Association were represented by the one party, who was also present as a delegate from a pharmaceutical body. Thus the medical profession of the entire State of Missouri was without direct representation along purely medical lines. What is true of this State is also true of many other large and influential sections of the country.—Meyer Bros. Drug., St. Louis, 1906, v. 27, p. 190.

Whelpley, Henry M., reports that a communication was received from C. J. Borgmeyer, corresponding secretary of the St. Louis Chemical Society, suggesting that the chemical societies of the United States be invited to send delegates to the convention of 1910, and that the matter will receive careful consideration.—J. Am. M. Ass., 1906, v. 47, p. 2102.

Stevens, A. B., notes that one critic thinks that all schools of medicine should have been represented.—Proc. Michigan Pharm. Ass., 1906, p. 96.

Leffman, Henry, says:

> The book is supposed by many to represent the collective wisdom of medicine and pharmacy; but the method by which the convention is called destroys much of the dignity of it, for a general invitation is extended, including all grades of schools of medicine and pharmacy and of medical and pharmaceutical societies. The great trade interests are sure to be on the alert; they can

afford to send a full complement of representatives and insist on their zeal and activity. Standards, therefore, may be framed to suit such interests.—Am. J. Pharm., Phila., 1906, v. 78, p. 86.

An editorial, in commenting on the interest shown by medical practitioners in the U. S. P., asserts that, if the present activity in pharmacopœial affairs among physicians continues, the convention at Washington, in May, 1910, will have at least 1,000 delegates and be of a decidedly medical complexion.—Meyer Bros. Drug., St. Louis, 1906, v. 27, p. 191.

6. VALUE OF CRITICISMS.

Remington, J. P., discussing Coblentz's Comments on the U. S. P. Inorganic Chemicals, said that of the criticisms of the U. S. P., 1890, only about 2 per cent were found to have any value, the others showing for the most part merely differences of opinion. He expressed the hope that the criticisms of the eighth revision would be of more value, and said that they will all be considered. It should be understood, he said, that the pharmacopœia is a book of standards for medicines, and not for analytical chemists. Referring to the criticism that it is a manufacturers' book, he asked how it could be anything else, when all of the chemicals are made by manufacturers and not by druggists themselves.—Am. J. Pharm., Phila., 1906, v. 78, p. 150. (See also Proc. Pennsylvania Pharm. Ass., 1906, pp. 97–100.)

Stevens, A. B., thinks it remarkable that there has not been wider and more varied criticism. He believes that criticism pointing out existing defects and suggesting improvements will aid the revisers of future editions. Nothing, he says, could be further from the truth than Leffman's statement that the pharmacopœia is always issued under a star-chamber control. Only a few persons are taken into confidence; and in proof he cites page xlv of the U. S. P., VIII. He recommends the appointment of a committee to test systematically the preparations criticised.—Proc. Michigan Pharm. Ass., 1906, pp. 93–97.

Osborne, O. T., is quoted as asserting that however successful the U. S. P., VIII, may be from a scientific standpoint, it is a flat failure from the standpoint of the teacher of therapeutics.—Am. Druggist, N. Y., 1906, v. 48, p. 316.

Remington, Jos. P., asserts that a comprehensive report giving briefly the views of the pharmaceutical and medical journals, writers, chemists, botanists, and others interested is in active preparation, but at this time the chairman desires to state that the favorable comments vastly exceed the unfavorable criticisms.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 79.

2. SCOPE.

1. NATURE AND CONTENT OF THE PHARMACOPŒIA.

Hunt, Reid, would like to see the pharmacopœia limited as much as possible to definite simple preparations, to which tests and standards capable of verification can be applied. As the pharmacopœia becomes more and more a legal standard it appears even more desirable that mere mixtures should be eliminated and relegated to the National Formulary. Liquor antisepticus and cataplasma kaolini should never have been made official.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Oldberg, Oscar, in discussing the future revisions of the U. S. P., says:

> One of the most desirable reforms in this connection would be to eliminate from the Pharmacopœia all formulas for therapeutic combinations and remedies containing two or more therapeutic agents, and to include all such remedies in the National Formulary, while the Pharmacopœia should include all simples and all substances of definite chemical composition, together with galenical preparations representing single drugs.—*Ibid.*, v. 54, p. 123.

Leffman, Henry, is quoted as objecting to the introduction of a large number of manufactured substances made by the combination of other drugs. * * * He particularly deprecated the introduction of liquor antisepticus and headache powders.—Bull. Pharm., Detroit, 1906, v. 20, p. 39.

An editorial calls attention to the fact that the pharmacopœia is a mirror of its time only to a limited extent, and states that the "Extra Pharmacopœia" of Martindale and Wescott and the reports of pharmaceutical associations are in reality the real mirrors of the time.—N. York M. J., 1906, v. 84, p. 655.

Wilbert, M. I., discusses the pharmacopœia with reference to its historical aspect and pleads for a more limited materia medica, for international uniformity, and for the cooperation of physicians in the coming revision.—J. Am. M. Ass., 1906, v. 47, pp. 1989–1991.

Searby, W. M., notes with regret the omission of the pharmacopœial preparations. It is a convenience to students to know what preparations are made from each drug, and it would add to the popularity of the pharmacopœia among physicians to see at a glance what form of a remedy is official that they might prescribe it accordingly.—Am. J. Pharm., Phila., 1906, v. 78, p. 214.

Francis, John M., in closing his series of articles, says the Revision Committee used splendidly the superabundance of data which was made available to them; it has ably performed a peculiarly onerous and embarrassing duty. Our pharmacoœia is the best in the world;

let us be proud of it and give it our hearty support.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Gehe & Co. point out that the U. S. P. VIII might well be considered a model in every respect, as both theoretical requirements and practical needs appear to have been taken into consideration in its compilation.—Handels-Ber., Gehe & Co., 1906, p. 14.

Wilbert, M. I., points out that for nearly half a century the American Pharmaceutical Association has taken an active interest in the work of revising the pharmacopœia, and that it is largely due to the work done by the committees of this association that the Pharmacopœia of the United States is generally recognized as the peer of national pharmacopœias.—J. Am. M. Ass., 1906, v. 47, p. 1990.

Remington, Jos. P., in discussing the volume of work involved in the revision of the U. S. P., says:

> The chairman of the 1890 committee issued 300 circulars, containing 1,359 pages. The number in the eighth revision was 634 numbered circulars and the pages 2,277, with 370 pages of lettered circulars in addition, making a total of 2,647 pages.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 79.

He asserts that the great obstacles to progress in pharmacopœial revision in the past have been the lack of interest on the part of physicians, and in a less degree the lack of familiarity and study of the needs of the book on the part of pharmacists generally.—Proc. Pennsylvania Pharm. Ass., 1906, p. 98.

An editorial, in discussing the criticism of the pharmacopœia by physicians, says:

> Everyone will recognize the necessity of a legal standard for all drugs, even though these drugs are never prescribed by physicians. As a matter of fact, the amount of drugs reaching the public through the physician is very small in comparison with the total amount consumed.—Midland Drug., Columbus, 1906, v. 7, pp. 1106–1107.

"Gnomom" holds that a pharmacopœia is not compiled as a students' guide, nor is it written simply for the benefit of the physician or the pharmacist. Its main object, as we are informed officially in regard to the British Pharmacopœia, is to afford to the members of the medical profession and those engaged in the preparation of medicines one uniform standard and guide whereby the nature and composition of substances to be used in medicine may be ascertained and determined. The chief object of the pharmacopœia is to insure uniformity in the medicinal substances used by physicians, and such a work should therefore deal with all those substances which are freely prescribed unless known by experiment to be valueless.—Pharm. J., Lond., 1906, v. 22, p. 10.

Carmichael, T. H., gives the following definition:

> A pharmacopœia is an official publication containing a list of the articles of the materia medica, with their characters, tests for determining their purity,

and the doses to be administered.—Trans. Am. Inst. Homœop., 1906, 62d sess., p. 224.

Wilbert, M. I., suggests that the work of revision could readily be supervised by five or six specialists, as responsible editors of the several departments of the pharmacopœia, and the credit for excellence or the censure for shortcomings would be more readily meted out to the one more directly responsible.—J. Am. M. Ass., 1906, v. 47, p. 1990.

Remington, Jos. P., says:

> As is well known, the consensus of opinion is that twenty-six members form too large a number for smooth working and permitting decisions to be reached within a reasonable time; there is no doubt that before the time for the convention in 1910 a better plan for doing the work will be proposed. The delays in issuing the last pharmacopœia became very irksome, not only to the Committee of Revision, but to the country generally. Charles Rice, former chairman of the Committee of Revision, was deeply impressed in 1900 with the necessity for a change in the method of conducting the revision. At that time, he, more than any other man in the country, knew that a simpler plan should be devised, and if his health had permitted him to be present at the convention of 1900, he would have used every effort to have induced the convention to reduce the number of the committee and simplify the method.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 76–77.

Kebler, Lyman F., writes that he considers the present edition of the pharmacopœia less serviceable in the drug laboratory than its predecessor.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 449.

An unsigned note gives a list of the various revisions and editions of the United States Pharmacopœia.—Meyer Bros., Drug., St. Louis, July, 1906, p. 194.

2. NOMENCLATURE.

Gehe & Co. point out that the nomenclature of the U. S. P. VIII is in striking discord with the general excellence of the remaining portions of the book. The titles are part Latin, in part anglicized, and in part they still adhere to the antiquated model presented by Berzelius. The titles for galenical preparations are more generally in harmony with more modern practices.—Handels-Ber., Gehe & Co., 1906, p. 14.

Tschirch, A., expresses the opinion that the nomenclature of the U. S. P. appears to have been selected without due consideration of any particular plan and expresses regret that practices in other countries have been given but little consideration.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 420.

Weigel, G., points out that the U. S. P., VIII, uses the older Latin nomenclature for the chemical substances (Calcii carbonas præcipitatus in place of Calcium carbonicum præcipitatum) while the galenical preparations have the same endings as the corresponding preparations in the Ph. Germ.—Pharm. Zentralh., 1906, v. 47, p. 5.

Searby, W. M., thinks it is doubtful whether any considerable use will be made of the sesquipedalian names [hexamethylenamina, etc.]. Either shorter names must be invented or we shall have to wait until the patents on these names have expired. In the case of those which have been simply trade-marked, it is almost impossible to tell whether these will ever expire. There seems to be no limit to the duration of the trade-mark.—Am. J. Pharm., Phila., 1906, v. 78, p. 208.

Eliel, Leo, discussing the use of chemical terms for the newly admitted synthetics, asserts that with the expiration of the patents the names by which they were introduced become public property and there is much comment why these names were not used. It is time that those responsible for this action make explanation. The chemical names will not be used by the profession. What explanation can be given for use of common names of Phenyldimethylpyrazolon, which was also a patented product; or of Phenylis Salicylas, which was in the same class?—Proc. Indiana Pharm. Ass., 1906, p. 69.

Stevens, A. B., remarks that doubtless the greatest fault found with the committee has been upon its failure to include the popular names for synthetics. He thinks the Druggists Circular has made a very serious charge in suggesting that the manufacturers had made it an object to the subcommittee having synthetics in charge to keep the common names out of the pharmacopœia, and says it is a question which bids fair to be thoroughly discussed before another revision, when it is to be hoped it will be settled for all time.—Proc. Michigan Pharm. Ass., 1906, p. 95.

Stahel, A. W., thinks it unfortunate that the Committee of Revision should have laid so much stress on chemical nomenclature in its adoption of some of the new synthetic compounds. From an ethical standpoint their version is undoubtedly correct, but from a common-sense point of view it seems a little strained. A coined name would have been more practical in many ways. The business tact of the proprietary concern is shown by the ingenuity with which they select short and catchy names for their products.—Proc. Arkansas Pharm. Ass., 1906, p. 64.

Thrush, M. Clayton, considers that the Revision Committee erred in adopting the chemical name as the official name, as these names are quite long and difficult to remember. * * * He does not think that the medical profession favors the adoption of patent medicines in the pharmacopœia.—Am. J. Pharm., Phila., 1906, v. 78, p. 36.

Beringer, White, and La Wall think it one of the most difficult problems to induce physicians to memorize and use some of the lengthy official titles for organic chemicals.

Sayre, Edward A., asks if the physician can be expected, on short notice, to write acetphenetidinum for phenacetin, or liquor antisepticus for listerine.—Proc. New Jersey Pharm. Ass., 1906, pp. 99–100.

Holzhauer suggests that instead of writing out the full name they abbreviate it to acetphen.—*Ibid.*, p. 102.

Payne, George F., a member of the Revision Committee, referring to the unfamiliar names of a number of additions to the pharmacopœia, gives a list of titles probably more familiar to many by the names of similar articles given opposite them. Among these we find: "Acetphenetidin, phenacetine; ethyl carbonate [*Sic*], urethane; benzosulphinide, saccharin, guarantose; gambir, catechu; sabal, palmetto berries."—Proc. Georgia Pharm. Ass., 1906, p. 73.

Remington, Joseph P., points out that the subcommittee on nomenclature had entire charge of the names of official articles. In general the object sought was to secure an official name that is descriptive and derived from the correct chemical name.—Am. Druggist, N. Y., 1906, v. 49, p. 81.

Arny, H. V., thinks that the conversion of the familiar names, arsenous acid and chromic acid, into arsenic trioxide and chromium trioxide, respectively, while scarcely destined to become popular in prescription writing, is a step toward correct nomenclature. Not so, however, with the substitution of the clumsy titles sodium hydroxide, potassium hydroxide, calcium oxide, and magnesium oxide for the simpler and equally distinctive terms soda, potassa, lime, and magnesia, employed by former pharmacopœias. * * * Nor does the change of the simple spiritus glonoini into the cumbersome spiritus glycerilis nitratis seem very happy.—Am. J. Pharm., Phila., 1906, v. 78, p. 11.

Leffman, Henry, commends the reform made in the use of hydrochloride instead of hydrochlorate, for alkaloidal salts, and the restoration of the proper spelling of naphthol and naphthalene; but deplores the useless final " e " in halogen salts and names of alkaloids. He regrets that methyl and kaolin were not made indeclinable and that the whole genitive construction of binary compounds was sent by the board. Liquor potassii hydroxidi is no gain in applied pharmacy, nor is it consistent with liquor calcis. In the change from acidum arsenosum to arseni trioxidum a step has been made from one bad form to another. To call the common white arsenic the trioxide when it is a sesquioxide is to add confusion to chemical nomenclature. The older name was objectionable, but the new one is as much so. If ferri hydroxidum is acceptable, why should not arseni sesquioxidum be equally so? Even the noncommittal arseni oxidum, following the style of arseni iodidum, would have been better than the given name.—*Ibid.*, v. 78, p. 80.

Hallberg, C. S. N., asserts that the nomenclature of chemical compounds should be thoroughly thrashed out before the Pharmacopœial Convention meets, so that we can determine definitely whether the present nomenclature should be changed to that of the A. A. A. S.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Wulff, C., points out that in the nomenclature of chemical substances there is considerable variation in the several pharmacopœias In the U. S. P., as in the Ph. Austr., the base is given as the substantive, while the acid is the adjective. In other pharmacopœias, on the other hand, this is reversed, and the base is given in adjective or genitive form. And while the difference in nomenclature per se may be considered trifling, it does not materially interfere with a comparative study of the several pharmacopœias, and is generally misleading.—Ber. d. pharm. Gesellsch. Berl., 1906, v. 16, p. 159.

Ephraim, Julius, discusses the trade-mark for pharmaceutical products, the factors that are of importance in popularizing a proprietary name, and some of the regulations in various countries regarding trade-marks.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, pp. 515–516.

A book review points out that, in the National Formulary, an attempt has been made to provide suitable short names for the preparations, but it was only an attempt. The name mistura chlorali et potassii bromidi composita remains the same, but its English equivalent, compound mixture of chloral and potassium bromide, has been cut to chloral and bromide compound, which is put in quotation marks, as if it were really not meant. If some short, euphonious, and fairly descriptive word were coined to designate this mixture, doctors would be more apt to prescribe it. And, of course, the same statement holds good as to many others.—Drug. Circ. & Chem. Gaz. N. Y., 1906, v. 50, p. 303.

An editorial says:

> Selecting a name for a new medicine or a new name for an old one is not so easy as it may seem, especially when we consider that the appellation should be original, short, euphonious, descriptive, easy to remember, and not hard to write or pronounce.—*Ibid.*, v. 50, p. 281.

Wulff, C., points out that the principal title in the Ph. Svec., Ndl., Austr., and U. S. is in Latin, while in the Ph. Ital. and the Ph. Hisp. it is in the vernacular. The Ph. Austr. and the U. S. P. have discontinued the use of synonyms. He calls attention to the fact that the nomenclature of the several pharmacopœias differs widely, and it is unfortunate that the provisions of the Brussels Conference were not extended so as to provide for greater uniformity in this respect. The provisions so far adopted have been complied with in several instances, and it is to be hoped that there will be a gradual approach to international uniformity. He also prefers the use of folium to folia and of tuber in place of tubers in connection with the nomenclature of crude drugs. He points out that the singular permits of presenting a better collective description and would tend to greater uniformity in the pharmacopœia itself. (The U. S. P. VIII designates the roots, the seed, the corm as singular, while the leaves alone are plural.)—Ber. d. pharm. Gesellsch. Berl., 1906, v. 16, pp. 147–175.

Rudorf, G., comments on the differences in nomenclature in the price lists of three well-known firms and in the Ph. Brit., Ph. Fr., Ph. Germ. IV, and Ph. Hisp. VII, giving a table of quinine salts and their titles in each. He concludes:

> An international pharmaceutical conference, at which a uniform system of Latin terms could be decided upon, is certainly much to be desired. These should be the same for all countries, or, at any rate, so little different that any one can at once recognize a name when he sees it, of whatever nationality the prescriber may be. The ordinary name of a chemical in a country where it is used is, of course, immaterial to the issue; but even then it should be uniform in its own particular country, and for that purpose the pharmacopœia should be the standard. It is therefore essential that this reference book should be scientifically and logically correct, and from these points of view the Ph. Brit. wants a lot of correcting, too.—Chem. & Drug., Lond., 1906, v. 68, p. 174.

In the Pharmacopœia of Japan the registered names of patented medicines are changed to their chemical names and a comparative table of the official and the ordinary popular names of medicines is added.

"Gnomon" points out that medicines and pharmacy are being threatened with an overwhelming flood of fancy names, and calls attention to the possibility of a number of names being applied to a single article made by one manufacturer but sold by different people.—Pharm. J., Lond., 1906, v. 22, p. 55.

Hill, Charles A., presents observations on the inaccuracy of trade names in connection with drugs and medicinal preparations generally. He recounts a number of geographical misnomers, botanical and pharmaceutical misnomers, trade misnomers, and chemical misnomers.—*Ibid.*, v. 22, pp. 346–347.

Pharm. J., 1906, v. 23, p. 158, gives a list of synonyms and definitions, collected since the publication of the Chemist's Annual, 1906.

3. COST AND SIZE.

Leffman, Henry, registers a strong protest against the cost and size of the book and the delay in its issue, the growing tendency to make it a reference work, the misleading date, the monkish Latin and the unnecessary genitive construction of many common names, the lack of comprehensiveness, precision, and conciseness. He considers it much too elaborate in some ways and insufficient in others. It is limited to but one school of medicine. Its literary style he considers much too turgid and prolix. The analytical notes and comments should be more concise and simple, avoiding iteration and multiplication of terms. He deplores the elementary instruction as to test solutions, the infrequency of publication, and the complicated system by which any revision must be brought about.—Am. J. Pharm., Phila., 1906, v. 78, pp. 77–87.

Stevens, A. B., notes the criticisms and suggestions of Leffman, Searby, and others as to the size of the book and how it might be diminished.—Proc. Michigan Pharm. Ass., 1906, p. 95.

Wilbert, M. I., points out that a book of the technical nature that a pharmacopœia must necessarily be is not useful to physicians as a reference book on materia medica. He suggests the publication of a readily available reference list containing pharmacopœial articles, their medicinal uses and doses.—J. Am. M. Ass., 1906, v. 47, p. 1990.

4. PUBLICITY.

Remington, Jos. P., in discussing the suggestion that publicity be given to the proceedings of the Committee on Revision, says:

> If the work of revision conducted by 26 recognized authorities in some branch of the work required five years to reach conclusions, how long would it take a larger committee, composed of 40 state pharmaceutical associations, 40 state medical societies, with 5 or 6 national associations, together with the departments of the Government, to reach conclusions?—Proc. Am. Pharm. Ass., 1906, v. 54, p. 77.

Thorburn, A. D., offered the following resolutions at a meeting of the Chicago branch of the A. Ph. A., which, after some discussion, were adopted:

> Whereas in proposed legislation before Congress and state legislatures it is intended that the U. S. Pharmacopœia and National Formulary shall be authoritative publications fixing legal standards for crude drugs and preparations; and
>
> Whereas these publications are now controlled by bodies whose appointment and conduct is not provided for in any of our food and drug laws, but whose acts will have the authority of laws: Therefore be it
>
> *Resolved by the Chicago Branch of the American Pharmaceutical Association,* That the Pure Food Bill now pending in Congress should be amended to require that bodies controlling the United States Pharmacopœia and National Formulary should give frequent public hearings before there be any changes in, withdrawals from, or additions to these standards.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 147.

Thrush, M. Clayton, thinks that to keep pharmacists and physicians ignorant of what is being done, and then suddenly project upon them innumerable changes, many of them radical, some of them dangerous, and nearly all of them important, is to cause them an embarrassment which is as great as it is unnecessary.—Am. J. Pharm., Phila., 1906, v. 78, p. 30.

An editorial note, apropos of a protest from W. S. Vaughan against the numerous changes in the pharmacopœia (see under aconite) says:

> We hope that publicity will be given the work of the next Committee of Revision so that the medical and pharmaceutic public may know what is com-

ing and may prepare themselves for the inevitable gradually and intelligently.—Bull. Pharm., Detroit, 1906, v. 20, p. 76.

Leffman, Henry, deplores the fact that the pharmacopœia is always issued under a sort of star-chamber control. Only a few persons are taken into confidence, and the bulk of the medical and pharmaceutical profession finds material for much surprise and astonishment when the book appears.—Am. J. Pharm., Phila., 1906, v. 78, p. 82.

Wilbert, M. I., points out that the work of revising the pharmacopœia should be practically accomplished before the meeting of the national convention, and the several changes that are proposed should be given widespread publicity.—J. Am. M. Ass., 1906, v. 47, p. 1991.

Schimmel & Co. call attention to the very great advantage of preliminary publication in connection with the revision of the pharmacopœia. They point out that practically all of the errors that appeared in the preliminary publication of the monographs on the essential oils of the Ph. Belg., in 1903, have been eliminated from the completed descriptions. They conclude:

> The procedure of the Belgian Pharmacopœia Committee to submit their draft first to public discussion appears to us to be well worthy of imitation, for only in this manner is it possible to avoid incorrect requirements or such as can not be fulfilled, which are, unfortunately, up to the present, met with in all pharmacopœias, and which continually give rise to disagreeable discussions between the reviser, the chemist, and the manufacturer.—Semi-Ann. Rep., 1906, Oct.–Nov., p. 88.

5. TIME OF PUBLICATION.

An editorial says:

> The occurrence of the necessity for making numerous amendments and alterations in a work that was so long in making its appearance as was this (U. S. P., VIII), together with the rapidity with which additions are now made to the materia medica, emphasize the necessity for a shorter period between revisions of the National Pharmacopœia. Under conditions like those now prevailing, a period of ten years between revisions is far too long. Aside from the mass of emendations, corrections, alterations, etc., that pile up in that length of time and hence make a long delay in publication, the advances made by chemistry occur so rapidly nowadays as to amount to almost a complete revolution in a decade.—Nat. Druggist, St. Louis, 1906, v. 36, p. 350.

Wilbert, M. I., points out that if the Committee of Revision would, as it should, present the completed outline of the revised pharmacopœia at the next decennial convention the time for completing the revision could be materially shortened.—J. Am. M. Ass., 1906, v. 47, p. 1990.

Leffman, Henry, considers that a manual which applies to this branch of science should be under the supervision of very few persons and should be issued in limited editions that will permit a frequent revision. Two years, or at most three years, is the efficient life of an analytical manual.—Am. J. Pharm., Phila., 1906, v. 78, p. 79.

Remington, Jos. P., discusses the difficulties involved in the work of revision and says:

> With a pharmacopœia of the scope we have at present it would be impossible to complete the revision in one year. The number composing the Committee on Revision prior to 1860 was much smaller than at present, as will be seen by the following: The 1820 committee consisted of 5 physicians; the 1830 committee, 17 physicians; the 1840, 7 physicians; 1850, 8 physicians and 2 pharmacists; 1860, 5 physicians and 4 pharmacists; 1870, 10 physicians and 5 pharmacists; 1880, 11 physicians and 14 pharmacists; 1890, 9 physicians and 17 pharmacists; 1900, 8 physicians and 18 pharmacists.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 77.

6. DOSES.

All of the new pharmacopœias have adopted maximum doses for potent medicaments. These maximum doses frequently vary considerably. The Ph. Ndl. also includes maximum dosage for hypodermic administration of such drugs as morphine and scopolamine.

Lowe, C. B., discusses the doses of the U. S. P., VIII, and compares the quantities given with the figures given by Hare, Wilcox, and Maisch.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 100–104.

Stevens, A. B., remarks that the introduction of doses has given general satisfaction, but, as was to have been expected, some of the individual doses have been criticised.—Proc. Michigan Pharm. Ass., 1906, p. 96.

An editorial discusses the doses official in the U. S. P., VIII, and makes some general comment.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 1.

Bougault, J., thinks the Revision Committee went even a little beyond its instructions in including doses for acacia, tragacanth, excipients, etc., which are therapeutically indifferent.—J. de pharm. at de chim., Par., 1906, v. 23, p. 289.

Hawthorne, C. O., discusses the drug idiosyncrasies in relation to official dosage, and states that strenuous resistance should be made to the attempt to make the pharmacopœia aught else than an authoritative definition and interpretation of the meaning of terms currently used by physicians in prescribing.—Brit. M. J., Lond., 1906, v. 1, p. 309.

An editorial points out that the "average" doses would have been much better if they had been left out of the pharmacopœia, for they are exceedingly unsatisfactory, incorrect, and misleading.—Critic and Guide, N. Y., 1906, v. 6, p. 180.

Leffman, Henry, is quoted as objecting to the introduction of doses because it will encourage the putting up of medicines by druggists without a physician's prescription.—Bull. Pharm., Detroit, 1906, v. 20, p. 39.

Massey, Franklin P., says:

> The homœopath often accuses his old-school brother of overdosing his case, when often the *average* dosage is very nearly the same under both systems (especially when using such drugs as potassium, iodide, digitalis, passiflora, etc.). Many of these mistaken views could be corrected if all physicians would endeavor to honestly inquire into the merits of substances in dispute and make a fair comparative study of them. (Of course, we know that much overdosing occurs in the old school, but when making such charges we should be specific and well able to prove our statement.)—Hahneman. Month., Phila., 1906, v. 41, p. 585.

When the allopath does carefully prove (test) his drugs he comes to practically the same conclusions as his brother of the new school.—*Ibid.*, p. 591.

Hawthorne, C. O. (Brit. Med. J., February 10, 1906), states that unless official doses are strictly limited and defined they must be considered as being a possible danger to free and responsible personal prescribing.—J. Am. M. Ass., 1906, v. 46, p. 756.

Lewin, L., is quoted as making a number of general observations on the official (German) doses.

(1) The basis for the determination of these maximum doses is furnished by toxicologic and clinical experiences.

(2) The maximum limitations apply to the administration of medicaments to all parts where they may be absorbed into the fluids of the body (a) stomach, (b) rectum, (c) uterus, (d) thorax and abdomen, (e) hypodermatic injection, (f) intravenous injection, and (g) injection into the spinal canal.—(From Deut. Med. Wchnschr., 1906.) Pharm. Zentralh., 1906, v. 47, p. 541.

Hérissey, H., notes that the Dutch Pharmacopœia indicates the dose for an adult man, both initial and daily, and that physicians are not required to indicate excessive doses in their prescriptions.—J. de pharm. et de chim., Pharm., 1906, v. 23, p. 478.

Bokorny, Th. (Pflügers Arch., 1906, x. III, pp. 341–375), maintains that the question of toxicity is not so much that of the quantity of a poison necessary to kill a given quantity of living substance, but rather of the specific reaction of specific cells or tissues to specific poison under specific conditions.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 201.

Maurel, E. (Soc. de Biol., 26/V/06; v. 60, p. 909), says that the physiologic study of any agent should always commence with the fixation of the minimal lethal dose (immediate and remote). It is necessary to fix these doses for each species of animal and for each method of administration. It is necessary also to report the quantity employed for each animal-kilogram.—Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 188.

Bokorny, Th., contributes some observations on the amount of poison required to kill a definite weight of living substance.—Pharm. Zentralh., 1906, v. 47, pp. 121–124, 146–148, 162–165, 188–191.

Wilbert, M. I., commenting on the doses in the U. S. P., remarks that while the members of the Committee on Revision have succeeded in giving us a practical solution of the much dreaded question of official doses, and while they have also contributed materially toward advancing the use of the metric system in medicine in this country, they have not been altogether successful in the selection of quantities indicative of approximate, average metric doses. The paper includes interesting tables of doses and equivalents showing the frequency of their occurrence and a comparison of the doses of the U. S. P. 1830, and the U. S. P. VIII.—Am. J. Pharm., Phila., 1906, v. 78, pp. 87–90.

7. ANTIDOTES.

Hérissey, H., notes that the Dutch Pharmacopœia gives very precise indications as to first aid in poisoning cases and reviews methodically the indications for the various emetics and antidotes.—J. de pharm. et de chim., Par., 1906, v. 23, p. 479.

8. WEIGHTS AND MEASURES.

An unsigned article reproduces the rules for abbreviations of metric signs promulgated by the French minister of public instruction. Among the designations in common use are: Metre, m; millimetre, mm; kilogramme, kg; gramme, g; milligramme, mg; litre, l; and millilitre, ml.—Am. Druggist, N. Y., 1906, v. 49, p. 103.

Seaman, Wm. H., suggests that the U. S. P. adopt the international abbreviations for metric quantities in place of those now included in the pharmacopœia.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 19.

Weigel, G., points out that the Ph. Ndl. IV includes the following abbreviations for metric quantities: G=gramme, mG=milligramme, cM3=cubic centimetre, μ=micromillimetre, mM=millimetre, cM=centimetre, dM=decimetre, M=metre.—Pharm. Zentralh., 1906, v. 47, p. 374.

The introductory notes to the Pharmacopœia of Japan point out that the metric system is adopted for weights and measures, and for 1 gramme, 2 centimetres, 3 cubic centimetres, figures with abbreviations are used, viz, 1 g., 2 cm., and 3 ccm.—Ph. Japon. III, p. XXII.

An abstract points out that a practical disadvantage that is met with in the metric system lies in the relative magnitude of the smallest measure, the millilitre. In order to simplify matters, the editor of The Pharmaceutical Journal suggests that the millilitre should be known as the "mil," the one-tenth part of the millilitre as the "decimil," and the one-hundredth part of a millilitre as a "centimil."—Am. Druggist, N. Y., 1906, v. 48, p. 43.

"Gnomon," discussing the defects which have been pointed out in the metric system, asserts that perhaps the gravest defect of the system is the needlessly long terminology He points out that much of the opposition might be overcome if during the inevitable transition period the metre were called the metric yard, the half litre the metric pint, and the half kilogram the metric pound.—Pharm. J., Lond., v. 22, p. 524.

Plowright, Charles H., discusses and illustrates the origin of the symbols used to designate scruple, drachm, and ounce in medicine.—*Ibid.*, v. 22, pp. 583–586.

An editorial refers jocularly to these wicked fellows who would introduce the metric system of weights and measures to take the place of the cumbrous lack of system under which the rear-guard of the druggists are now laboring and under which they can not say whether an ounce of sulphuric acid is 437.5 grains, 480 grains, or 830.1 grains.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 391.

Goodman, F. M., is quoted as protesting against the adoption of the metric system by the departments of the U. S. Government. He believes that this system was originated by a consummate rascal and that the liability to err in its use is almost beyond belief.—Drug Topics, N. Y., 1906, v. 21, p. 100.

Hollis, H. G., is quoted as pointing out the difference in the length of the American and British yard. He says:

> If a mile were measured in England it would be found that a mile would be three inches and six hundred and sixty-seven thousandths of an inch longer than an American mile. * * * The Canadian standard is based not upon the old yard in London but upon an American standard, which in turn was taken from Washington and is an integral part of a metric bar.—Western Druggist, 1906, v. 28, p. 311.

Halsey, F. A., in discussing the introduction of the metric system, asserts that the changing of a people's system of weights and measures is a task of mountainous difficulty and of endless confusion. So great is the task that it is safe to say that no nation in modern times has ever completed it.—Nat. Druggist, St. Louis, 1906, v. 36, pp. 19–21.

An editorial discusses the paper by F. A. Halsey, and asserts that even in France, where the metric system has been compulsory for more than a century, it is not yet in universal use. It was established in Germany some thirty or forty years ago and still the old units prevail there to a very great extent, as they prevail in all the other metric countries.—*Ibid.*, v. 36, pp. 2–3.

A book review comments on, "The Metric Fallacy," by Frederick A. Halsey; and "The Metric Failure in Textile Industry," by Samuel

S. Dale, cloth; octavo; 231 pages. New York: Van Nostrand Co., 1904.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 219.

Burge, J. O., points out that he was opposed to the metric system of weights and measures until he had tried it and was himself "converted." He criticises one of the well-known works on pharmacy for the manner in which the weights and measures of ingredients in preparations are presented.—*Ibid.*, v. 50, p. 219.

An editorial comment on a communication regarding the metric system of weights and measures says:

> We are sorry for those people who continue to grope in the darkness of opposition to the metric system, but it is their own stubbornness that keeps them there, and they can step out whenever they are ready to pay a couple of dollars for a set of metric weights and measures—and use them.—*Ibid.*, v. 50, p. 219.

An unsigned article, based on an address by Professor McLellan, describes the metric system and enumerates the several countries in which it has been adopted.—Canad. Druggist, Toronto, 1906, v. 18, pp. 141–159.

Seaman, Wm. H., reviews the progress of the metric system of weights and measures during the past forty years and asserts that in at least three spheres of human activity it is absolutely universal; chemistry, watch manufacture, and the pharmacopœias. While with the latter it can not be said to have progressed far beyond the books themselves, the progress made in connection with electricity will more than compensate for the overconservatism of English-speaking pharmacists and physicians.—Meyer Bros., Drug., St. Louis, 1906, v. 27, pp. 18–20.

An editorial says:

> One of the books for the feeble-minded which "converts" the metric weights of the pharmacopœia, speaks of 1.6 ounces. Please, will some one tell us how the feeble-minded one is to weigh 0.6 ounce. He has no weights for decimals of an ounce, and presumably does not know how to state or solve the problem $0.6\times437+\frac{1}{2}=$. The same book directs the feeble-minded to weigh 4,432 grains of a substance. Now, how many druggists have that many grain weights? So, supposing the poor fellow has to use ounce weights, and dram weights, and scruple weights, and grain weights, how is he to tell how many of each are needed? And even if he found somebody to show him how to work out these mathematical problems, would it not be easier and better for him to have used un-"converted" gramme weights of the original text in the first place.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 157.

Wilbert, M. I., points out that the inclusion of duplicate weights and measures in the N. F. III, detracts considerably from the appearance and the true usefulness of the book. The formulas lose much of the simple character and concise form that served to dignify and to enhance the working value of earlier editions of the Formulary.—Am. J. Pharm., Phila., 1906, v. 78, p. 435.

Caldwell, Paul, points out that the relative proportions between the metric and apothecary's weights do not always maintain the right ratio, and that there will necessarily be a slight difference in the results obtained from the use of the metric or the alternate, apothecary's, formula, given in the N. F. III.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 351.

An editorial discussing the article by Caldwell says:

> If experts fail to do their "converting" properly, when they take all the time they want, there is only one thing for others to do when their time is limited, and that is to employ metric weights and measures in weighing and measuring quantities expressed in the metric system. Nothing could be simpler, and why druggists work themselves into a fret over "converting"—and then probably make a mistake—when they could include a set of metric weights and measures in their next order to their jobber, at a cost of less than two dollars, is a mystery.—*Ibid.*, v. 50, p. 391.

Oldberg, Oscar, outlines the method by which the metric system of weights and measures was made compulsory in the Marine-Hospital Service in 1878.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 540.

LaWall, Chas. H., calls attention to a bill pending in Congress to introduce the metric system of weights and measures in all of the departments of the United States Government. He also calls attention to an address by the American Metrological Society, which recounts some of the advantages of the metric system and points out the need for further enlarging upon its usefulness.—Bull. Am. Pharm. Ass., 1906, v. 1, pp. 139–141.

An abstract refers to an address by A. G. Bell to the Committee on Coinage, Weights, and Measures of the U. S. House of Representatives, in which he calls attention to the widespread use of the metric system of weights and measures and its general compliance with the decimal coinage now in use.—J. Franklin Inst., Phila., 1906, v. 161, p. 394.

9. ADDITIONS AND DELETIONS.

"Gnomon" points out that the *Lancet*, while agreeing with the general proposition that the pharmacopœia should combine simplicity with efficiency, also asserts that it is possible to narrow down too finely the choice of drugs which form the offensive and defensive weapons of the physician in combating disease. The desire to eliminate the useless drugs must be tempered by the fact that our knowledge of the pharmacological action of simple drugs is too limited to justify a rigid exclusion from the pharmacopœia of those about which there is any doubt.—Pharm. J., Lond., 1906, v. 22, p. 10.

Goldmann, Felix, points out that in considering the admission of an article to the pharmacopœia it is not alone necessary to consider the uses to which that article is being put at the time, but also the particular stage of development and the causes that are directly responsible for its use at the time. It is also necessary critically to consider the therapeutic properties, the dose, the secondary effects, the method of administration, and the indications, as all are of importance in connection with the introduction of an article into the pharmacopœia.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 358.

Remington, Jos. P., points out that a pharmacopœia can never successfully lead in the matter of introducing new remedies and preparations. Its function is to control, to select, and to devise standards. A pharmacopœia can express disapproval of popular remedies which are objectionable, and it can take preparations which are in general use, possibly improve them, and secure uniformity in strength by giving its stamp of authority.—Proc. Pennsylvania Pharm. Ass., 1906, p. 98.

Leffman, Henry, considers that the introduction of many articles belonging essentially to the category of crude drugs adds unnecessarily to the size and cost of the book. The items of the pharmacopœia should be limited to substances used as medicines, which will, of course, include external as well as internal remedies. Materials which are merely used for extraction purposes, for tests or for the preparation of other remedies by mere dilution, need not be enumerated.—Am. J. Pharm., Phila., 1906, v. 78, p. 81.

Searby, W. M., thinks the older pharmacists will regret, if only for association's sake, the dismissal of kermes mineral, Plummer's pill, turpeth mineral, emplastrum-de-vigo cum mercurio, massa copaiba, potassa cum calce, pulvis antimonialis, and tobacco.—*Ibid.*, v. 78, p. 211.

Hall, W. A., presents a critical examination of 600 prescriptions.—Proc. Michigan Pharm. Ass., 1906, pp. 78–89.

Hommel, P. E., thinks that bryonia, caulophyllum, chenopodium, pulsatilla, and rumex should have been retained, as they possess valuable medical properties. It is only want of knowledge on the part of the regular school that they are not largely prescribed. He thinks that kousso, cypripedium, euonymus, geranium, rhus glabra, sassafras pith, stavesacre seeds, and pipsissewa should have been dismissed.—Proc. New Jersey Pharm. Ass., 1906, p. 107.

Stevens, A. B., notes that the omission of the paragraph giving the preparations into which each article entered has been frequently objected to, and will be missed by students and pharmacists.—Proc. Michigan Pharm. Ass., 1906, p. 95.

Wulff, C., calls attention to the change in nomenclature, introduced in the Ph. Belg., III, which provides for the grouping of all preparations of an article immediately after the article itself. (In the Ph. Belg., Chinæ Cortex is followed by Chinæ Decoctum, Chinæ Extractum, and Chinæ Extractum Fluidum.)—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 258–259.

Coblentz, Virgil, discusses in some detail the general principles which underlay the adoption of the "Purity Rubric," to secure uniformity and avoid misconstruction of the intention of the text.—Am. J. Pharm., Phila., 1906, v. 78, p. 303 ff.

Arny, H. V., joins in praise of the new standard, which he considers a monument to American pharmacy. Rarely has a revision brought about so many radical changes, and, what is best, nearly every change is a distinct advance over the standards of a decade since. * * * The "Purity Rubric" * * * will prove a decided safeguard to those retail pharmacists whose interests are jeopardized by overzealous food and drug commissioners, a safeguard more than counterbalancing any possible objection raised against reduction of the standard based on the fact that the average manufacturer is prone to live up to the minimum requirement of any standard.—*Ibid.*, v. 78, p. 10.

Searby, W. M., attributes the introduction of the purity rubric to rigid state laws imposing penalties for the sale of drugs or pharmaceutical preparations below the standard of the U. S. P., to the enhanced cost of absolute purity, and the fact that a small amount of impurity of an innocuous character is unobjectionable.—*Ibid.*, v. 78, p. 209.

Remington, J. P., in discussing Coblentz's comments upon the U. S. P. inorganic chemicals [a reply to the adverse criticism of Henry Leffman], said that the rubric for chemicals had not been adversely criticised.—*Ibid.*, v. 78, p. 150.

Vanderkleed, C. E., asserts that the U. S. P. VIII has hardly yet been in force sufficiently long to enable one to come to any very general conclusions as to what effect, if any, the "Purity Rubric" will have upon the quality of chemicals made by the large factories.—Proc. Pennsylvania Pharm. Ass., 1906, p. 121.

An editorial points out that the claims made for the practicability and value of the purity rubric, so far as the inorganic chemicals in the U. S. P. VIII, are concerned, have been fairly well substantiated.—Am. Druggist, N. Y., 1906, v. 49, p. 159.

Leffman, Henry, says that the control of the purity of preparations must be attained through control of the purity of the original materials, but the methods of the pharmacist can never go to the first condition. He will always rely on the manufacturer at some point, and the purity of a preparation can be as well controlled in the preparation itself as in the crude source. * * * Minute tests, such as those for nitrous compounds in sulphuric acid, are unnecessary.—Am. J. Pharm., Phila., 1906, v. 78, p. 81.

11. ATOMIC WEIGHTS.

With the single exception of the U. S. P. VIII, all of the newer pharmacopœias have adopted O=16 as the standard for atomic weights.

The Ph. Austr. VIII directs that the International Standard, O=16, be used for the atomic weights of official chemicals.

The Ph. Austr. VIII includes a table of the atomic weights of the more important elements based on H=1.008 and O=16. The pharmacopœia also includes a table of the molecular weights, and the chemical formulas of the several official chemical substances.

The introductory notes of the Pharmacopœia of Japan assert that the atomic weights, selected by the International Atomic Weight Committee of 1898, are adopted. A table (VII) containing names, symbols, and atomic weights of the more important elements is appended, based on O=16 and H=1.01.—Ph. Japon. III, p. 398.

Leffman, Henry, asserts that by the adoption of the hydrogen standard for atomic weights, all quantitative measurements are put out of accord with those in the preparation of standard solutions, as given in the official bulletins of the U. S. Department of Agriculture and of the numerous dependent experiment stations and many analytical manuals.

He also asserts that some of the tables exemplify the tendency to absurd and useless detail. Chemical calculations are carried out to the sixth decimal place, although it is well known that the atomic weights on which these calculations depend are not positive beyond the first decimal. * * * To carry out thermometric degrees to the ten-thousandth is mere arithmetical gymnastics, adding to the expense of the book without any advantage.—Am. J. Pharm., Phila., 1906, v. 78, pp. 80, 85.

Coblentz, Virgil, explains that in the summer of 1900 there was little choice as to the standard for atomic weights. O=16 had been but recently proposed for general adoption among chemists, and the system of H=1 had always been employed in previous pharmacopœial revisions. Owing to the fact that the majority of chemists, especially teachers, favored the old standard, and since it was impossible to delay work until this matter was settled, the more conservative plan was adopted in retaining H=1. * * * Possibly by 1910 an agreement may be reached in accepting the O=16 standard which gives figures more convenient for practical purposes.—*Ibid.*, v. 78, p. 303.

Stevens, A. B., thinks it likely that if the committee were to act upon it at the present time they would adopt O=16 as the standard. He thinks it matters little to those who use the pharmacopœia which standard is selected so long as it is used throughout the entire work.—Proc. Michigan Pharm. Ass., 1906, p. 95.

The report of the International Committee on Atomic Weights, 1906, points out that during the year 1905 there has been unusual activity in the determination of atomic weights and that some of the work done relates to the most fundamental values. A general revision of the table would seem to be needed in the near future. A single table, based on O=16, is presented.—J. Am. Chem. Soc., 1906, v. 28, pp. 1–7.

Clarke, F. W., in presenting the Thirteenth Annual Report of the Committee on Atomic Weights, points out that the developments of the next year or two are likely to bring about many changes in the accepted atomic weights.—*Ibid.*, v. 28, pp. 293–315.

J. E. G. calls attention to the note in the last report, for 1906, of the International Committee on Atomic Weights, to the effect that recent work on chlorine and nitrogen indicates that an entire revision of the atomic weights may soon be necessary. He notes that for nitrogen the results obtained by independent workers, using different substances and both gravimetric and volumetric methods, necessitates the acceptance of the value 14.01 instead of the value 14.04, as found by the indirect gravimetric methods, and as adopted by the international committee. He quotes Guye's suggestion that the difference in the atomic weight of nitrogen, as obtained by the older gravimetric methods and by the physical-chemical methods, may be due to the use of too high an atomic weight for silver, which probably lies between 107.871 and 107.859, and can not be as high as 107.93.—Am. Chem. J., 1906, v. 35, pp. 458–463.

12. CHEMICAL FORMULAS.

Stevens, A. B., remarks that a few idealists believe that structural formulas should have no place in a pharmacopœia, but should be confined to text or reference books.—Proc. Michigan Pharm. Ass., 1906, p. 95.

Arny, H. V., considers the reduction of chemical formulas to their simplest form ($Hg_2\ I_2$ to HgI e. g.) a sacrifice of theory to simplicity, and in view of the present indefinite knowledge of the real molecular weights of these bodies, the change is perhaps for the best. From the pedagogic standpoint, however, the new formulas are less easy to explain than were the old.—Am. J. Pharm., Phila., 1906, v. 78, p. 12.

Schimpf, Henry W., considers the elongated method of indicating the formula of ammonium carbonate is the better, in that it more readily shows the constitution of the commercial salt to be a mixture of ammonium bicarbonate and carbamate.—*Ibid.*, v. 78, p. 20.

Leffman, Henry, finds that among the special features deserving strong disapproval is the introduction of structural formulas. What possible advantage can accrue to any user of the book from the introduction of such an expression as $CO.(OLi)_2$? Many trained analysts will be obliged to look twice before recognizing lithium carbonate under this hodge-podge. The force of pedantry run mad could hardly go beyond $2(C_2H_2(OH)_2(COOK)COOSbO)+H_2O$ for tartar emetic. It would be interesting to know under whose mismanagement these abstruse and useless formulas were introduced.—*Ibid.*, v. 78, p. 80.

3. NONPHARMACOPŒIAL STANDARDS.

1. NATIONAL FORMULARY.

Diehl, C. Lewis, discusses the object as well as the content of the National Formulary, the need for such a book, and the attitude to preparations with fanciful titles. He points out that while the real need for "poly-pharmacal" articles is debatable, it is certainly desirable to establish uniformity in formulas for all medicinal preparations likely to be prescribed by physicians, so that they may arrive at a definite knowledge of composition and a reasonable interpretation of possible effect. He discusses the origin and the evolution of "pharmaceutical proprietaries" and points out that so long as a formula or process is not vested in private ownership by right of patent there can be no objection to the Committee on National Formulary developing or constructing formulas for any preparation whose use warrants the establishment of a generally accepted standard.—J. Am. M. Ass., 1906, v. 47, pp. 1826–1828.

Hallberg, C. S. N., discusses the practical value of the N. F. to the retail druggist, points out the reason for the book and the propriety and uses of the formulas that it contains.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 336.

Wilbert, M. I., outlines the history of the N. F., the preliminary work in connection with which he traces to 1856, when a committee was appointed by the American Pharmaceutical Association to compile unofficial formulas in use by physicians in several sections of the country.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 397.

A review of the N. F. says:

> Mingled feelings of pleasure and regret come o'er us as we take up the new N. F. and turn its pages; pleasure at realizing that the book is at last out and presents such a neat and healthy appearance; regret that there are still some druggists in the country so blind to their own interests as to make it appear desirable for the publishers of the formulary to take a step which puts the 1906 edition of that book behind the editions of 1888 and 1896 in so far as the matter of weights and measures is concerned. The new edition gives weights and measures in both the apothecary's and the metric system when "parts" are not employed, as in the formulas for the ointments.—*Ibid.*, v. 50, p. 303.

An editorial asks, When does the new N. F. become official? and points out that the revision committee itself is silent on this question.—Pharm. Era, N. Y., 1906, v. 36, p. 145.

An editorial points out the need for determining definitely the date when the N. F. III becomes official and that in view of the provisions of the Food and Drug Law this date should not be earlier than November 1, 1906.—Drug Topics, N. Y., 1906, v. 21, p. 241.

A book review says:

> One of the best tributes that could be paid to the character of the N. F. was the action of the revisers of the U. S. P. in accepting 15 of the N. F. formulas for the new pharmacopœia—formulas for what might be called pharmaceutical "specialties" similar to those found in great variety on the market.—Bull. Pharm., Detroit, 1906, v. 20, p. 348.

An editorial announces the appearance of the N. F. and points out several of the innovations that have been included.—Am. Druggist, N. Y., 1906, v. 49, p. 2.

Wooten, T. V., started an interesting discussion by asking what provision is made for directing attention to errors which occur in the text of the U. S. P. and N. F. Leo Eliel suggested notification to the chairman of the committee on revision of the U. S. P. of the A. Ph. A. or the presentation of the facts at the meeting of the association. C. S. N. Hallberg urged the use of the Bulletin of the A. Ph. A. as a medium of communication and advised that the work be done promptly and not postponed until 1909 or 1910, in order to facilitate the work of revision. Stout suggested that the working plans for the different preparations admitted to the N. F. should be confirmed by some one outside of the committee.—Proc. Indiana Pharm. Ass., 1906, pp. 70–77.

Caldwell, Paul, reviews the N. F. and calls attention to some inconsistencies and errors in the book.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 351.

An unsigned comment on one of the N. F. formulas says:

> Just why "U. S. P." is specified after some of the ingredients and not after some of the others, and why it is specified after certain ingredients in some formulas and not after the same ones in others, we are not able to explain.—*Ibid.*, v. 50, 295.

Wilbert, M. I., points out that the recognition accorded the N. F. by the Food and Drugs Act of June 30, 1906, gives to this book an entirely new aspect and will make its possession practically compulsory, not alone to wholesale dealers and manufacturers but also to the retail druggist. The book will probably meet with considerable just, as well as unjust, criticism, all of which will tend to make future revisions of the book even more desirable and more perfect.—Am. J. Pharm., Phila., 1906, v. 78, p. 435.

Hensel, Samuel T., comments briefly on the apearance of the third edition of the N. F. and thinks the necessity for a work to supplement the U. S. P. is a natural consequence of the enormous development and extension of our country.—Spatula, Bost., 1906, v. 12, p. 831.

An editorial calls attention to a number of typographical errors in the N. F.—Am. Druggist, N. Y., 1906, v. 49, p. 126.

An editorial, under the caption, "Inaccurate standards," comments upon the large number of errors, more or less important, discovered in the last edition of the N. F. by the author of a review in *Merck's Report*, and adds the remark that when a book thus receives legislative authority, it is fair to expect that it shall be compiled with more than usual care, but this appears not to have been the case.—Pharm. J., Lond., 1906, v. 23, p. 316.

A discussion on the advisability of allowing publishers to use the N. F., in whole or in part, is recorded.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 50–52.

Wiley, H. W., is quoted as having expressed the opinion that preparations listed in the appendix to the National Formulary are not N. F. preparations.—Am. Druggist, N. Y., 1906, v. 49, p. 309.

An editorial notes that obvious deficiencies in the Ph. Brit. have driven the chemists and druggists, in various important centers, to the conclusion that those deficiencies ought to be made good by the publication of recognized formulas for preparations in great demand.—Pharm. J., Lond., 1906, v. 23, p. 539.

The pharmacists of Vienna are taking an active interest in combating the popularization of proprietary remedies, in Austria, and have compiled and published a formulary containing formulas for a line of preparations that can be made by the pharmacist.—Am. J. Pharm., Phila., 1906, v. 78, p. 578.

A contributor to the "Therapeutics" column quotes extensively from Grünbaum's tabulation, in the Practitioner, of preparations used for infants.—J. Am. M. Ass., 1906, v. 47, pp. 1762–1763, 1851, 1953, 2033–2034, 2117–2118.

2. NEW AND NONOFFICIAL REMEDIES.

A list of the articles tentatively accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in the proposed annual New and Nonofficial Remedies is presented with a copy of the rules governing the acceptance of articles for admission to the book.—J. Am. M. Ass., 1906, v. 47, p. 856 ff.

An editorial comments on the first installment of the list of new and nonofficial articles approved by the Council on Pharmacy and Chemistry which appears in the same issue of the Journal. It is pointed out that additional installments will appear weekly until all of the articles approved by the council shall have been announced.

Comments and criticisms are asked for and the announcement made that the material will finally appear in book form.—*Ibid.*, v. 47, p. 865.

An editorial discusses the restrictions usually placed on articles in which new remedies are mentioned and suggests the need of a change in the present day conditions.—New Idea, Detroit, 1906, v. 28, p. 79.

An editorial discusses the economic effect of the expiration of the patents on several widely used synthetics and the very marked difference in the price of these substances.—Pharm. Era, N. Y., 1906, v. 35, p. 2.

A news item presents a lengthy account of the hearing on the Mann Drug Patent Bill held before the House Committee on Patents, on May 16–17, 1906.—Oil, Paint and Drug Rep., 1906, v. 69, May 21, pp. 28–30.

A report of the second hearing, on May 23, 1906, is presented.—*Ibid.*, May 28, pp. 26–27.

Schlotterbeck, J. O., presents a discussion of some of the economic problems involved in the use and misuse of the popular synthetic remedies.—New Idea, Detroit, 1906, v. 28, pp. 135–136.

Davis, N. S., points out that if physicians never tried new drugs there would be no advance in therapeutics. The indiscriminate use of new drugs or mixtures of old drugs is objectionable because all of the known facts connected with the composition or possible deleterious use of these drugs or preparations are not available or taken into consideration.—Pharm. Era, N. Y., 1906, v. 36, pp. 54–55.

Stieglitz, Julius, discusses the need of critical review of the claims made by manufacturers of synthetic chemicals for medicinal use, and asserts that physicians should insist that all chemical compounds should pass before some reviewing board which will see to it that the manufacturers give the plain truth, the whole truth, and nothing but the truth.—*Ibid.*, v. 36. p. 55.

Puckner, W. A., discusses the naming of carbon compounds.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 205–207, 252–256, 281–284, 327–331.

Riedel's Mentor (Berl., 1906, p. 100) presents a comprehensive list of new remedies and, so far as known, suggests the composition of a number of proprietary articles.

Abstracts from various publications record the names and properties of a number of new remedies.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 684–713.

A contributor to the "Pharmacology" column calls attention to the variability of different brands of diastase and the need of some standard method for the valuation of the diastase preparations, which should, as far as possible, indicate their value as aids to digestion.—J. Am. M. Ass., 1906, v. 47, p. 1394.

Mai, C., discusses the composition and production of pharmaceutic and chemical preparations.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 169–173.

Kochs, J., presents an enumeration and some description of the new remedies that were introduced during the year 1905.—Arb. a. d. pharm. Inst. d. Univer., Berl., 1906, pp. 107–142.

For a list of scientific synonyms of new remedies, see report on new remedies appended to Proc. New York Pharm. Ass., 1906, pp. 49–51.

A contributor to the "Therapeutics" column quotes the report of the committee on newer remedies of the New York Pharm. Ass. in regard to a number of incompatibilities.—J. Am. M. Ass., 1906, v. 47, p. 1052.

NEW REMEDIES.

Francine, Albert, quotes Frank Billings as follows:

> To the rational physician, mixtures even with a known formula are objectionable, for disease is never quite the same in different individuals and never quite the same in its different stages.—J. Am. M. Ass., 1906, v. 47, p. 984.

Jacobi, A., discusses "Proprietary medicines."—*Ibid.*, v. 47, pp. 977–978.

Dock, Geo., presents a paper on "Proprietary medicines and their abuses."—*Ibid.*, v. 47, pp. 978–982.

Cabot, Richard C., comments on "The physician's responsibility for the nostrum evil."—*Ibid.*, v. 47, pp. 982–983.

An editorial asserts that a quiet inquiry conducted by the American Druggist has revealed the fact that, contrary to expectations aroused by the crusade of the American Medical Association against proprietary medicinal compounds, the number of such compounds prescribed by physicians was greater during 1905 than in the year preceding.—Am. Druggist, N. Y., 1906, v. 48, p. 59.

Mason, Frederic S., presents a paper on the standpoint of the manufacturer of special and proprietary preparations in which he discusses proprietaries abroad, some historical notes, and the difference in the status of the galenical and of the chemical proprietary.—*Ibid.*, v. 48, pp. 65–66.

Diner, P. J., discusses the proprietary medicine from the pharmacist's standpoint. He concludes that there are a number of valuable preparations of proprietary origin, which the physician has a right to use in his daily practice, but that it is also the duty of the physician to differentiate between an ethical proprietary and a fake with a high sounding name.—*Ibid.*, v. 48, pp. 66–67.

Fairchild, B. T., asserts that all manufacturers of modern and original products had found it necessary to adopt the trade-mark, but, he points out, the adoption of the trade-mark gave no right or property except that of the trade-mark itself, and thus the identity of the product—that is to say, the particular product placed upon the market under any particular name.—*Ibid.*, v. 48, p. 67.

Crinon presents (Soc. de Pharm. de Par.) a letter from a committee of the Swiss society inviting cooperation in certain demands upon the manufacturers of new remedies, as proposed by Golaz.—J. de pharm. et de chim., Par., 1906, v. 24, p. 376.

Dufau, in the discussion, recalls the approval of the society July 6, 1904, of a project for the establishment of an assay laboratory for new remedies.—*Ibid.* For full text of letter and comments see also *Ibid.*, pp. 429–432.

Golaz, H., urges the need of a radical reform in the denomination of medical chemical products and the control of chemical medicaments. He thinks the container or original package should bear a label or circular setting forth: (*a*) Commercial name (with exact chemical synonomy). (*b*) Reactions typical of identity. (*c*) Points of fusion and boiling. (*d*) Conditions of solubility. (*e*) Special incompatibilities. (*f*) Posology. (*g*) Precautions to be taken for sterilization and preservation.—Bull. des sc. pharmacol. Par., 1906, v. 13, pp. 249–251.

See also comments of Vigneron and others.—*Ibid.* (Compt. rend, des soc. sav.), pp. 102, 125, 143–144, 145–147, 167–168, 261.

SYNTHETICS.

Schlotterbeck, J. O. (J. Michigan Med. Soc.), is quoted in the "Pharmacology" column in regard to the use and misuse of the popular synthetic remedies. He calls attention to the large number of closely allied substances with practically identical actions which can be appreciated only by one who knows something of chemistry.—J. Am. M. Ass., 1906, v. 47, p. 1392.

4. ANALYTICAL DATA.

1. ADULTERATIONS.

An editorial points out that of the three important scientific-technical divisions of the pharmacist's occupation—dispensing, making, and testing of medicinal preparations—the latter is becoming more and more important, and insists that greater attention be devoted to the cultivation of this branch, particularly in the fitting out of the laboratory or shop. The editorial also contains suggestions on the convenient arrangement of a testing laboratory and a number of practical hints to facilitate the work.—Pharm. Ztg., Berl., 1906, v. 51, p. 168.

Evans, John, asserts that all chemicals should be examined qualitatively, and that the pharmacist should be able to do so quantitatively as well.—Apothecary, Bost., 1906, v. 18, p. 907.

A news item says that J. N. Hurty, secretary of the Indiana Board of Health, has recently published the results of the analysis of one thousand samples of drugs collected in all parts of the State. Forty-seven per cent of the samples are said to have been adulterated.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 454.

A news item includes a portion of a speech made by Mr. Mann in the House of Representatives, in the course of which he enumerates a number of articles frequently found to be adulterated.—Oil, Paint, and Drug Rep., 1906, v. 70, July 2, p. 27.

Bell, J. Carter, asserts that adulteration in pharmacopœial preparations may be divided roughly into two classes: (1) Compounded drugs which contain a volatile oil principle and are liable to deteriorate on keeping. (2) Preparations which are not prepared strictly according to the directions of the pharmacopœia and contain less than the due amount of active principle or principles.—Brit. and Col. Drug., Lond., 1906, v. 49, pp. 548.

An editorial points out that a common cause of complaint is the dirty condition of many of the ordinary chemicals on the market. Many of the commonly used medicinal chemicals will not make a brilliant solution in water and this, it is said, may be due to carelessness in packing and storing.—Drug Topics, N. Y., 1906, v. 21, p. 354.

Schade, J. W., points out the possible sources of impurities in chemicals used for reagents. He asserts that to ask for a reagent "absolutely pure" is to ask, in most cases, for the impossible in economical manufacture.—Oil, Paint, and Drug Rep., 1906, v. 70, Nov. 5, p. 40.

Coblentz, Virgil, presented a paper at the meeting of the New York section of the American Chemical Society on the purity of medicinal chemicals, in which he reported the results of the analysis of a number of samples of medicinal chemicals obtained from different sources.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 222.

2. REAGENTS.

The Ph. Austr. VIII includes a long list of reagents and enumerates the apparatus that must be on hand in each pharmacy for testing the identity, quality, and composition of the materials purchased.

The Ph. Belg. III contains a list of the utensils and instruments that must be on hand in each pharmacy for applying the several tests required.

v. Waldheim, Max, presents a compilation of reagents and reactions designed to be used in connection with the more comprehensive compilations of reagents.—Monograph, pp. 68, published as a supplement to Pharm. Prax., 1906, v. 5.

Kebler, L. F., reports on the testing of chemical reagents for the presence of arsenical compounds and chlorides. The compounds in which arsenic was found are enumerated.

He also points out the widespread occurrence of small quantities of chloride as a contamination in chemicals sold for analytical purposes. The results are presented in the form of tables and indicate the presence of chlorides in objectionable amounts in many of the chemicals sold for analytical purposes.—Proc. Ass. Off. Agric. Chem., 23d Ann. Conv., pp. 181–188. (Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 105.)

Eberle, E. G., asserts that with the average druggist a common source of error in the assay of drugs is his failure to verify the strength of his volumetric solutions, and points out that these solutions can not be trusted to maintain their "titre" if kept for any length of time under ordinary conditions.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 438.

v. Friedrichs, Oscar, reports an examination of commercially available volumetric solutions. He presents his results in the form of a table to illustrate the unreliable nature of these solutions.—Svensk. Farm. Tidskr., 1906, v. 10.

Cowley, R. C., presents a method for the standardization of solutions of iodine and sodium thiosulphate which, he says, is novel only in the rapidity of execution.—Pharm. J., Lond., 1906, v. 23, p. 430.

Acree and Brunel have prepared standard solutions of hydrochloric acid and ammonium hydroxide sufficiently accurate to warrant them in believing that the principle of using weighted quantities of well-dried gases for making up standard solutions is one worthy of further study.—Am. Chem. J., 1906, v. 36, pp. 117–123.

An abstract from Rép. de Pharm. outlines a method for using mercuric iodide for the demonstration of phosphorus, arsenic, or antimony hydride by passing the gas through a solution of mercuric iodide. Phosphorus gives an orange-yellow, arsenic a light-brown, and antimony a blackish-brown precipitate.—Pharm. Zentralh., 1906, v. 47, p. 317.

Schlicht, A., suggests the use of phosphomolybdic acid as a reagent for salts of potassium and asserts that it is superior to platinum chloride and tartaric acid.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 1299–1300.

Reisert, in a German patent application, outlines a method of water purification in which barium carbonate is used as the precipitant.—Pharm. Zentralh., 1906, v. 47, pp. 137, 138.

3. INDICATORS.

Arny, H. V., thinks the pharmacopœia shows too great a fondness for methyl orange, using it in several cases where phenolphthalein is usually used and to better advantage. * * * For the average observer the change from orange to pink is so gradual that it frequently means the addition of 1 c. c. of the volumetric solution to determine the end of the reaction. For carbonates its use is perhaps a necessary evil, but its application, instead of phenolphthalein, in such cases as estimation of soda and solution of soda, and in place of rosolic acid in estimations of ammonia, seems a mistake.—Am. J. Pharm., Phila., 1906, v. 78, p. 17.

Cohn, Robert, discusses the decoloration of slightly alkaline phenolphthalein solutions by means of alcohol. He ascribes the phenomenon to a retardation of the dissociation of the phenolphthalein alkali by excess of alcohol. Dissociation is facilitated by heat and an alcohol containing alkaline liquid that is colorless in the cold assumes a red color on heating.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, part 2, pp. 1389, 1390.

Howell, E. V., reports some experiments on the use of coloring matter of certain grape skins as an indicator, and suggests some of its possible applications.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 466.

Niece, Frederic E., reports experiments with the red coloring matter of early radishes as an indicator. He concludes that this coloring matter has properties that are unique as an indicator, that the colors produced are stable and lasting, and that it is sensitive both to acids and alkalies in very dilute solutions.—Merck's Rep., N. Y., 1906, v. 15, pp. 320, 321.

Dieterich, Karl, reports examining a number of reagent papers for comparative sensitiveness. Litmus paper was found to be sensitive from 1:20,000 to 1:50,000 of acid or alkali. Curcuma paper was sensitive to from 1:5,000 to 1:20,000, phenolphthalein paper from 1:20,000 to 1:50,000, and Congo red paper from 1:5,000 to 1:20,000.—Helfenberger Annalen, 1905, Berl. 1906, v. 18, pp. 146–147.

Cribb and Arnaud (Pharm. Ztg., li, No. 62, 1906, 688; from the Analyst, 31, 147) have modified the process of Cassal and Gerrani for the estimation of boric acid with tumeric paper by substituting tartaric for oxalic acid in the preparation of test paper. They describe the manner of conducting the experiment.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 649–650.

4. SPECIFIC GRAVITY.

Stevens, A. B., says that the change in the temperature for taking specific gravities from $\frac{15}{15}$ to $\frac{25}{25}$ seems to have met with universal approval.—Proc. Michigan Pharm. Ass., 1906, p. 96.

Williams, F. M., outlines a modified Westphal balance for solids and liquids, and figures the apparatus which is said to combine in compact and portable form all of the advantages of the original Westphal balance and the Jolly balance.—J. Am. Chem. Soc., 1906, v. 28, pp. 185–187.

Schimmel & Co. point out that in the Ph. Ndl. IV, the data with regard to solubility and specific gravity are given for a temperature of 15° C. and in the latter case are compared with water at +4° C. They have convinced themselves, by comparative estimations, that the differences between specific gravities as compared with water at +15° and at +4° are so slight that for practical purposes they can be neglected, and the specific gravities given in the pharmacopœia can therefore be taken as if based upon that of water at +15°.—Semi-Ann. Rep., 1906, Oct.–Nov., p. 85.

5. PHYSICAL CONSTANTS.

Wiebelitz, H., points out that in addition to detailed directions for the determination of the melting point it would also be desirable to have, in the Ph. Germ., a detailed method for determining the boiling point and the congealing point of substances.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Hérissey, H., points out that the manner of determining the points of fusion, solidification, and boiling are specified in the Dutch Pharmacopœia.—J. de pharm. et de chim. Par., 1906, v. 23, p. 479.

An unsigned critique of the Ph. Ndl. IV notes that great care has been taken in the determination of solubilities, melting points, and boiling points.—Chem. & Drug., Lond., 1906, v. 69, p. 828.

6. SOLUBILITIES.

Dott, D. B., asserts that many of the official solubilities require revision from a dispenser's point of view. They should represent the amount of substance that can be dissolved by shaking up the substance, in a finely divided state, with the solvent at 60° to 65° F. for a reasonable length of time. Other methods which may be correct in themselves are unsatisfactory from a practical aspect of the question.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 277.

An abstract from a paper by O. N. Witt discusses some of the problems involved in chemical solubility and points out the need for elaborating on the unaided perception of sense by logical reasoning.—Nat. Druggist, St. Louis, 1906, v. 36, pp. 25–26.

Trevor, J. E., discusses solubility curves and the several factors controlling the solubility of various materials. (From J. Physiol. Chem., v. 10.)—Chem. Centralbl., Berl., 1906, v. 77, p. 1688.

Wulff, C., points out that the several pharmacopœias differ to some extent in the methods adopted for indicating the solubility of substances; Ph. Austr. and Ph. Ndl. use the designation 1=20, indicating that 1 part of the substance is dissolved in 19 parts of the solvent. The U. S. P. says 1 in 20, the Ph. Svec. 1+19, and the Ph. Ital. 1:19.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p 155.

The Ph. Belg. III contains a table showing the solubility (in round numbers) of chemical medicaments in water, alcohol (90 per cent), and ether.

Holmes, John, discusses: I. The nature of the molecular arrangement in aqueous mixtures of the lower alcohol and acids of the paraffin series. II. Molecular complexity in the liquid state. III. Theory of the intermiscibility of liquids.—J. Chem. Soc., Lond., 1906, v. 89, pt. 2, pp. 1774–1786.

7. MELTING POINT DETERMINATIONS.

Riedel's Berichte (Berl., 1906, pp. 16–21) discusses the determination of the melting point of official substances and reviews the literature relating to this factor.

Thomann discusses the importance of melting point determinations as being indicative of the composition and purity of certain substances. He points out that, in view of the decreasing amount of manufacturing done in the laboratory of the pharmacy, the amount of analytical work must be increased.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 261–262.

The Ph. Austr. VIII outlines a definite method for the determination of the melting point of the various substances.—Ph. Austr. VIII, p. XXV.

The Pharmacopœia of Japan gives detailed directions for determining the melting point of chemicals and for determining the melting point of fats and other similar substances.—Ph. Japon. III, pp. XXII–XXIII.

Lenz, W. (Pharm. Ztg., v. 50, 1031), recommends that in place of the rubber bands commonly used for fastening melting point tubes to the thermometer a metal band composed of a spiral and a thin sheet of some suitable metal, such as German silver, platinum, or iridium.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 605.

Wegschneider, R. (Pharm. Journ., May 17, 1906, 319), asserts that in the determination of melting points in capillary tubes one hardly ever obtains sharp melting points, but more commonly a temperature interval within which the substance melts. He is of the opinion that in the case of substances which decompose at or below their melting point, the exact conditions under which the melting point was determined should be recorded.—*Ibid.*, v. 54, p. 606.

8. BOILING POINT DETERMINATIONS.

The Ph. Austr. VIII outlines the method to be followed in the determination of the boiling point of pharmacopœial liquids.—Ph. Austr. VIII, p. XXV.

In addition to the determination of the melting point and the boiling point of substances the Ph. Ndl. IV also prescribes the determination of the congealing point for substances like anethol, and describes the method to be followed.

9. THERMOMETRY.

The Ph. Ndl. IV describes as luke warm water a temperature from 30° to 40° C.; warm water (aqua calida), 60° to 70° C.; hot water (percalida), 85° to 95° C. The term to warm (calefacere) applies only to temperatures up to 100° C., for higher temperatures the term to heat (fervefacere) is applied.

The Ph. Austr. VIII directs that the centigrade thermometer of Celsius be used for the determination of temperatures. By ordinary temperature a variation of from 15° to 20° C. is to be understood. Maceration is to be conducted at 20° C., digestion at 50° C., and the determination of specific gravity is to be carried out at 15° C.

The Ph. Belg. III directs that pharmaceutical operations and the determination of analytical data are to be conducted at 15° C.

10. POLARIZATION AND REFRACTION.

Whelpley, H. M., discusses the use of the polariscope, especially in the recognition of the volatile oils, and notes the need of a new chapter in some reference books on the use of the polariscope.—Proc. Missouri Pharm. Ass., 1906, pp. 122–124.

Utz reviews the uses to which the Abbe refractometer may be applied in connection with pharmaceutical preparations.—Pharm. Zentralh., 1906, v. 47, pp. 896–897.

Matthes, H., discusses the possible uses and the evident limitations of the immersion refractometer.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 101–102.

Wagner, Rinck, and Schultze outline methods for the production of normal solutions and give some practical hints on the use of the Zeiss immersion refractometer.—*Ibid.*, v. 30, pp. 1181–1183.

11. APPARATUS.

An abstract (from Chem. News, Feb. 16, 1906, 71) discusses a filling device devised by Edward French with which ordinary burettes may be rendered self-filling, and thus, after having been calibrated, do not require to be discarded. A description of the apparatus is given.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 591.

Ranwez, F. (Ann. de Pharm. octobre, 1906), figures a very simple apparatus, a modified U tube, for the production of gas in small quantities, as they are generally used by pharmacists. With 50 gm. the apparatus will disengage 12 liters of H_2S.—Abstr. in J. de pharm. et de chim. Par., 1906, v. 24, pp. 561–563.

Collins, S. H., discusses the inaccuracies of Scheibler's apparatus for the determination of carbonic acid in carbonates and describes and figures a modification, giving half a dozen tables showing his results.—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 518–522.

Perman, Edgar Philip (Chem. News, May 11, 1906, 213), overcomes the difficulty met with in estimating chlorine, ammonia, and other substances, in which an absorption tube is used, by the use of a modified tube, illustrated in connection with the abstract.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 608.

Wilson, J. Beetham, describes and illustrates a modified Soxhlet tube which has been devised to facilitate the removal of the last trace of the solvent without necessitating the taking apart of the apparatus.—Pharm. J., Lond., 1906, v. 22, p. 587.

Ludecke, K. (Pharm. Ztg.), describes a reflux condenser which combines the advantage of compactness with a large cooling surface. Condensation is effected both by the surrounding air and by the circulation of water through an interior tube. The condenser perfectly replaces Liebig's condensers.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 603–604.

Glatzel, C. (Apoth. Ztg., 1906, v. 21, 323), describes a condenser which differs from the ordinary form by providing a double cooling surface. This construction secures the effective condensation of highly volatile fluids, and is particularly useful for reflux condensers in extracting operations.—*Ibid.*, v. 54, pp. 602–603.

Rogers, Allen, describes and figures an apparatus which has given him excellent results in the analysis of such substances as tea, coffee, tannin, and so on, where an aqueous infusion is necessary.—J. Am. Chem. Soc., 1906, v. 28, pp. 194–196.

Bang, I., discusses the application of the centrifuge for quantitative analysis, particularly of urine.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 651.

Brandel and Kremers present an exhaustive review of the balance, describe balances of various kinds, and illustrate the different parts and their modifications.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 49–60, 75–82, 105–111, 151–154, 166–171.

12. FILTERS.

Labat, A., reviews the observations published relating to the element of error caused by filter paper in chemical analysis.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 195–200.

Dunning, H. A. B., recommends the use of powdered paper as a filtering medium, as a clarifying agent for a variety of purposes, or as a diluent in the percolation of substances, such as cudbear, which have a tendency to clog in percolating.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 484.

An abstract (from Apoth. Ztg.) gives a simple expedient used by Eschenburg for the prevention of ruptures in folded filters. Before fully expanding the filter a piece of string is loosely tied around the folds a short distance above the point, which is then well inserted into the neck of the funnel and the filter spread out, moistened, and filled as usual.—*Ibid.*, v. 54, p. 594.

13. COLOR STANDARDS AND COLORS.

Wiebelitz, H., in discussing the revision of the Ph. Germ., points out that in providing for color tests or in describing the color of a preparation it would be desirable to outline some general method and to prescribe the bulk or the thickness of the liquid to be observed.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

An unsigned article describes and figures the Kennicott-Sargent colorimeter which is claimed to combine accuracy of determination with rapidity of operation.—Chem. Eng. Phila., 1906–7, v. 5, pp. 213–214.

Blarez, Ch., outlines a method for determining the density of color solutions.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 296–298.

Several reports from the associate referees on food adulteration discuss the behavior of colors with reagents and outline methods for differentiating the commercial colors claimed to be vegetable from colors of coal-tar origin.—Proc. Off. Agric. Chem., 23d Ann. Conv., pp. 11–14. (Bull. Bur. Chem. U. S. Dept. Agric. 1907, No. 105.)

Berry, W. G., presents an exhaustive compilation of the coloring matters that may occur in foodstuffs and methods for their detection. The colors are classified as (1) coal-tar lakes, (2) natural colors of vegetable and animal origin, (3) organic lakes, (4) mineral pigments, and (5) coloring compounds. Methods of analysis for various products are given in detail.—Circ. Bur. Chem. U. S. Dept. Agric. 1906, No. 25, p. 40.

Janny, A., discusses the bearing of the Pure Food and Drug Law on the use of coal-tar colors and points out that while vegetable colors are themselves impure and not infrequently contaminated with objectionable materials the same colors when made from coal tar may be produced chemically pure, but would still be interdicted by the letter of the food and drug law.—Oil, Paint and Drug. Rep., 1906, v. 70, November 5, pp. 29–30.

14. ANALYTICAL METHODS AND RESULTS.

La Wall, Charles H., commenting on the recurring tests for various salts, says that much space could have been saved by giving these in some one place and referring to them as need be under the chemicals.—Am. J. Pharm., Phila., 1906, v. 78, p. 99.

Arny, H. V., thinks much space might have been saved by giving in the appendix the details for the detection of heavy metals and of arsenic, as well as of the most important impurities, thus requiring under each chemical discussed bare mention of the impurities likely to be present, and reference to the article where the test is discussed in detail.—*Ibid.*, v. 78, p. 14.

Hérissy, H., in a discussion of the analytical processes of the Ph. Ndl. IV, remarks that the description of a process of analysis should be so precise as not to leave the initiative to the experimenter; it should guide him to the very last weighing, the very last volumetric titration.—J. de pharm. et de chim. Par., 1906, v. 23, p. 483.

"Derlin" points out that it would be desirable to add to the tests for purity in the Ph. Germ. a statement as to what is expected to be attained and the degree of purity that must be evidenced. Many of the directions, he believes, might be included in the preface or omitted entirely and simply referred to as being according to some other well-established authoritative work. Thus, for instance, the determination of the iodine or the saponification number could be directed to be made according to some previously stated or well-established method.—Pharm. Ztg. Berl., 1906, v. 51, p. 993.

The Pharmacopœia of Japan directs that the qualitative tests, unless otherwise stated, are done by taking 10 c. c. of its solution in a test tube which has an internal diameter of 1.5 cm. In cases where the name of the solvent is not mentioned, it being only stated "a solution," it is always means that water is used as the solvent.—Ph. Japon. III, p. XXII.

The term "unweighable residue" is defined by the Ph. Ndl. as being less than 1 mg.

15. CHEMICAL CONSTANTS.

The Ph. Belg. III includes definitions for and suggests methods for determining ether index, acid index, iodine index, and saponification index.

Wiebelitz, H., believes that it would be desirable to include general directions for determining such factors as the iodine and saponification numbers of fats in the preface so as to avoid unnecessary repetition. The determination of the ash content should also be outlined and the term "unweighable residue" should be defined.—Pharm. Ztg. Berl., 1906, v. 50, p. 1003.

Fanto, Richard, discusses the importance of determining the acid number of a variety of commercial articles, defines what is understood by the acid number of various substances, and discusses the method of determining this factor.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, part 2, pp. 1856, 1857.

Rupp, E., discusses the amplification of iodometry and its application to the estimation of water soluble peroxide combinations, the estimation of ferrous salts, and the determination of iodides in the presence of chlorine and bromine.—Pharm. Zentralh., 1906, v. 47, pp. 870–872.

16. TESTS.

HALOGENS.

Jannasch and Zimmermann outline a method for the separation of iodine from bromine and chlorine by the use of hydrogen dioxide.—Ber. d. deutsch. chem. Gesellsch. Berl., 1906, v. 39, pp. 196, 197.

Vaubel and Scheurer present a method for the quantitative determination of halogens in organic combinations.—Chem. Ztg. Cöthen, 1906, v. 30, pp. 167, 168.

v. Wyss, H., discusses the behavior of the bromide salts in the animal and human organism, the elimination of bromides in general, the elimination of bromides by epileptics, the antagonism between chlorides and bromides, and the accumulation of bromides in the organism.—Arch. f. exper. Path. u. Pharmakol. Leipz., 1906, v. 55, pp. 263–287.

Rupp and Horn discuss the volumetric determination of iodides in the presence of chlorides and bromides.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 405–411.

Böttger, W., discusses the determination of chlorides in the presence of complex cyanides.—Pharm. Zentralh., 1906, v. 47, pp. 873–874.

METALS.

Skrabal and Neustadel (Ztschr. f. anal. Chem.) suggest a modification of the well-known chromate precipitation method for separating barium from strontium and calcium.—Pharm. Zentralh., 1906, v. 47, p. 318.

Kahn, S. K., discusses the detection of minute traces of copper and iron by the use of stearic acid.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 402–405.

Moser, L., discusses the volumetric estimation of lead as iodate by decomposing the solution of soluble salt of lead with an excess of a solution of potassium iodate.—Chem. Ztg., Cöthen, 1906, v. 30, p. 9.

Rupp, E., asserts that the method proposed by Moser is not new.—*Ibid.*, p. 37.

Rupp and Horn elaborate on a previously published method for the determination of ferrous salts by titrating with ferrous hypoiodite.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 571–575.

Foerster, F., discusses the quantitative determination of metals in aqueous solution by means of electrolysis and the factors that influence accurate determination.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, part 2, pp. 1842–1849.

SULPHUR AND SULPHATES.

Kleine, A., describes and discusses the use of an apparatus for the determination of sulphur.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, part 2, p. 1711.

Leffman, Henry, discusses the titrimetric determination of sulphates by means of benzidin hydrochloride. (Oil, Paint and Drug Rep., 1906, v. 70, Dec. 3, p. 23.)—Proc. Pennsylvania Pharm. Ass., 1906, p. 161.

NITRATES.

Leffman, Henry, discusses the use of nitron as a precipitant for nitric acid and nitrates and points out its advantages for determining the presence of nitrates in water by a direct method.—Proc. Pennsylvania Pharm. Ass., 1906, p. 160.

CARBON DIOXIDE.

Lunge and Rittener discuss the determination of carbon dioxide either alone or in mixtures of gases absorbed by solutions of alkali.—Ztschr. f. ang. Chem. Berl., 1906, v. 19, part 2, pp. 1849–1854.

Kleine, A., describes and discusses the use of an apparatus for the determination of carbon.—*Ibid.*, v. 19, part 2, p. 1712.

ACID, PICRIC.

Feder, E., outlines a method for estimating picric acid by titrating with N/10 potassium hydroxide solution, using phenolphthalein as an indicator.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 216.

CITRATES AND TARTRATES.

Tocher, J. F., discusses the reaction of tartaric and citric acid with cobalt nitrate solution and sodium hydrate. He records experiments with a number of organic acids and includes a table for the separation of tartrates, citrates, and malates.—Yearbook of Pharmacy, 1906, pp. 304–307.

FEHLING'S SOLUTION.

Lavalle, F. P., discusses the difficulties met with in the use of Fehling's solution and suggests the use of a solution containing an excess of alkali, to prevent the precipitation of red oxide of copper.—Chem. Ztg., 1906, v. 30, p. 17.

Kelhofer, W., discusses the estimation of invert sugar by weighing the dried precipitate obtained by means of Fehling's solution.—Ztschr. f. anal. Chem. Wiesb., 1906, v. 45, pp. 88–91, 745–747.

Tamisier, D. C., points out an error in the estimation of sugar by means of Fehling's solution caused by the solution of the oxide of copper in the solution.—Bull. Pharm. du Sud-Est., Montpel., 1906, v. 11, pp. 202, 203.

NESSLER'S REAGENT.

Buisson, A., asserts that the quantitative estimation of ammonia in water by Nessler's reagent is unreliable. (C. R., 1906, v. 143, p. 289.)—Biochem. Centr.lbl., Leipz., 1906–7, v. 5, p. 814.

Rosenthaler discusses the behavior of Nessler's reagent with several glucosides, particularly saponins.—Pharm. Zentralh., 1906, v. 47, p. 581.

THALLEIOQUIN REACTION.

Führer, Hermann, presents a study on the nature, history, and chemistry of the thalleioquin reaction.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 602–622.

ARSENUM TESTS.

Coblentz, Virgil, discusses the objections to the old and the method and philosophy of the new test.—Apothecary, Boston, 1906, v. 18, p. 31.

Hill and Collins (Chem. and Drug., Sept. 30, 1905, 548) discuss the application of Gutzeit's test, and suggest the use of apparatus somewhat different from that ordinarily used.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 848, 849.

Goods and Perkins conclude, as to the reliability of the Gutzeit test, that it is not possible to prepare permanent standards; therefore, all determinations must be done in parallel. * * * With reference to the different methods of detecting arsenic, the Marsh-Berzelius apparatus requires a lot of experience, but in the hands of an experienced manipulator may be said to be practically infallible. The same remarks apply to the electrolytic method when a lead cathode is used, although this is not quite so delicate as the Marsh-Berzelius apparatus. The Gutzeit test requires care and experience and then leaves little to be desired. In all the methods the samples to be tested should be as free as possible from foreign substances, especially metallic impurities. For general testing purposes they think the Gutzeit test has decided advantages over the Marsh-Berzelius; but for cases of poisoning, of course, the Marsh-Berzelius apparatus is the one which should be employed. A lengthy discussion follows.—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 507–512.

Ferraro and Carobbio present a modification of the Bettendorf test for arsenic which consists in adding to the suspected liquid a thin piece of tin and ten or twelve drops of hydrochloric acid and heating for from ten to twelve minutes. (Boll. chim. farm., v. 44, p. 805.)—Pharm. Ztg., Berl., 1906, v. 51, p. 214.

The Ph. Austr. VIII directs that the Bettendorf test for arsenic be used in place of the formerly official Marsh test.

Thorpe, Thomas Edwards, finds that the arsenic occasionally present in wall papers, fabrics, etc., can be accurately and expeditiously determined by the electrolytic method.—J. Chem. Soc., Lond., 1906, v. 89, pt. 1, pp. 408–413.

Kebler, L. F., discusses the several available tests for arsenic and points out that the arsenic mirror obtained by the Marsh-Berzelius method is comparable in all respects with the corresponding mirror obtained by the electrolytic method, and that equally satisfactory determinations can be made by using the one or the other method.—Proc. Ass. Off. Agric. Chem., 23d Ann. Conv., pp. 181–182. (Bull. Bur. Chem., U. S. Dept. Agric. 1907, No. 105.)

Galimard and Verdier outline a modification of the Marsh test which involves the breaking down of the organic compounds of arsenic found in glycerin.—J. de pharm. et de chim. Par., 1906, v. 23, p. 183.

De Vamossy, Zoltan, finds, as the result of his researches on the activants in the disengagement of hydrogen in the Marsh apparatus, that, contrary to the earlier experiences of Gautier, one may employ the salts of copper as well as the salts of platinum; the quantitative results are the same and all of the metalloid is recovered in the ring.—Bull. Soc. de chim. Par., 1906, v. 35, pp. 24–28.

Gautier, Armand, replies that he still holds to his opinion of thirty years, and insists that the employment of platinum is indispensable.—*Ibid.*, pp. 207, 208.

Betrand and De Vamossy (Ann. Chim. Phys., 1906, v. 7, pp. 523–536) present some observations on the estimation of arsenic by means of the Marsh apparatus, and point out the need of regulating the flow of gas and other conditions influencing the test.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 884.

Thomson, William, describes an improvement in the cooling method for condensing the arsenic mirrors in arsenic determinations, certain details of electrolytic methods and the sensitization of zinc in the Marsh-Berzelius apparatus by cadmium sulphate.—Brit. Food J., Lond., 1906, v. 8, pp. 165–168. (See also Chem. News, Lond., 1906, v. 94.)

Bishop, H. B., outlines a method for the estimation of minute quantities of arsenic in sulphuric acid and in other substances soluble in or decomposed by hot concentrated sulphuric acid. The special advantages claimed are that large samples may be taken, comparatively few reagents are required, and the final determinations are made by means of the Marsh apparatus which can be operated under standard and uniform conditions.—J. Am. Chem. Soc., 1906, v. 28, pp. 178–185.

Reckleben and Lockemann have investigated the reactions of arsenic hydride with silver nitrate solution, the halogens, the halogen acids, also with chromic and permanganic acids, and make a preliminary report. (From Ztschr. f. angew. Chem., 1906.)—Pharm. Zentralh., 1906, v. 47, p. 525.

Reckleben and Lockemann (Ztschr. f. ang. Chem., 1906, v. 19, p. 275) recommend the hypochlorite, rather than the silver nitrate method for the determination of AsH_3.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 175.

Coblentz, Virgil, discusses the special tests for arsenic and the objections to each. He summarizes these tests as follows: Berzelius-Marsh, limit. 0.001 mgm. As_2O_3; Gutzeit silver, limit, 0.001 mgm. As_2O_3; Gutzeit mercuric chloride, limit, 0.002 mgm. As_2O_3; Bettendorf, limit, 0.1 mgm. As_2O_3.—Am. J. Pharm., Phila., 1906, v. 78, pp. 305–311.

5. BIOLOGIC PRODUCTS.

Weidermann, H. P., in an article on chemical engineering in the packing house, enumerates and reviews, in addition to pepsin, pancreatin, thyroid, and suprarenal gland, the following animal extracts: Cardine from the heart of the bullock, medulline from the spinal cord, testine from the testes of the bull and ram, ovarine from the ovaries of the hog, musculine from the muscular tissue, and cerebrine from the brain of the bullock.—Chem. Eng., Phila., 1906–7, v. 5, p. 73.

Arnold, L., records a list of the drugs of animal origin employed by Arabs. This list embraces substances of human origin.—Bull. pharm. du Sud-Est., Montpel., 1906, v. 11, pp. 69–74, 126–129.

Wintgen and Keller discuss the composition of lecithins. They conclude that for plant lecithin the phosphorus and the nitrogen contents are not always indicative, though they might be for the lecithin obtained from egg yolk. Lecithin, they believe, should be reserved as a name for the preparation made from egg yolk, while the plant extracts should be designated to indicate their origin.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 3–11.

ENZYMES.

Pollak, Isidor, discusses diastatic enzymes and their practical application, both as to medicine and for technical purposes.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 219, 220.

Smeliansky, Mana (Arch. f. Hygiene, 1906, v. 59, pp. 187–215), discusses the influences exerted, by various additions, on the coagulation of milk by means of rennin.—Biochem. Centralbl. Leipz., 1906–7, v. 5, p. 895.

Huss, Harald, discusses the origin and uses of kefir, its biologic constituents and its chemical constituents.—Svensk. farm. Tidskr. 1906, v. 10, pp. 117–119.

Gonnermann, M., reports a number of experiments on the action of enzymes and intestinal bacteria on glucosides and alkaloids. The substances reported on in this series of papers are sinigrin, arbutin, amygdalin, sapotoxin, atropine, cocaine, morphine, and oxydimorphine.—Apoth. Ztg., Berl., 1906, v. 21, pp. 976–979, 988–989, 998–999.

Bourquelot, M., in a communication to the Congress on applied chemistry at Rome, discusses the action of oxydases and gives numerous bibliographic references.—J. de pharm. et de chim. Par., 1906, v. 24, pp. 165–174.

See also communications on related subjects, Bourquelot, Em., *Ibid.*, v. 23, pp. 369–375; Vintilesco, J., *Ibid.*, v. 24, pp. 145–154.

6. VEGETABLE DRUGS.

Bougault, J., in a review of the new U. S. P., notes that the descriptions of vegetable drugs are very brief and limited to morphologic and organoleptic characters; there are no histologic characters given and rarely any microscopical characters for the powders. The absence of directions for the preparation of simple powdered drugs seems curious to the reviewer and he wonders if they are not used in this form.—J. de pharm. et de chim. Par., 1906, v. 23, pp. 285, 288.

Rusby, Henry H., discusses the identification and preservation of drugs, points out how certain general characteristics are utilized for identifying drugs, and how a knowledge of these same characteristics with some knowledge of the composition of the drug can be utilized for its preservation.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 255–259.

Holmes, E. M., discusses the preservation of drugs and points out that it is not light alone which destroys color in plants and alters their constituents, but oxidizing enzymes in the presence of moisture. He calls attention to the possible use of lime as an aid in the complete drying of drugs and asserts that samples of flowers and leaves that have been on exhibition in the Museum of the Pharmaceutical Society for upward of twenty-five years, and in the drying of which lime was used, still retain their original color.—Pharm. J., Lond., 1906, v. 22, p. 127.

Weigel, G., points out that the Ph. Ndl. devotes considerable attention to the specification of the time of year in which certain drugs are to be gathered. Then, too, certain drugs like digitalis, colchicum, ergot, and aspidium are to be renewed annually. A number of chemical tests and assay processes are given. Quantitative tests are provided for opium, ipecac, nux vomica, and others, while qualitative tests are provided for such drugs as belladonna leaf, hyoscyamus and stramonium. The ash content of the drug is also quite frequently prescribed.—Pharm Zentralh., 1906, v. 47, p. 374.

Tschirch, A., presents a systematic classification of plant secretions. He classifies them primarily into (*a*) resinotannol or tannol resins, (*b*) resenresins, (*c*) caesalpinoid resins, (*d*) resinolresins, (*e*) aliphatoresins, (*f*) chromoresins, (*g*) enzymoresins, (*h*) gluco resins, (*i*) lactoresins, (*k*) pseudoresins.—*Ibid.*, v. 47, pp. 329–333.

Mittelbach, Wm., believes that the recognition of more than one part of the same plant, as in the case of belladonna and colchicum, is a mistake. Proc. Am. Pharm. Ass., 1906, v. 54, p. 449.

An editorial points out that the standards for crude drugs in the U. S. P. have been criticised as being impracticably high in many instances.—Am. Druggist, N. Y., 1906, v. 49, p. 159.

Hopkins, J. L., in a letter to the chairman of the committee on revision of the U. S. P., asserts it to be his belief that nature has not stopped producing botanical drugs of high alkaloidal content, but that rather the poor supplies must be ascribed to the indiscriminate gathering of immature and deficient specimens.—Oil, Paint and Drug Rep., 1906, v. 70, Dec. 31, p. 47.

Dohme, A. R. L., asserts that nature does not always provide crude drugs of uniform quality and strength and that in such cases government officers should be in position to make their rulings accordingly.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Rusby, H. H., is quoted as saying that while it is true that the markets of New York do not afford ipecac, jaborandi, and possibly other crude drugs which comply with the requirements of the pharmacopœia, this is merely because Americans have not insisted on higher standards, and that drugs complying with the pharmacopœial standards can be readily secured if our importers will only pay an adequate price.—*Ibid.*, v. 49, p. 346.

He asserts that:

> A large minority of American pharmaceutical manufacturers make no provision for ascertaining the alkaloidal strength of the drugs which they employ, or of the preparations after they are made. Most of the others do so in so fragmentary and careless a way that they can not truly claim to attempt to meet the official requirements. Of these two classes, a majority purchase the cheaper drugs, closing their eyes to the fact that the price conditions render it highly improbable that the drugs so bought are of standard quality. The fact is established by the uniform experience of drug dealers that they have difficulty in finding a market for their better grades of goods.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 332.

Weigel, G., discusses the more remarkable changes evidenced in the crude drug market during 1905.—Pharm. Zentralh., 1906, v. 47, pp. 159–162, 182–187. 234–240, 250–257, 279–282.

A report of the drug market presents a considerable amount of interesting material relating to the prices and uses of the several drugs sold in this country.—Oil, Paint and Drug Rep., 1906, v. 69, Jan. 29, part 2, pp. 33–51.

Hartwich, C. (Schweiz. Wchnschr. f. Chem. u. Pharm., 1906). records a number of adulterations and sophistications of well known and widely used drugs.—Apoth. Ztg., Berl., 1906, v. 21, pp. 65, 66.

True, Rodney H., in an address before the N. W. D. A., reported experiments in the growing of a number of medicinal plants. Four drug-testing gardens are now in existence under the supervision of the Bureau of Plant Industry, one in Vermont, one near Washington. one in South Carolina, and one in Texas. The situation of these gardens permits of the cultivation of plants, the habitats of which are in widely separated countries, the species planted at each station being those found to thrive best in the particular latitude.—Drug. Circ. and Chem. Gaz., N. Y., 1906, v. 50, p. 422.

An abstract from the report of B. T. Galloway, the chief of the Bureau of Plant Industry of the Department of Agriculture, contains much interesting material relating to the growing of medicinal plants in the United States.—Oil, Paint, and Drug Rep., 1906, v. 69, Jan. 8, p. 17.

See also report by R. H. True.—*Ibid.*, v. 70, July 2, pp. 46, 47.

Holmes, E. M. (J. Roy. Hort. Soc., Lond., 31, 1906, pp. 42–61, figs. 8), discusses the use and culture of plants for medicine, both in ancient and modern times. The important herbs employed for medicinal plants are considered. He also refers to the publications of numerous members of the medical profession who have been active in encouraging the production and cultivation of medicinal plants. A list of the herbs most commonly used for medicinal purposes in England is given.—Exper. Sta. Rec., 1906, v. 18, p. 740.

An abstract (from Ber. über Land und Forstwirtschaft in Deutsch Ost Africa) presents some data regarding the cultivation of drugs in German East Africa and enumerates the drugs that are being experimented with.—Oil, Paint, and Drug Rep., 1906, v. 69, May 28, p. 10.

Hanausek, Eduard, reviews the literature of the year relating to pharmacognosy.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 373–375.

Tschirch, A., outlines the efforts made to classify the geographic origin of drugs and plants. He attempts to establish type drugs from the several geographic divisions, which he classifies as Middle European, Northern, Mediterranean, North African, Central African, South African, North African-Arabian-Persian, South

Asiatic, Chinese-Japanese, North American, Central American, South American and Australian-New Zealand Drug Kingdoms.—Ztschr. d. allg. österr. Apoth.-Ver. Wien, 1906, v. 44, pp. 39–43.

Henkel, Alice, presents a compilation of the names of wild medicinal plants of the United States, the synonyms employed, the parts used, some of the important features of habit and stature, and the geographical distribution of the plant in the United States.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89.

Morrison, George C., exhibited at a meeting of the Indiana Pharm. Ass. a large collection (40 varieties) of common medicinal plants found in a healthy growing condition within a radius of 10 miles from the Hoosier capital.—Proc. Indiana Pharm. Ass., 1906, p. 217.

Cooper, Stanley (Proc. Ind. Acad. Sci.), reports a series of experiments with the reputed poisonous plants of Indiana for the purpose of determining the cause of the local irritation that is produced by them.—Pharm. J., Lond., 1906, v. 22, p. 227.

Schneider, Albert, discusses the medicinal plants of California Indians and cites the more important plants used by them in the treatment of disease.—Merck's Rep., N. Y., 1906, v. 15, pp. 63–66, 95–96, 126–128.

Weberbauer, A., presents observations on the vegetation of the higher Andes, discusses the meteorology, enumerates the plants found, and points out some of their characteristics.—Bot. Jahrb., Engler, Leipz., 1906, v. 37, pp. 60–94.

Peckolt, Theodor, presents a number of popular names of Brazilian plants and products that have been adapted from the native language.—Pharm. Rev., 1906, v. 24, p. 17, 32, 65, 161, 193, 225. (See also Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 22 ff.)

1. POWDERED DRUGS.

Rupp, E., asserts that the widespread practice of purchasing drugs in the powdered form makes their control a matter of great difficulty. He points out that in addition to the microscopic control, chemical testing, and particularly the determination of certain factors, such as ash content and the yield of extract to water and alcohol of varying dilutions, are important. He outlines the maximum ash content for a number of drugs and also presents some data on the minimum extract content that should be required.—Apoth. Ztg. Berl., 1906, v. 21, pp. 485–488.

Nelson, Burt E., continues the description of powdered drugs with an analytical scheme for the microscopical examination.—Merck's Rep., N. Y., 1906, v. 15, p. 6 ff.

Whelpley, H. M., discusses the possibilities of the compound microscope in the recognition of powdered drugs, and cites the difficulty of differentiating belladonna and stramonium as an excuse for not including more of this kind of work in the pharmacopœia.—Proc. Missouri Pharm. Ass., 1906, p. 84.

Hartwich and Bohny assert that in purchasing powdered drugs the pharmacist must satisfy himself, by a careful microscopic examination of the powder, of the identity of the drug, and, so far as possible, determine by chemical means the activity or the value of the drug that is supplied him.—Apoth. Ztg., Berl., 1906, v. 21, p. 231.

Whelpley, H. M., calls attention to the fact that often a 10-cent magnifying lens is of great value in recognizing drugs which have distinguishing characteristics not readily detected by the naked eye, and notes that the U. S. P. gives particular attention to characteristics of drugs which are brought out by means of a cheap, simple microscope.—Proc. Missouri Pharm. Ass., 1906, pp. 104–106.

Wulff, C., calls attention to the fact that practically all of the pharmacopœias now devote considerable attention to the description of histologic structures of crude drugs. He also points out that in the U. S. P. VIII in comparison with the really excellent descriptions of chemical substances, the descriptions of crude drugs appear to be deficient.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 167.

Weigel, G., points out that the Ph. Ndl. IV is particularly complete in its description of vegetable drugs. The various anatomic elements of these drugs are considered in detail and frequently a lengthy paragraph is devoted to the consideration of the microscopic examination of drug powders.—Pharm. Zentralh., 1906, v. 47, p. 374.

An unsigned critique of the Ph. Ndl. IV notes that the description of drugs and the microscopy of the powders that are made from them is regarded as the best and most scientific part of the pharmacopœia and original in many respects.—Chem. & Drug., Lond., 1906, v. 68, p. 828.

The Ph. Austr. VIII devotes considerable attention to the description of powdered drugs. The histologic characteristics are fully defined and with the greater majority of the drugs a limit of ash content, a minimum of extract, and with resinous and gum containing drugs also the desired content of these constituents.

Bedall, C., suggests that the next Ph. Germ., in addition to scientific descriptions of powdered drugs, also include at least some well chosen illustrations of important characteristic structures.—Apoth. Ztg., Berl., 1906, v. 21, p. 742.

Rusby, H. H., asserts that:

> Of powdered drugs and spices—that is, spices handled as drugs and getting into the retail pharmacy, fully a third are intentionally adulterated or seriously degraded by systematic formulæ.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 332.

Schürhoff, P., reports on a number of adulterations of powdered drugs and their detection by means of the compound microscope.—Pharm. Ztg. Berl., 1906, v. 51, p. 479.

Thomann, Julius, calls attention to a number of adulterations met with and points out the need of examining all powdered drugs by means of the microscope.—Schweiz. Wchnschr., f. Chem. u. Pharm., 1906, v. 44, p. 544.

Evans, John, comments on the frequency of adulteration and the necessity for and practicability of microscopic examination. He commends the method of Allen and the papers of Greenish and Collin.—Apothecary, Bost., 1906, v. 18, p. 906.

Collin, E., points out the widespread use of rice chaff as an adulterant in powdered drugs and spices, and figures the characteristic structures.—Pharm. Ztg. Berl., 1906, v. 51, p. 680.

Jones Henry William, has found it of distinct advantage to supplement the microscopic analysis of powdered drugs by a further examination of the residues left after treatment with acid and alkali as generally used for the determination of fiber. He describes the process by which he concentrates a powder.—Pharm. J., Lond., 1906, v. 23, p. 102. (See also note on p. 161.)

2. VALUATION OF VEGETABLE DRUGS.

The Ph. Austr. VIII directs that the extract content of drugs be determined in a way outlined in the pharmacopœia.—Ph. Austr. VIII, 1906, p. 27.

Alcock, F. H., describes the process for the determination of the amount of nitrogen in some common drugs by the Kjeldahl-Gunning process and summarizes his results with a number of drugs, grouped as seeds, leaves, barks, etc.—Pharm. J., Lond., 1906, v. 23, p. 100. See also Yearbook of Pharmacy, 1906, p. 286.

Jones, Henry Williams, outlines methods for the separation of and the subsequent determination of the amount of fiber present in drugs by means of the microscope.—Yearbook of Pharmacy, 1906, pp. 290–291.

The Geschäfts Bericht von Caesar & Loretz (1906, p. 5) gives the following figures:

Pharmacopœia.	No. of vegetable drugs.	No. of assays.	No. of ash deter.
Ph. Germ. IV, 1900	127	9	12
U. S. P. VIII, 1905	151	19	13
Ph. Ndl. IV, 1905	136	12	41
Ph. Belg. III, 1906	134	5	22
Ph. Austr. VIII, 1906	171	9	147

3. ASH DETERMINATIONS.

Frerichs, G., suggests that for uniformity and convenience the pharmacopœia should direct the maximum quantity of substances that should leave no weighable residue on incineration. He suggests the quantities for a number of official substances, also gives a list of substances that should leave no residue, and a maximum ash content for a number of official drugs.—Apoth. Ztg., Berl., 1906, v. 21, pp. 937–939.

Kebler, L. F., says it is undoubtedly impossible for a druggist to ascertain the quality of all his wares, but he ought to take sufficient professional pride in his business to apply a few simple tests to determine their purity, especially when the testing is of so simple a nature as an ash determination.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 163.

von Konek, F., presents some observations of interest in connection with ash determinations.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 567, 568.

Cowie and Dickson report on the ash percentage and its composition in samples of commercial eclectic resinoids: Euonymin, iridin, leptandrin, and podophyllin.—Pharm. J., Lond., 1906, v. 22, pp. 220, 221.

The following table, adapted from the Geschäfts Bericht von Cæsar & Loretz (1906, p. 4), will serve to illustrate the requirements made by the several pharmacopœias published in 1905 and 1906 in regard to ash content:

Name of drug.	U. S. P. VIII.	Ph. Ndl. IV.	Ph. Belg. III.	Ph. Austr. VIII.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Acacia	4	4	5	3
Anisum			12	5
Cardamomum	4	3 to 8		10
Cinnamomum	4	4 to 8	7	5
Caryophyllus	8	6		8
Cinchona		4		6
Granatum		8 to 15		10
Ipecacuanha		1.8 to 6		5
Rhamnus purshiana		10		6
Rheum		5 to 12		12

4. ALKALOIDS.

Puckner, W. A., discusses the meaning of the term alkaloid, some applying the term to all vegetable bases, while others restrict the term to those bases which are related to pyridine, according to which definition caffeine and even morphine are excluded.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 228.

Lyons, A. B., points out that from the replies received by the A. Ph. A. committee on the U. S. P. it would appear that the U. S. P. standards for alkaloid contents of crude drugs are in the main reasonable.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Thurston, Azor, presents a tabular arrangement of the pharmacopœial alkaloids and alkaloidal salts, including among other information all of the requirements regarding source, solubility, melting points, and characteristic reactions.—Merck's Rep., N. Y., 1906, v. 15, pp. 256–258.

Gordin, H. M., reviews the progress in alkaloidal chemistry during the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 97–104, 142–148, 175–192, 208–224, 238–251, 274–280, 366–374.

Pictet, Amé, discusses the formation of alkaloids in plants as indicated from a study of the alkaloids of tobacco—nicotine and nicoteine—which he believes are formed by the union of pyridine and a pyrrol nucleus.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 389–398.

Moureu, Charles, discusses the recent work on the alkaloids of tobacco.—J. de pharm. et de chim., Par., 1906, v. 24, pp. 302–310.

Spiegel, L., discusses the advances made in the chemistry of the alkaloids since the beginning of the century.—Biochem. Centralbl., Leipz., 1906–7, v. 5, pp. 97–104, 149–166.

Herder, M., discusses the behavior of alkaloids with aluminum sulphate, cobalt, nickel potassium cyanide, the cadmium double salts, mercury and potassium iodide, and the application of these reagents to microchemical uses.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 120–132.

Simmer, A., discusses the behavior of alkaloids and other organic substances to the solvents used in shaking-out processes, particularly chloroform; the decomposition products occurring on treating alkaloids with chloroform; and the reducing action of alkaloids.—*Ibid.*, v. 244, pp. 672–684.

5. ASSAY PROCESSES.

Lloyd, John Uri, points out the fallacy of placing too much weight on the assaying of pharmaceutical plant preparations and suggests that the limitations of assay processes should be better defined.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 8.

Bougault, J., in a review of the U. S. P., questions the advisability of introducing assay processes and analytical methods which have not been established by " abundant " experimentation.—J. de pharm. et de chim., Par., 1906, v. 23, p. 290.

Tschirch, A., commends the method of directing the assay followed in the U. S. P. VIII. The necessary materials being directed, it is possible to arrange all of the material before proceeding with the work and thus avoid annoyance.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 419.

Francis, John M., points out that so long as the pharmacopœia only possessed an academic interest it was perhaps not so important for us to give it attention; but since the recently enacted food and drug law is based upon the specifications of the U. S. P. and N. F., the assay methods have become a matter of very great interest and importance to all pharmacists.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 452.

Gordin, H. M., can see no good reason for the use of different methods for different drugs. While it is true that not every method is suitable for every drug, it would nevertheless seem to be advisable to adhere to one and the same method wherever it gives as good results in one case as another.—Am. J. Pharm., Phila., 1906, v. 78, p. 453.

Searby, W. M., doubts not but that many persons will question whether the assay processes are " reasonably simple," as prescribed by the Pharmacopœial Convention. It is to be borne in mind that this assay work requires some skill and care, and only persons reasonably skilled will be able to make reliable assays by any processes that may be given them.—*Ibid.*, v. 78, p. 210.

Moerk, Frank X., presents a comprehensive study of the assay processes of the U. S. P. VIII, and a tabular arrangement of some of the details of the assay processes.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 157–160.

Gordin, H. M., presents a critical study of the assay methods adopted in the U. S. P. VIII, and points out that while the greater number of these methods are very good there are a few that either do not work at all or are so complicated that they will hardly ever give concordant results in the hands of different chemists.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 377–381.

Eliel, Leo, discussing the methods pursued by the Committee of Revision, asserts that some of the work falls into the hands of people who will not listen to certain things. There are a number of assay processes in the U. S. P. that are absolutely wrong. If we follow them as they are now, and if we undertake to do work according to some of these assay processes, we are likely to reject good drugs because of errors in the assay processes.—Proc. Indiana Pharm. Ass., 1906, p. 73.

Puckner, W. A., believes that the most striking feature in connection with the U. S. P. VIII is the inconsistency in the adoption of assay processes; showing a lack of cooperation or system in the work of the subcommittee having this work in charge. Instead of deciding on some general principle for the methods of assay to be selected, each drug appears to have been considered by itself. Even the adaptation of the method of assay for a drug to its preparations appears to have been neglected for no very evident reasons.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 229.

Dohme, A. R. L., maintains that the U. S. P. VIII assay processes for aconite, belladonna root and leaf, cinchona, coca, colchicum, conium, guarana, hydrastis, hyoscyamus, ipecac, nux vomica, pilocarpus, scopola, stramonium, and jalap are practical and correct and can be carried out by a competent analyst, and that the standards of strength are fair and in accordance with experience.—Am. Druggist, N. Y., 1906, v. 49, p. 267.

Rusby, H. H., says that the results of pharmaceutical assaying are irregular and uncertain, but he believes that the causes for this uncertainty can and should be overcome. He asserts that the chief responsibility for the present uncertainty in pharmaceutical assaying rests with the institutions which profess to teach pharmaceutical chemistry. Many of these have been conducted on a system quite as dishonest as anything that has existed in commerce.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 332.

Kebler, L. F., points out that the development of a high degree of accuracy in drug assaying is desirable and is to be sought through an application of the scientific principles which have improved other branches of analysis. He believes it to be necessary first to recognize the nature of the difficulties to be surmounted, determine the obscure causes for variation in results, and eliminate the errors usually ascribed to personal equation or personal error.—Proc. Off. Agric. Chem., 23d Ann. Conv., pp. 127–128. (Bull. Bur. Chem., U. S. Dept. Agric., 1907, No. 105.)

Francis, John M., points out that an operator following the exact instructions given in the assay processes of the U. S. P. may fail to get the full strength of the extract by 20 to 30 or even 50 per cent, and this leads to no end of trouble for the pharmacist as the Pharmacopœia requires that a drug or preparation when assayed by the process given should contain a given amount of alkaloid.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 453, 454.

Lyons, A. B., points out that in all shaking out processes sufficient of the solvent should be prescribed to extract the whole of the alkaloid, and the assay process should provide tests that this has been done in each case; or, better, the general instructions should make this imperative without special instructions in each instance.—*Ibid.*, v. 54, p. 441.

Vanderkleed, Charles E., believes that practically all of the U. S. P. assay processes are weak in specifying certain small amounts of ethereal solvents for " shaking out " purposes. He does not believe that in half the cases the full amount of alkaloid can be extracted unless vastly more than the amounts of ether, chloroform, etc., specified be used.—*Ibid.*, v. 54, p. 441.

Schaer, Edward, discusses the behavior of alkaloidal salts toward immiscible solvents and points out that during the contact of water immiscible solvents, such as chloroform, ether, etc., with neutral and especially acidulated solutions of alkaloidal salts, changes occur in consequence of which lesser or greater quantities of free alkaloid as well as alkaloidal salts are removed by these solvents.—*Ibid.*, v. 54, pp. 425–427.

Puckner, W. A., points out that in at least two particulars the verbiage of the directions in connection with the assay of mydriatic drugs is not happily chosen. Thus, when extracting with immiscible solvents the specification "shake the separator for half a minute" is liable to convey the impression that vigorous agitation is required. Such action may be the cause of forming emulsions. Also, in the case of hyoscyamus, in the directions given for the evaporation of the chloroform prior to the titration, sufficient stress is not laid on the importance of insuring the complete evaporation of the volatile organic bases present in the henbane.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 232.

An editorial recounts some of the criticisms that have been made regarding the assay methods for aconite, ipecac, and physostigma, and suggests that they and some of the other processes that have been criticised should be improved.—Am. Druggist, N. Y., 1906, v. 49, p. 159.

Dohme, A. R. L., to illustrate the impracticability of obtaining absolutely accurate results in the assay of crude drugs, presents a table showing the results obtained by seven well-known chemists using the same method of assay on the same drug. The figures for opium vary from 14.41 to 16.02 per cent; aconite from 0.81 to 1.21 per cent; and belladonna leaf from 0.17 to 0.33 per cent of alkaloid sought.—*Ibid.*, v. 49, p. 268.

Vanderkleed, Charles E., regrets that the pharmacopœia does not more emphatically advocate the use of iodeosin as an indicator in alkaloidal assays. He outlines his method of using this indicator.—Proc. Pennsylvania Pharm. Ass., 1906, p. 134.

Moerk, Frank X., points out that the difference in the quantity of tenth normal sulphuric acid consumed in the several titrimetric assays necessarily gives a wide range to the resulting error and suggests that the quantities that are directed to be used for the assays be readjusted so as to require a more uniform volume of the volumetric solution and thus make the error inherent in the assay process as near as possible an uniform one.—*Ibid.*, p. 159.

Puckner, W. A., presents a review, of the literature on the estimation of alkaloids, for the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 228–237, 267–273.

Browne, A. W., reviews the report, of the International Committee on Analysis, to the Sixth International Congress of Applied Chemistry at Rome, 1906.—J. Am. Chem. Soc., 1906, v. 28, pp. 1035–1047.

Philipp Röder, Wien, calls attention to the fact that the Ph. Austr. VIII demands assays for the alkaloidal content of galenical preparations made from drugs for which no assay is demanded, and asserts that it is not practicable to make satisfactory preparations from drugs that are not themselves satisfactory.—Pharm. Zentralh., 1906, v. 47, p. 481.

Wulff, C., points out that one of the more evident shortcomings of the German pharmacopœia is that in connection with the assay processes (which are practically all titrimetric) the Ph. Germ. IV does not indicate the equivalent amount of alkaloid, and this information is usually furnished in connection with assay processes in foreign pharmacopœias.—Ber. d. pharm. Gesellsch. Berl., 1906, v. 16, p. 164.

Dott, D. B., believes that the Ph. Brit. processes might, with advantage, be simplified, and asserts that some of the peculiarities in assay processes are rather in the nature of fads. All of the more important alkaloids in liquid extracts, he believes, are easily dissolved out by a mixture of chloroform and ether, so there is no need for varying the solvent employed.

In the instances of belladonna, cinchona, and ipecacuanha the alkaloids can be well enough titrated by standard acid to estimate the quantity present.

In the case of nux vomica the modification of the nitric acid method, devised by Farr and Wright, gives excellent results, is less liable to error than the ferrocyanide process, and can be completed in a much shorter time.—Yearbook of Pharmacy, 1906, p. 301.

Dieterich, Karl, reports a comparative study of the assay processes of the Ph. Austr. VIII, the Ph. Germ. IV, and the potassium bismuth iodide method advocated by Thoms. From his observations it is evident that the Ph. Germ. IV method gives abnormally high, and somewhat irregular results, while the Ph. Austr. VIII and the potassium bismuth iodide method advocated by Thoms give fairly correlating results.—Helfenberger Annalen, 1905, Berl., 1906, pp. 163–165.

Thoms, H., discusses the applicability of potassium bismuth iodide solution and concludes that while this proposed reagent offers a fairly accurate method for the determination of the quantity of alkaloid present, the routine use is not to be considered because of the difficulty and complex nature of its application.—Arb. a. d. pharm. Inst. d. Univer. Berl., 1906, pp. 57–61.

Jonescu, D., elaborates on the work done by Thoms in connection with the quantitative estimation of alkaloids by means of potassium bismuth iodide solution. He concludes that atropine, strychnine, quinine, caffeine, and antipyrine may be accurately determined by this method.—Ber. d. pharm. Gesellsch. Berl., 1906, v. 244, pp. 130–133.

Matthes and Rammstedt review the literature relating to the determination of alkaloids by means of potassium bismuth iodide and enumerate the several references.—Pharm. Ztg. Berl., 1906, v. 51, pp. 1031–1033.

Caesar and Loretz outline a series of assays for various drugs, and, in the introductory, enumerate the materials that are necessary for the successful carrying out of these several processes. They point out that the materials needed are simple, inexpensive, and that every pharmacist should be able successfully to follow the methods as outlined.—Geschäfts-Ber. v. Caesar & Loretz, 1906, p. 87.

Gordin, H. M., describes and figures two separatory funnels for use in the assay of drugs by immiscible solvents.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 378.

Eldred, Frank R., describes and figures a percolator which he has found useful in the assaying of drugs.—J. Am. Chem. Soc., 1906, v. 28, pp. 187, 188.

6. PHYSIOLOGICAL STANDARDIZATION.

Galloway, B. T., in transmitting the manuscript of Bulletin 112 to the Secretary of Agriculture, says:

> Among the great advance steps taken by medicine in later years, the attempt to bring medicinal agents to known and, when possible, uniform standards of action is one of the most important. Many drugs are now standardized by chemical methods and can be administered by the physician in full confidence that his remedy is capable of exerting the desired degree of action. In the case of others in which the active principles are not as yet known or in which the principles will not admit of isolation, testing by physiological means has come to be recognized as a prime necessity. Since this phase of drug investigation is still young, a considerable diversity in methods exists.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 112.

Maben, T., discusses the need of standardizing galenical preparations and the rationale on which it is based. He quotes from the Brit. Med. J. for 1905 to show that the need of standardizing preparations of active drugs for which no chemical standards have been developed is being recognized and points out that for such preparations the best scientific opinion is on the side of physiological standardization.—Pharm. J., Lond., 1906, v. 22, pp. 61–63.

Editorial comment.—*Ibid.*, p. 56.

Martin, William, suggests that it would be desirable to make tests by selecting the crude drug and have liquid preparations made from this drug according to the pharmacopœial directions. As it is there is frequently no evidence to show the origin or the composition of the preparations tested. It has yet to be shown that there will be any variation of clinical importance if proper care is exercised by a competent pharmacist both in selecting the crude drugs and in making the preparation according to pharmacopœial directions.—Pharm. J., Lond., 1906, v. 22, p. 86.

"Gnomon," in discussing standardization extravagance, suggests that many of the preparations tested have probably been manufactured on the large scale by modifications of the official processes and kept for an unreasonable length of time or under improper conditions.—*Ibid.*, v. 22, p. 88.

Quant, Ernst, discussing the possibilities of physiological standardization, points out that it would be advisable to consider the practicability of introducing standard methods of preparing and preserving galencial preparations and believes that the perfecting of these methods would go far toward keeping the pharmacist free from the embarrassment of physiological standardization.—*Ibid.*, v. 22, p. 98.

Holmes, E. M., discusses the necessity for physiological standardization and points out that it is very doubtful indeed if the methods of physiological testing now employed will serve to secure permanent uniformity of strength.—*Ibid.*, v. 22, p. 126.

Gadd, H. Wippel, discusses the economic questions involved in the physiological standardization of drugs and points out that, for the present at least, it would appear to be desirable for all who desire to see preparations of drugs made more efficacious to direct their efforts toward settling the methods by which this can be attained, leaving the economic questions to be settled in due course by ordinary laws of supply and demand.—*Ibid.*, v. 22, pp. 149, 185.

Grier, J., points out that the conditions under which physiological standardization must be conducted are too uncertain to warrant its adoption as an official method. A large series of experiments would have to be done before any definite conclusions concerning the value of any particular sample could be determined.—*Ibid.*, v. 22, p. 238.

McWalter, J. C., in discussing the bio-standardization of drugs, points out the desirability of determining the individual equation of the animal.—Chem. & Drug., Lond., 1906, v. 68, p. 204.

Haynes, G. S., comments upon the unreliability of preparations of digitalis and declares the solution of the difficulty is to be found in physiological standardization of these drugs. Preparations should be placed on the market, suitably labeled, stating definitely that at a given date a certain dose killed a frog of so many grammes within a limited time.—Biochem. J., Liverpool, 1906, v. 1, pp. 62–87.

Focke agrees with Haynes that physiological control of the so-called "active principles," as well as the galenical preparations of the several heart tonics, is a practical necessity, and believes that future pharmacopœias will include such requirements.—Therap. d. Gegenw. Berl., 1906, v. 47, pp. 348–351.

Günther (Tierarztl. Zentralbl., 1906) presents some observations on the relations existing between chemical composition and the action of medicinal substances.—Pharm. Post, Wien, 1906, v. 39, pp. 54–56.

Maurel, E., concludes (1) the physiologic study of any agent should always commence with the fixation of the minimal mortal doses; (2) it is necessary to fix these doses for each species of animal and for each channel of administration utilized; (3) it is necessary to report the quantity employed per kilogramme of animal; finally (4) in describing the results obtained one should always indicate the quantity employed per kilogramme, the channel of administration utilized, and the minimum mortal dose by this channel.—Compt. rend. Soc. de biol. Par., 1906, v. 60, pp. 909, 975.

Perrot, E., discusses the therapeutic action of drugs and their active principles and points out that the latter do not accurately or even satisfactorily represent the therapeutic action of a satisfactory extract of the crude drug.—Bull. gén. de thérap. Par., 1906, v. 151, p. 447.

Bacon, Raymond Foss, reports on the physiologically active constituents of certain Philippine medicinal plants, including dita bark (*Alstonia scholaris*), *Datura alba*, *Entanda scandens*, and a number of fish poisons used by the natives.—Philippine J. of Sci., 1906, v. 1, pp. 1007–1036.

7. PHARMACEUTICAL PREPARATIONS.

1. GENERAL FORMULAS.

Searby, W. M., notes that the direction given by the Pharmacopœial Convention to adopt general formulas as far as possible does not seem to have been carried out to any great extent. As a consequence 56 pages are taken up with processes for making fluid extracts, which would seem to be about 50 pages more than was really necessary. A general formula for preparing a few of these extracts would have sufficed; the menstruum to be employed in the making of the remainder is all that need have been given.—Am. J. Pharm., Phila., 1906, v. 78, p. 213.

Bougault, J., in discussing the U. S. P. VIII, notes that, with rare exceptions, one finds at the head of the different groups of medicaments no general indications as to mode of preparation, principal properties, and characters of the group.—J. de pharm. et de chim. Par., 1906, v. 23, p. 287.

The Ph. Austr. VIII includes 19 general formulas; the Ph. Belg. III, 22; and the Ph. Japon. III, 14.

Taylor, S., suggests that dilute acids be prepared on a scientific basis. They should be some fraction of a normal solution, N/3 or N/5, as thought best. The present strength is an ancient relic not creditable to a scientific volume. Cowley and Catford make the same suggestions for alkaline and acid solutions.—Pharm. J., Lond., 1906, v. 23, p. 668.

Hérissy, H., notes that Ph. Ndl. IV prefaces the discussion of fatty oils, volatile oils, powders, etc., with general consideration relating to the groups. With reference to titrimetric solutions it is assumed that the pharmacist knows the modus operandi of their preparation.—J. de pharm. et de chim. Par., 1906, v. 23, p. 480.

The Ph. Belg. III includes a general formula and a description of compressed tablets under the heading "Compressa."

Lunan, George, discusses the propriety of arranging granular effervescent preparations consecutively and providing a monograph, giving a general process, in the appendix to the pharmacopœia. He gives formulas for a number of preparations.—Pharm. J., Lond., 1906, v. 23, pp. 665–668. (For discussion see pp. 675, 698.)

2. CHANGES IN STRENGTH.

Abraham, A. C., points out that a pharmacopœia is not justified in vitally altering the composition of a remedy, which has for hundreds of years been of practically the same composition, without altering its name.—Am. Druggist, N. Y., 1906, v. 48, p. 9.

3. STANDARDIZATION.

Kirby, William, discusses the application of the term "standardization" to medical preparations. He discusses in detail pharmacopœial evolution, standardization by analysis, percentage purity of chemicals, standard methods of testing, official standards, and minimum limits.—Pharm. J., Lond., 1906, v. 22, pp. 197–200.

Maben, Thos., points out that the generally accepted definition for "standardization" includes the adoption of definite amounts of the active principles of drugs; their various preparations must approximate, or in the case of potent drugs, must actually correspond thereto.—Brit. & Col. Druggist, Lond., 1906, v. 49, pp. 48–49.

"Gnomon" says the reference to Professor Remington's confession, that the U. S. P. VIII is certainly to be considered a manufacturer's handbook, reminds him of a protest made at the B. P. C. against the recognition of standardized preparations on the ground that the production of such preparations means throwing a larger share of the manufacture of galenicals into the hands of the wholesale druggists. . . . It should not be possible for a tincture made from inferior opium, or a liquid extract made from cinchona sweepings, to be passed off as a pharmacopœial preparation, because its alkaloidal strength has been adjusted so that the tincture or extract complies with the requirements of the official assay process.—Pharm. J., Lond., 1906, v. 23, p. 238.

Commenting on a discussion of standardized preparations, he says the obvious moral is that suggested modifications of existing processes and proposed new formulas should be made the subject of experimental work at a much earlier period than has been customary when the pharmacopœia is undergoing revision.—*Ibid.*, v. 23, p. 698.

Rupp, E., points out that in view of the steady decrease of preparations made in the laboratory of the apothecary it becomes necessary to develop simple methods for the determination of the composition and purity of the preparations purchased from the manufacturer. He outlines methods for determining the composition of the several preparations of mercury, particularly the several ointments.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 536–539.

An editorial points out that it is still undoubtedly true that as therapeutical effect is the sole reason of being for drugs and galenicals, the progress of pharmaceutical standardization must be strictly regulated by the progress of the science of pharmacology. There is little need to insist upon this. It is clear that to " standardize " a galenical on the basis of some ingredient of which the therapeutic effect is not understood is mere waste of time and effort.—Pharm. J., Lond., 1906, v. 22, pp. 190–191.

An editorial questions whether the scientific preparation of drugs used in daily practice has kept pace with researches upon their actions; whether the estimation of morphine in opium gives the best possible measure of the power of the drug, etc. A plea is made for the physiologic standardization of those drugs in which the chemical standardization is neither possible nor practicable.—Brit. Med. J., Lond., 1906, v. 2, p. 583.

4. REQUIREMENTS.

Eschbaum, Friedrich, asserts that the pharmacist should carefully test the liquid preparations, such as tinctures and fluid extracts, that he purchases and suggests a possibility of developing a satisfactory indication of the amount of alcohol and the percentage of extractive present by determining the specific gravity and the weight of the drops of any given preparation.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 355.

Wulff, C., deplores the changes in the Ph. Belg., which provide for the making of pharmaceutical preparations by simplified methods, such as the diluting of fluid extracts in the making of syrups, and the production of medicated waters by dissolving the oil in water in place of distilling the water from the crude drug. He believes that methods of this kind are only permissible when it can be actually shown that the resulting preparations are in every respect the equal of the preparations made by the more cumbersome but more direct method.—*Ibid.*, v. 16, pp. 260–261.

Weigel, G., points out that the Ph. Ndl. IV includes a number of specific requirements for pharmaceutical preparations. For tinctures the specific gravity and the extract content are generally specified, while in a number of instances quantitative or qualitative tests for active ingredients are included.—Pharm. Zentralh., 1906, v. 47, p. 375.

Evans Sons Lescher and Webb point out that the estimation of extractive often forms a good analytical check on the manufacturer, but they are of the opinion that the fixing of an arbitrary standard of extractive for many preparations is unnecessary and sometimes unwise.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 18.

5. GALENICALS.

Stiles, M. H., presents observations on the making of galenical preparations, and figures an apparatus for the automatic production of distilled water, the recovery of alcohol, and an improved glass percolator.—Pharm. J., Lond., 1906, v. 22, pp. 442–444, 467–469.

Scoville, Wilbur L., discusses pharmaceutical flavors and their uses, particularly the proper use of flavors, the purpose of flavoring wine to bring out lemon and oil flavors, flavors for acid mixtures, chloroform for alkaline mixtures, the flavoring of bitters, and flavors for emulsions and oils.—Am. Druggist, N. Y., 1906, v. 48, pp. 157–158.

Beysen, Kurt, suggests that the Ph. Germ. require that extracts and fluid extracts be made from the prescribed plant part previously dried and comminuted and used with the finer particles produced in course of comminution.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 328.

Brunker, J. E., reports on the examination of galenical preparations supplied to the Irish Medical Charities. Out of 9,455 samples of drugs examined only 231 were rejected. The results obtained are compiled in the form of tables giving the name of the preparation, number of samples examined, number found defective, amount of extractive in 100 mils, and the alcohol by volume per cent.—Yearbook of Pharmacy, 1906, pp. 292–295.

Fendler and Mannich discuss the several tests proposed from time to time for the detection of methyl alcohol in galenical preparations, and conclude that the official German method for detecting the presence of methyl alcohol is thoroughly satisfactory.—Arb. a. d. pharm. Inst. d. Univer., Berl., 1906, pp. 243–260.

6. DECOMPOSITION.

Caspari, Chas. E., discusses the preservation of galenical preparations and the precautions to be observed.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 261–264.

Hallberg, C. S. N., points out that it would be advisable to include in the U. S. P. lists giving the names of articles with special reference to their preservation. Such lists, presenting the necessary information in a concise way, would be of considerable practical value.—*Ibid.*, v. 54, p. 260.

The section on commercial interests of the American Pharmaceutical Association adopted a resolution calling the attention of the Committee of Revision of the Pharmacopœia to the practicability of incorporating in the appendix lists of the articles of the pharmacopœia with reference to the particular methods for their best preservation.—*Ibid.*, v. 54, p. 260.

Smith, F. A. Upshur, discusses the preservation of medicinal and chemical substances and calls attention to the detailed directions for keeping, embodied in the pages of the U. S. P. VIII. He points out that the worst conditions for storing drugs and chemicals are in large white glass bottles, partially filled, on shelves exposed to a strong light and to heat.—Pharm. J., Lond., 1906, v. 22, pp. 31, 33, 63, 86.

"Gnomon" discusses the precautions included in the U. S. P. for the preservation of medicaments and points out that, curiously enough, the stock of the elegantly fitted and well lighted modern establishment must tend to deteriorate much more rapidly than did the contents of its less attractive and more gloomy predecessor, and this fact doubtless explains why we hear so much more nowadays about the relative inertness of drugs, chemicals, and galenicals.—*Ibid.*, v. 22, p. 64.

Gane, E. H., suggests that systematic tests be made from time to time, over a long interval, of standard samples of assayed alkaloidal preparations to learn what impairments they are subject to.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 351.

7. INCOMPATIBILITY.

Dunning, Morgan, and others discuss the incompatibilities of alkaloids.—Proc. Maryland Pharm. Ass., 1906, p. 65.

For a list of incompatibilities of some new remedies, see the "Report on new remedies," appended to Proc. New York Pharm. Ass., 1906, pp. 51–53.

8. PERCOLATION.

Brandel and Kremers review the history of percolation, with numerous illustrations, and present quite an exhaustive bibliography relating to percolation and its uses.—Pharm. Rev. Milwaukee, 1906, v. 24, pp. 200–204, 311–316.

They discuss the general principles of percolation and point out that the choice of a percolator depends mainly upon, (1) the nature of the drug, (2) the nature of the menstruum, (3) the kind of percolate desired.—*Ibid.*, v. 24, pp. 363–365.

Bruns, W., describes and figures a pressure percolator and outlines the process for producing extracts and tinctures. He concludes that the use of a pressure percolator reduces the time required, exhausts the drug, avoids heating and filtering, preserves the medicinally active ingredients and permits the apothecary to produce his own extracts economically.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 264–275. (See also Pharm. Zentralh., 1906, v. 47, pp. 125–128.)

Herzog, J., discusses the comparative efficiency of percolation and maceration in the preparation of official tinctures. He concludes that tinctures made by percolation contain relatively more extractive than do tinctures made by maceration, and that the combined advantages of percolation far outweigh the possible disadvantages.—Ber. d. pharm. Gesellsch. Berl., 1906, v. 16, pp. 358–373.

See also under Fluidextracta and Tincturæ.

9. EXTRACTION.

Alpers, W. C., discusses the use of circulatory displacement in the making of pharmaceutical preparations, and enumerates the preparations in which this process is particularly applicable.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 506–507.

Wulling, Frederick J., recommends the use of a perforated porcelain funnel, in place of cheese cloth or gauze, for holding the drug in circulatory displacement.—*Ibid.*, v. 54, p. 507.

Bosworth, A. H., points out that a percolator may often take the place of a jar for the maceration of drugs, and describes the manner used. He asserts that this process is useful in making such things as tincture of benzoin, tincture of guaiac, green soap, soap liniment, etc.—Bull. Pharm. Detroit. 1906, v. 20, p. 163.

Zelmanowitz, C., describes and figures an apparatus for the extraction of aqueous liquids by means of ether, ligroin, or other immiscible, lighter liquids.—Biochem. Ztschr. Berl., 1906, v. 1, pp. 253–258.

10. STERILIZATION.

The Ph. Belg. III has included a lengthy article entitled " Sterilisatio " in the body of the book describing the methods that are to be employed for sterilizing the several medicinal articles.

The Ph. Austr. VIII prescribes the method for sterilizing medicaments and materials used for antisepsis; also defines the object of sterilization and the classes of medicaments to be sterilized. It provides that sterilization by means of the addition of bactericides is only permissible when directed by the physician. Medicaments that are themselves antiseptic need not be further sterilized.

"Derlin," in reviewing the prospective revision of the Ph. Germ., points out that bacteriology can no longer be ignored by the pharmacist, and that in future revisions of the pharmacopœia considerable attention must, of necessity, be given to sterilization.—Pharm. Ztg., Berl., 1906, v. 51, p. 993.

Kraemer, Henry, discusses the application of the principles of bacteriology in pharmaceutical practice and the uses and value of sterilization. He points out that cleanliness is not only desirable from an æsthetic point of view, but is of great moment economically.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 12.

Schoofs (in an abstract) suggests that bacteriology be included as one of the essential studies in the course of pharmacy. He also outlines general methods for the sterilization of medicinal substances, and points out that the harmful influences of sterilization on many medicaments have as yet not been sufficiently studied.—Pharm. Zentralh., 1906, v. 47, p. 130.

Fischer, B., discusses the object and the uses of sterilization and the possible application in pharmacy. He also discusses the preparation, filling, and sterilization of ampoulles.—Apoth. Ztg. Berl., 1906, v. 21, pp. 179–181; also Pharm. Zentralh., 1906, v. 47, p. 670.

Denigés, G., reviews a monograph by M. Gérard, professor of pharmacology in the University at Lille, on the "technique of sterilization useful to pharmacists."—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 62–63.

v. Hauschka, Herman Ritter, reviews the several methods for sterilizing various materials, and figures the apparatus necessary for sterilizing pharmaceutical materials.—Ztschr. d. allg. österr. Apoth.-Ver. Wien., 1906, v. 44, pp. 255–257.

Stich, Conrad, outlines a ready method for sterilizing solutions designed for hypodermic use. He recommends that the vial and cork be boiled in distilled water, the distilled water for the solution boiled in a test tube, the required salt added and immediately poured into the still hot vial and securely corked, and, after cooling, sealed.—Pharm. Ztg., Berl., 1906, v. 51, p. 831.

Mario, Giogri, contributes an exhaustive study of the sterilization of vaccines, sera, and other materials for hypodermic injections, giving extensive tables showing the results with tellurium salts, etc., on various organisms.—Arch. di farmacol. sperim, Roma, 1906, v. 5, pp. 220–259, 289–308.

11. FORMS OF ADMINISTRATION.

BOUGIES.

Gerrard, A. W., outlines a method of forming bougies in glass tubes.—Yearbook of Pharmacy, 1906, pp. 288–289.

GELATIN CAPSULES.

Forret, J. A., discusses the uses of gelatin capsules and outlines methods for preparing and filling flexible capsules.—Pharm. J., Lond., 1906, v. 22, pp. 195–197.

Robin, F. F., describes the making of filled capsules, the machinery necessary, the composition of the gelatin mass, and the actual molding.—Pharm. Era, N. Y., 1906, v. 35, pp. 50–51.

Eschbaum, Friedrich, believes that gelatin capsules, particularly ready-filled capsules, have many shortcomings and leave much to be desired so far as reliability is concerned. He believes that balsams and oils in the form of emulsions or mixtures are more reliable and more efficient from a therapeutic point of view.—Ber. d. pharm. Gesellsch, Berl., 1906, v. 16, p. 355.

Hallberg, C. S. N., outlines a method of sealing hard capsules, which, he asserts, is both efficient and easily followed. It consists simply of pressing the cap down for a moment on a piece of filter paper soaked in water and then sticking it on the capsule.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 487.

KONSEALS.

An unsigned article points out that konseals are particularly adapted for the administration of bulky or nauseous drugs. Deliquescent salts, from their absorbent nature, should not be used in konseals.—Canad. Druggist, Toronto, 1906, v. 18, p. 184.

ALKALOID SOLUTIONS IN OIL.

Scrini (Bull. Commerc., 1906, No. 1) suggests the use of alkaloids in oil for use in the eye in place of solutions in water. The following solutions have been found to be particularly useful: Atropine, 0.2 to 0.5 per cent; cocaine, 2 per cent; duboisine, 0.2 to 0.5 per cent; homatropine, 0.2 to 0.5 per cent; physostigmine, 0.5 to 1 per cent; pilocarpine, 2 per cent and scopolamine hydrobromide, 0.1 to 0.2 per cent. He recommends the use of peanut or olive oil and preferably the alkaloid, as the salts of the alkaloids are not so readily soluble in oils.—Pharm. Ztg. Berl., 1906, v. 51, pp. 300–301.

TABLETS.

Seel, E., discusses the history and the uses of tablets and suggests how objectionable features may be eliminated.—Pharm. Zentralh., 1906, v. 47, p. 897.

Thomson, Edwin, discusses the making of compressed tablets, the care of the machine, the preparing of the materials to be compressed, and the use of lubricant to prevent the material from adhering to the dies.—Pharm. J., Lond., 1906, v. 22, p. 263.

Rowell, H., discusses the making of compressed tablets and the necessary granulation of the various medicaments. For the latter, he suggests the use of oil of theobroma in etheral solution or of an emulsion of oil of theobroma with soap and tragacanth.—D.-A. Apoth. Ztg., N. Y., 1906-7, v. 27, p. 87.

MODE OF ADMINISTERING MEDICINES.

Wilbert, M. I., is quoted as giving some information regarding the origin of capsules, cachets, coated pills, and compressed tablets.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 300.

ABSORPTION OF MEDICAMENTS.

Menges, J., discusses the possibility of administering active medicaments, by local applications, in the vagina, reviews the literature relating to the absorption of poisons from the vagina, and reports a number of experiments made with a variety of drugs.—Ztschr. f. exper. Path. u. Therap., 1906, v. 2, pp. 391-412.

II. INTERNATIONAL STANDARDS.

1. BRUSSELS CONFERENCE.

1. PROJET D'ARRANGEMENT.

The agreement between the United States and other Powers respecting the unification of the Pharmacopœial formulas for potent medicaments was signed at Brussels, November 29, 1906. This Agreement was signed, for the United States, by Henry Lane Wilson, for Germany by Graf von Wallwitz, for Austria and Hungary by Comte Clary et Aldringen, for Belgium by Favereau, for Bulgaria by Dr. Zolotovitz, for Denmark by W. Grevenkop Castenkiold, for Spain by Arturo de Baguer, for France by Étienne Ganderax, for Great Britain by Arthur H. Hardinge, for Greece by A. Charalamby, for Italy by Pce Mario Ruspoli de Poggio Suasa, for the Grand Duchy of Luxemburg by Le Comte d'Ansembourg, for Norway by W. Christophersen, for The Netherlands by van der Staal van Piershil, for Portugal by ———, for Russia by N de Giers, for Servia by M. Boghitchévitch, for Sweden by Falkenberg, for Switzerland by Jules Borel. The document is certified by the Minister of Foreign Affairs, for Belgium.—Reprinted by the State Department of the United States as "Treaty Series No. 510."

Wulff, C., points out that the work of the International Conference for the Unification of the Formulæ for Potent Medicaments, in Brussels, has not been in vain and that there appears to be a universal tendency toward the adoption of the provisions of that conference.—Ber. d. pharm. Gesellsch. Berl., 1906, v. 16, pp. 147–149.

He also points out that all of the recently published pharmacopœias have taken cognizance of the protocol of the International Conference for the Unification of the Formulæ for Potent Medicaments. Even the Ph. Ital., which was in course of revision, practically completed, when the Brussels conference protocol was adopted, includes the protocol intact as a guide to Italian pharmacists who may have occasion to dispense prescriptions calling for medicaments designated as being of standard international strength.—*Ibid.*, v. 16, p. 150.

Hérissey, H., points out that the decisions of the Brussels Conference are scrupulously observed by the Dutch pharmacopœia; such medicaments being designated by the letters F. I. (Formula internationalis).—J. de pharm. et de chim. Par., 1906, v. 23, p. 478.

Schamelhout, A., discusses the compliance of the Ph. Austr. VIII with the protocol of the Brussels Conference, and the preparations not included in the pharmacopœia.—Bull. Soc. roy. de pharm., Brux., 1906, v. 50, p. 117.

An unsigned critique of the Ph. Ndl. IV quotes as noteworthy the statement, with reference to the Brussels Conference, to the effect that while the committee did not attempt to decide whether the prescriptions given in those tables were better than the methods of preparation prescribed in the Ph. Ndl. III or not, they did not hesitate to admit them into the pharmacopœia.—Chem. & Drug., Lond., 1906, v. 68, p. 828.

Maben, Thomas, calls attention to differences in strength of potent tinctures due to different methods of standardization.—*Ibid.*, v. 69, p. 155.

Stahel, A. W., commends the progress made in the U. S. P. VIII toward international uniformity in the strength of preparations and comments on several preparations which, through lack of uniformity, tend to spoil the theory, such as Vinum Cocæ, Vinum Ergotæ, and Tinctura Iodi.—Proc. Arkansas Pharm. Ass., 1906, p. 65.

Whelpley, Henry M., points out that the tenacity with which physicians cling to inheritance from the materia medica of their forefathers and the number of medicines peculiar to each country are conditions which render it impossible to agree upon a common standard.—Meyer Bros. Drug., St. Louis, 1906, v. 27, p. 332.

Hemm, Francis, commenting on the changes in the U. S. P., thinks we should go slow in condemning the Committee of Revision, who are men of the very highest standing in the profession, and must have had weighty reasons for the changes.

Whelpley, H. M., explains that the changes were made in conformity with the action of the Brussels Conference.—Proc. Missouri Pharm. Ass., 1906, p. 41.

Yvon (Acad. de méd., 20/II/06; LV, 256), reports in the name of the committee on potent remedies. The committee is of the opinion that the arrangement will become obligatory in France from the day of publication of the new pharmacopœia actually in preparation.—Bull. des sc. pharmacol. Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 90.

"Gnomon," commenting on the proposed British Imperial Pharmacopœia, says that, given an official volume in which was recorded accurate information regarding all drugs and galenical preparations in demand throughout the British Empire, we should not be far off the time when the scheme for the production of a universal pharmacopœia could be brought within the sphere of practical politics. Beginning with international standards for potent remedies, the scheme might be extended gradually so as to include all medicinal substances used in several countries, until, in course of time, information with regard to articles with a purely local reputation could be relegated to a national supplement to the international pharmacopœia.—Pharm. J. Lond., 1906, v. 23, p. 324.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE, IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1906, WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE.

	Protocol, International.	Ph. Austr., VIII.	Ph. Belg., III.	Ph. Japon., III.
Aconitum napellus (L.):				
Title	Aconiti tuber seu Tuber Aconiti	Not official	Aconite tuber	Radix Aconiti Napelli.
Requirement	Tuber of the current year		Requirement same as P. I. Description of the powder with assay process; 0.8 per cent of alkaloid.	The dried tuberous root of *Aconitum Napellus* Linn.; collected at the end of the flowering season. Volumetric assay.
Tinctura aconiti:				
Title	Aconiti tinctura seu Tinctura Aconiti.		Aconiti tinctura	Tinctura Aconiti Napelli.
Strength	10 per cent		0.05 per cent of alkaloid	Same as P. I.
Menstruum	Alcohol (70 per cent)		Same as P. I	60° alcohol.
Requirement	0.05 per cent of total alkaloids		Assay process	Color; taste.
Atropa belladonna (L.):				
Title	Belladonnæ folium seu Folium Belladonnæ.	Folia Belladonnæ	Belladonnæ Folium	Folia Belladonnæ.
Requirement	Use only the leaf, dried	Dried leaves; structural characteristics; limit of ash; limit of extract.	Same as P. I	Dried leaves collected in the flowering season; microscopic characteristics.
Tinctura belladonnæ:				
Title	Belladonnæ tinctura seu Tinctura Belladonnæ.	Tinctura Belladonnæ foliorum	Belladonnæ Tinctura	Not official.
Strength	10 per cent	Same as P. I	Same as P. I	
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	
Requirement		Alkaloidal requirement; color, taste, and qualitative test for alkaloids.		
Extractum belladonnæ:				
Title	Belladonnæ extractum seu Extractum Belladonnæ.	Extractum Belladonnæ	Belladonnæ Extractum	Not official.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE, IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1906, WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE—Continued.

	Protocol, International.	Ph. Austr., VIII.	Ph. Belg., III.	Ph. Japon., III.
Extractum belladonnæ—Con.				
Requirement	Solid extract (containing about 10 per cent of water) made with alcohol (70 per cent).	Firm extract containing 2 per cent of the alkaloids of belladonna; color, solubility, and qualitative test for alkaloids.	Requirement same as P. I.; 1.5 per cent of alkaloids by assay method given.	
Colchicum autumnale (L.):				
Title	Colchici semen seu Semen Colchici.	Semen Colchici	Colchici Semen	Semen Colchici.
Requirement	Use only the seed	The fully ripe, dry seeds; limit of ash and extract content.	Requirement same as P. I	The seed, microscopic characteristics.
Tinctura colchici:				
Title	Colchici tinctura seu Tinctura Colchici.	Tinctura Colchici seminis	Colchici Tinctura	Tinctura Colchici.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol 60°.
Requirement		Color, taste, specific gravity, extract and 0.4 per cent of alkaloids.		Color, qualitative test for alkaloids.
Digitalis purpurea (L.):				
Title	Digitalis folium seu Folium Digitalis.	Folia Digitalis	Digitalis Folium	Folia Digitalis.
Requirement	The leaf of the second year	Carefully dried leaves of the flowering plant; structural characteristics, extract, limit of ash, chemical test.	Same as P. I	Dried leaves of flowering plant; microscopic characteristics, qualitative test for active principles.
Tinctura digitalis:				
Title	Digitalis tinctura seu Tinctura Digitalis.	Tinctura Digitalis	Digitalis Tinctura	Tinctura Digitalis.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol 60°.
Requirement		Color, odor, specific gravity, extract, and chemical test.	Extract content	Color, taste, and odor.

Uragoga ipecacuanhæ (Baill.):				
Title	Ipecacuanhæ radix seu Radix Ipecacuanhæ.	Radix Ipecacuanhæ	Ipecacuanhæ Radix	Radix Ipecacuanhæ.
Requirement	Only the root bark to be used. The powder to have an alkaloidal strength of 2.0 per cent.	Same as P. I.; microscopic characteristics, extract, limit of ash	Same as P. I	(Rio only); microscopic characteristics, and volumetric assay.
Tinctura ipecacuanhæ:				
Title	Ipecacuanhæ tinctura seu Tinctura Ipecacuanhæ.	Tinctura Ipecacuanhæ	Ipecacuanhæ Tinctura	Tinctura Ipecacuanhæ.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol 60°.
Requirement		Color, taste, and specific gravity; 0.2 per cent of alkaloids.		Color, volumetric assay.
Syrupus ipecacuanhæ:				
Title	Ipecacuanhæ sirupus seu Sirupus Ipecacuanhæ.	Syrupus Ipecacuanhæ	Ipecacuanhæ Sirupus	Sirupus Ipecacuanhæ.
Strength	10 per cent of the tincture	Same as P. I	Same as P. I	Same as P. I.
		Color		Color.
Hyoscyamus niger (L.):				
Title	Hyoscyami folium seu Folium Hyoscyami.	Folia Hyoscyami	Hyoscyami Folium	Folia Hyoscyami.
Requirement	Use only the leaf	Same as P. I.; from the wild growing flowering plant; microscopic characteristics, limit of ash, extract.	Same as P. I	Dried leaves from flowering plant, microscopic characteristics.
Tinctura hyoscyami:				
Title	Hyoscyami tinctura seu Tinctura Hyoscyami.	Not official	Hyoscyami Tinctura	Not official.
Strength	10 per cent		Same as P. I	
Menstruum	Alcohol (70 per cent)		Same as P. I	
Extractum hyoscyami:				
Title	Hyoscyami extractum seu Extractum Hyoscyami.	Extractum Hyoscyami	Hyoscyami Extractum	
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	
Requirement	Solid extract (containing about 10 per cent of water).	Same as P. I.; 0.3 per cent of alkaloid; color, solubility chemical test.	Same as P. I.; 0.3 per cent of alkaloid.	

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE, IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1906, WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE—Continued.

	Protocol, International.	Ph. Austr., VIII.	Ph. Belg., III.	Ph. Japon., III.
Strychnos nux vomica (L.):				
Title	Strychni semen seu Semen Strychni seu Nux vomica.	Semen Strychni	Strychni Semen	Semen Strychni.
Requirement	2.5 per cent total alkaloids	Same as P. I	Same as P. I	Microscopic characteristics, volumetric assay and color test.
Tinctura nucis vomicæ:				
Title	Strychni tinctura seu Tinctura Strychni; Nucis vomicæ tinctura seu Tinctura Nucis vomicæ.	Tinctura Strychni	Strychni Tinctura	Tinctura Strychni.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol 60°.
Requirement	0.25 per cent total alkaloids	Same as P. I.; color, taste, chemical test.	Contain 0.25 per cent of alkaloids, chemical test.	Volumetric assay, color, and taste.
Extractum nucis vomicæ:				
Title	Strychni extractum seu Extractum Strychni; Nucis vomicæ extractum seu Extractum Nucis vomicæ.	Extractum Strychni	Strychni Extractum	Not official.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	
Requirement	16 per cent total alkaloids	Same as P. I.; taste, solubility, and chemical test.	Fixed oil removed by ether; 16 per cent of alkaloid.	
Opium:				
Title	Opii pulvis seu Pulvis Opii	Opium	Opii Pulvis	Opium.
Requirement	Powder to be dried at 60° C.; morphine 10 per cent.	Directions for preparing powder; limit of ash; extract; morphine content 12 per cent is to be reduced to 10 per cent for dispensing or the preparation of Dover's powder.	Same as P. I	Directions for preparing the powder; limit for matter insoluble in water; 10–11 per cent of crystallized morphine; test for the identity of morphine.
Extractum opii:				
Title	Opii extractum seu Extractum Opii.	Extractum Opii	Not official	Extractum Opii.

Requirement	Morphine 20 per cent	Same as P. I.; color, odor, taste, and solubility.		From 16.6 to 18.3 per cent of crystallized morphine.
Tinctura opii:				
Title	Opii tinctura seu Tinctura Opii	Tinctura Opii simplex	Opii Tinctura	Tinctura Opii.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Equal parts water and alcohol.
Requirement	Morphine 1 per cent	Same as P. I.; color, odor, taste; specific gravity and extract content.		Color, taste, and specific gravity, from 1-1.11 per cent of crystallized morphine.
Tinctura opii crocata:				
Title	Opii tinctura crocata seu Tinctura Opii crocata seu Laudanum Sydenhami.	Tinctura Opii crocata	Opii Tinctura Crocata	Not official.
Strength	10 per cent opium	Same as P. I	Same as P. I	
Menstruum		Same as P. I	Same as P. I	
Requirement	Morphine 1 per cent	Same as P. I.; color, odor, taste, specific gravity, and extract.		
Pulvis ipecacuanhæ et opii:				
Title	Opii et Ipecacuanhæ pulvis compositus seu Pulvis Doveri.	Pulvis ipecacuanhæ opiatus, Pulvis Doveri.	Ipecacuanhæ Pulvis Opiatus	Pulvis Doweri.
Requirement	To contain 10 per cent of powdered opium.	Same as P. I	Same as P. I	Same as P. I.
Tinctura opii camphorata:				
Title	Opii tinctura benzoica seu Tinctura Opii benzoica.	Not official	Opii Tinctura cum Acido Benzoico.	Tinctura Opii Benzoico.
Requirement	Morphine, 0.05 per cent		Same as P. I	0.5 per cent of opium; alcohol 60°; color.
Tinctura strophanthi:				
Title	Strophanthi tinctura seu Tinctura Strophanthi.	Tinctura Strophanthi	Tinctura Strophanthi	Tinctura Strophanthi.
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol 60°.
Requirement	Seeds not to be freed from fat	Color, taste, specific gravity, behavior with water, and chemical test.		Color, taste, and color test.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE, IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1906, WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE—Continued.

	Protocol, International.	Ph. Austr., VIII.	Ph. Belg., III.	Ph. Japon., III.
Sclerotium clavicepitis purpuræ (Tul.) seu clavicepiti purpuræ (Tul.) sclerotium:				
Title	Secale cornutum seu Ergotum Secale.	Fungus Secalis	Secale Cornutum	Secale Cornutum.
Requirement	Not to be more than one year old and to be kept whole.	Same as P. I.; extract, ash content, and chemical test.	Same as P. I	Should be fresh and not kept in form of powder.
Extractum ergotæ:				
Title	Secalis cornuti extractum seu Extractum Secalis Cornuti; Ergoti extractum seu Extractum Ergoti.	Extractum Fungi Secalis	Secalis Cornuti Extractum	Extractum Secalis cornuti.
Menstruum and requirements	Prepare a watery extract and make up with alcohol (60 per cent).	Same as P. I.; using chloroform water as the menstruum; color, odor, solubility, and chemical test.	Same as P. I	Same as P. I.; color and solubility.
Fluidextractum ergotæ:				
Title	Secalis cornuti extractum fluidum, seu Extractum fluidum Secalis cornuti; Ergoti extractum fluidum seu Extractum fluidum Ergoti.	Extractum Fungi Secalis fluidum	Secalis Cornuti Extractum Fluidum.	Extractum Secalis Cornutum Fluidum.
Strength	100 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum		Mixture of glycerin, alcohol, and water.	Alcohol 20°	Alcohol and water.
Requirement		Color, odor, specific gravity, extract, and chemical test.	Extract content	Reddish-brown liquid.
Acidum hydrocyanicum dilutum:				
Title	Acidum hydrocyanicum dilutum.	Not official	Acidum Hydrocyanicum Dilutum.	
Requirement	Strength, 2 per cent		Same as P. I	

Aqua amygdalæ amaræ:				
Title	Amygdalæ amaræ aqua seu Aqua Amygdalæ amaræ.	Not official.	Amygdalæ Amaræ Aqua; Vide Lauro-cerasi aqua.	Aqua Amygdalarum Amarum.
Requirement	Strength, 0.10 per cent			Same as P. I.
Aqua laurocerasi:				
Title	Laurocerasi aqua seu Aqua Laurocerasi.	Aqua Laurocerasi	Lauro-cerasi aqua	Not official; Aqua Pruni Armeniacæ; Aqua Pruni Macrophallæ.
Requirement	Strength, 0.10 per cent	Same as P. I	Same as P. I	Strength same as aqua laurocerasi.
Aqua phenolata:				
Title	Phenoli solutio seu Aqua phenolata.	Aqua carbolisata	Aqua phenolata	Not official.
Requirement	Strength, 2 per cent	Same as P. I.; color, odor, and chemical test.	Same as P. I	
Sodii arsenas:				
Title	Arsenas sodii seu Sodii arsenas; Arseniccum natrium seu Natrium arseniccum.	Not official.	Natrium Arsenicicum	Not official.
Requirement	The crystallized salt containing 36.85 per cent of arsenic acid.		Same as P. I	
Liquor potassii arsenitis:				
Title	Arsenicalis liquor Fowleri seu Liquor arsenicalis Fowleri seu Kalii arsenicosi liquor.	Solutio arsenicalis Fowleri	Arsenicalis Liquor Fowleri	Liquor Kalii Arsenicosi; Liquor arsenicalis Fowleri.
Requirement	Strength in arsenious acid, 1 per cent.	Same as P. I.; color, chemical test, and assay.	Same as P. I.; chemical tests and assay method.	Same as P. I.; chemical tests, color, and odor.
Syrupus ferri iodidi:				
Title	Ferri iodidi sirupus seu Sirupus iodeti ferrosi seu Sirupus ferri iodati.	Syrupus Ferri iodati	Ferri Iodati Sirupus	Sirupus Ferri Iodati.
Requirement	Strength in anhydrous ferrous iodide, 5 per cent.	Same as P. I.; color and chemical test.	Same as P. I	Same as P. I.; assay.
Tinctura cantharidis:				
Title	Cantharidis tinctura seu Tinctura Cantharidis.	Tinctura Cantharidum	Cantharidis Tinctura	Tinctura Cantharidum.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE, IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1906, WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE—Continued.

	Protoco, International.	Ph. Austr., VIII.	Ph. Belg., III.	Ph. Japon., III.
Tinctura cantharidis—Cont'd.				
Strength	10 per cent	Same as P. I	Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)	Same as P. I	Same as P. I	Alcohol.
Requirement		Color, odor, specific gravity, and extract content.		Solubility test.
Tinctura iodi:				
Title	Iodi tinctura seu Tinctura iodi	Tinctura Iodi	Iodi Tinctura	Tinctura Iodi.
Strength	10 per cent	Same as P. I	Same as P. I	8.5 per cent.
Menstruum	Alcohol (95 per cent)	Same as P. I	Same as P. I	Alcohol.
Requirement		Color, odor, specific gravity, assay.	Minimum per cent of free iodine	Assay process, color, odor, and specific gravity.
Tinctura lobeliæ:				
Title	Lobeliæ tinctura seu Tinctura Lobeliæ.	Not official	Lobeliæ Tinctura	Tinctura Lobeliæ.
Strength	10 per cent		Same as P. I	Same as P. I.
Menstruum	Alcohol (70 per cent)		Same as P. I	Alcohol 60°.
Requirement				Color.
Cocainæ hydrochloridum:				
Title	Cocainum hydrochloricum	Cocainum hydrochloricum	Cocainum Hydrochloricum	Cocainum Hydrochloricum.
Requirement	The anhydrous salt	Same as P. I.; melting point 183° C.	Melting point 183° C.; same as P. I.	Same as P. I.; tests.
Unguentum hydrargyri:				
Title	Hydrargyri unguentum seu Unguentum Hydrargyri.	Unguentum Hydrargyri	Hydrargyri Unguentum	Unguentum Hydrargyri Cinereum.
Strength	30 per cent	Same as P. I	Same as P. I	Same as P. I.
Requirement				Physical properties.
Vinum antimonii:				
Title	Antimoniale vinum seu Vinum antimoniale; Stibiatum vinum seu Vinum stibiatum.	Vinum Stibii Kalio-tartarici, Vinum emeticum.	Vinum Stibiatum	Vinum Stibiatum.
Strength	In tartar emetic, 0.40 per cent	Same as P. I	Same as P. I	Same as P. I.
Requirement		Color and chemical test		Color.

3. DROPS AND DROPPERS.

The Ph. Austr. VIII prescribes the use of the international drop counter, having a dropping surface of 3 mm. and delivering, at 15° C., 20 drops of distilled water to the gramme.

The Ph. Belg. III defines the official drop counter as a tube the outer diameter of the dropping surface of which is exactly 3 millimetres. At 15° C. such an instrument should deliver 20 drops of water to the gramme.

Wulff, C., points out that the international standard for drops has been adopted in the Ph. Hisp., Ph. Ndl., and Ph. Austr. The first two also include a table of comparative weights of drops of various preparations.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 150.

Yvon's, P., thesis on the application of a normal drop counter in practical pharmacy is comprehensively reviewed and his conclusions succinctly stated in Ann. de chim. analyt., Par., 1906, v. 11, pp. 296–299. See also J. de pharm. et de chim., Par., 1906, v. 23, p. 122.

Koren, A., has applied for a patent, in Norway, for a simple device by means of which the drops from a pipette may be regulated. The device consists simply of the introduction of a more or less pointed nail into and through the outlet of the pipette. In use, the size of the drops depends on the shape and size of the nail.—Pharm. Ztg., Berl., 1906, v. 51, p. 353.

Wiebelitz, H., points out that the adoption of a normal drop pipette in the Ph. Germ. is desirable, particularly for use in connection with quantitative tests.—*Ibid.*, v. 51, p. 1003.

2. FOREIGN PHARMACOPŒIAS.

Wulff, C., reviews the new foreign pharmacopœias that have appeared since the publication of the Ph. Germ. IV; the Ph. Ital., Ph. Svec., Ph. Ndl., Ph. Hisp., U. S. P. VIII, and Ph. Austr. He points out that of the six new pharmacopœias reviewed by him five were in the vernacular, only Ph. Austr., because of the existence of a number of languages in Austria, being in Latin. The Netherlands Pharmacopœia also has a Latin edition, though the most widely circulated or used edition is the Dutch. Ph. Ital., Ph. Svec., Ph. Hisp., and U. S. P. are in the vernacular. He also points out that many, if not all, of the European pharmacopœias indicate the number of medicaments that are to be found in pharmacies. Ph. Austr. requires that all official medicaments be kept in stock by the pharmacist, while the Ph. Ital., Ph. Ndl., and the Ph. Svec. confine this requirement to certain specified articles. In the Ph. Ital. these articles are indicated by an asterisk, while the Ph. Ndl. and Svec. use the asterisk to indicate those not necessarily found in the pharmacy.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 147–175.

Schamelhout. A.. points out that the number of medicaments directed to be kept on hand in Belgium is 498. while in Holland it is 210.—Bull. Soc. roy. de pharm., Brux.. 1906. v. 50. p. 133.

Alpers. W. C.. points out that the revision of foreign pharmacopœias is often in the hands of men who never rolled a pill or folded a powder. and a comparison of the pharmacopœias of the various countries with ours will convince the most skeptical of the superiority of our method.—Proc. Am. Pharm Ass., 1906, v. 54. p. 478.

1. AUSTRIAN.

The Pharmacopoea Austriaca. editio octava, was published in Vienna, 1906. It is printed in Latin and includes a total of XXVIII + 483 pages. The pharmacopœia proper includes 13 animal drugs, 219 vegetable drugs, 160 chemical substances, 19 general formulas, 233 galenical preparations. while the elenchus contains formulas for 54 additional preparations, making a total of 698 titles.

An introductory chapter includes special remarks and directions, definitions as to what is to be understood by the various terms used, the degrees of temperature to be employed, the method of determining the boiling point and the melting point. the degree of fineness of powders, and the method of determining the extractive of drugs.

A chapter on general regulations and rules presents the requirements regarding official drugs and preparations. The official preparations must be of required purity and strength. Preparations for which formulas are included must be made by the official process. New and old medicaments not included in the pharmacopœia must be pure. and their sale is regulated by the ministry of the interior. The drugs and preparations not allowed to be sold promiscuously are enumerated in a special table and are specially designated by the titles in the pharmacopœia being printed in italics. Tables are also included of the medicaments to be kept apart from the others and the medicaments that are not to be dispensed in unusual doses unless specially signified by the prescribing physician.

The atomic weight is based on the International Atomic Weight Table of January 1, 1905, O=16.

For the determination of melting points and boiling points specific directions are included.

Solubilities of chemicals are usually given in figures. whereas formerly only the barest indications were included.

When drops are referred to or directed the drop counter described by the Brussels Conference is to be employed.

The degree of comminution of drugs is gauged by sieves of prescribed mesh. The formulas for liquid preparations are usually so arranged that the end product is 100 or 1,000 Gm.

Narcotic extracts and tinctures are directed to be assayed and the strength of the several preparations is based on the protocol of the Brussels Conference.

In the tests for purity the amount of material to be examined is usually directed.

For arsenic the expeditious Bettendorf test has been adopted.

Determinations for iron are usually directed to be made iodometrically.

For fats and waxes the determination of the iodine and the saponification number is usually required.

The compound microscope is directed to be used in connection with the testing of vegetable drugs.

Many vegetable drugs have a limit for ash content.

The minimum extract content is also provided in many instances.

A resin content is usually prescribed in gum resins.

Sterilization is treated quite exhaustively, the method to be followed is outlined, and the class of preparations to be sterilized is enumerated.

An appendix provides methods for examining surgical supplies and dressings.

An "Elenchus" provides formulas for complex pharmaceuticals that are in part prescribed by physicians and in part used as household remedies.

Philipp Röder, Wien, points out that the Ph. Austr. VIII contains a number of statements not in keeping with known facts and established practices.—Pharm. Zentralh., 1906, v. 47, p. 481.

Kremel, Alois, discusses the more important differences between the Ph. Austr. VIII, and the Ph. Austr. VII, in a monograph, which is described and partially abstracted.—Pharm. Post, Wien, 1906, v. 39, pp. 53–54. (See also *Ibid*, pp. 69–72.)

A review of the Ph. Austr. VIII points out some of the changes included in the new pharmacopœia, and compares it with the Ph. Ndl. IV.—Pharm. Ztg., Berl., 1906, v. 51, p. 155.

Weigel, G., reviews the Ph. Austr. VIII.—Pharm. Zentralh., 1906, v. 47, pp. 664–668, 683–688, 710–714.

2. BELGIAN.

The Pharmacopoea Belgica, Editio Tertia, published in Brussels, 1906, is printed both in Latin and in French. The Latin edition comprises a total of 286 pages, while the French edition requires a total of 340 pages for the material elaborated by the addition of French titles and synonyms.

The Pharmacopœia is arranged alphabetically, according to the Latin titles of the drugs and chemicals, and the several preparations are arranged under the same headings.

The preface includes a number of general directions and requirements. Part one includes a total of 722 titles, consisting of 22 general formulas and descriptions, 17 animal drugs, 168 vegetable drugs, 173 chemicals, 329 preparations, and 3 cross references.

The second part contains a number of tables, including a list of the analytical, chemical, and pharmaceutical apparatus that must be on hand in each pharmacy, a list of the medicaments that must be in stock, a list of the medicaments that must be preserved from light, a list of heroic medicaments, and a table of maximum doses, a list of reagents and test solutions, followed by definitions for the terms: Aetheris index, Acidi index, Iodi index, and Saponificationis index.

This part also includes a table of chemical formulas of the official chemical substances, a table of solubilities of the several substances in water, alcohol, and ether, and several other alcohol tables.

The preface contains a list of the names of the Committee on Revision.

The protocol of the International Conference for the Unification of the Formulas for heroic medicines has been closely adhered to.

To permit the extemporaneous preparation of a number of medicaments a number of fluid extracts have been included.

For the names of salts the revisers have adopted the names that are in general use in the neighboring countries, the principal name being that of the metal or alkaloid, and this is followed by the name of the acid.

The several determinations for constants are to be made at 15° C.

The water to be used is restricted to distilled water, and the only heading for water is under aqua, with aqua distilata as a synonym.

The Belgian Pharmacopœia contains the following biologic products: Serum antidiftericum, serum antitetanicum, tuberculinum, vaccinum.

The Ph. Belg. III, includes a formula for serum factitium. This latter formula prescribes the solution of 8 parts of sodium chloride in 992 parts of distilled water; filter and sterilize.

Wulff, C., reviews the Ph. Belg. III, and calls particular attention to the grouping of the content, which has been effected by making the drug or medicinal substance the substantive and thus permitting all of the preparations to appear alphabetically with the drug itself.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 251–264.

J. D. R. outlines the origin of the Ph. Belg. III, and enumerates the more or less direct forerunners of that book. The list includes the titles and date of publication of a number of interesting pharmacopœias and dispensatories.—J. de pharm. d'Anvers, 1906, v. 62, pp. 752–755.

Schamelhout, A., presents a review of the Ph. Belg. and discusses the several provisions.—Bull. Soc. roy. de pharm. Brux., 1906, v. 50, pp. 161–181, 193–202, 233–247.

A review of the Belgian Pharmacopœia discusses the characteristics of this book and points out the differences between it and the formerly official pharmacopœia and the innovations introduced.—Pharm. Ztg. Berl., 1906, v. 51, pp. 431–432.

Some formulas.—*Ibid.*, pp. 437–438.

Maben, Thomas, reviews the new Belgian Pharmacopœia.—Chem. & Drug., Lond., 1906, v. 69, p. 155.

3. JAPANESE.

The third revised edition of the Japanese Pharmacopœia was published in 1906 and decreed to be official from January 1, 1907. Translated and published by the Pharmaceutical Society of Japan. Published in Tokyo in September, 1907. The preface to this English translation is signed by Prof. Dr. Wilh. Nag. Nagai, Ri-Hak., Yak.-Hak., president of the Pharmaceutical Society of Japan. The book contains a total of 706 titles in the pharmacopœia proper—14 general formulas, 25 animal drugs, 179 crude drugs, 207 chemicals, 281 galenicals. From the previous edition 22 titles were deleted, 242 titles newly added.

The preface to the English translation of the Pharmacopœia of Japan points out that the necessity in foreign pharmaceutical circles, especially among those engaged in the trade of medicinal substances and also in their manufacture, of knowing the contents of the newly revised pharmacopœia was so great that it soon became clear that its translation into one of the foreign languages should somehow be brought about, not only in their interest, but also for the benefit of Japan itself.—Ph. Japon. III, p. III.

The historical introduction to the Pharmacopœia of Japan points out that since manufacturers freely prepare medicines, using as their authorities the pharmacopœias of various countries, different medicines often come into market under the same name, while identical medicines are often met with labeled with different names.—Ph. Japon., III, p. V.

The pharmacopœia was completed in March of the year 1906 and submitted to the Minister of Home Affairs.

The Latin names are always given at the beginning of an article.

The registered names of patent medicines are changed to their chemical names.

Except in the case of tinctures, extracts, and sirups, the transliteration of the names is written in "Katakana."

In cases where the chemical constitution is known, formulas and molecular weights are given under the Latin names of the medicines.

Atomic weights selected by the International Atomic Weight Committee are adopted.

For weights and measures, Arabic numerals are used with abbreviations.

Distinctions are made between the sizes of cut pieces and the degree of fineness of powder.

The sieves to be used are defined.

The size of the test tube to be used in qualitative tests is fixed.

The method of determining melting point is fixed.

The specific gravity of the tinctures is not given.

The chemical formula and molecular weights for chemicals the constitution of which is established are included.

In connection with chemical substances, the method of preparation is given only in cases where it is necessary to fix the composition.

The pharmacopœia contains a list of medicines which should always be kept in every dispensary; medicines of this class are distinguished from others by the symbol O standing before their Latin names in the text of the original pharmacopœia in Japanese. The list includes 97 articles.

There is also a list of medicines which should be kept separated from others, in a place which can be shut up, viz., the so-called poisonous medicines; medicines of this class are distinguished from others by the motto "Keep with special care" at the end of every article.

Another table contains a list of the so-called strong or energetic medicines, which are distinguished, in the body of the book, by the motto "Keep with care."

Bound in with the last fly leaf of the English translation of the Japanese Pharmacopœia is the following interesting—

> NOTICE.—Neither the Pharmaceutical Society of Japan nor the translator is responsible for any loss, damage, or controversy which may arise either from any misinterpretation of the original Japanese Pharmacopœia or from any errors which may occur in the printing.
>
> All corrections and suggestions will be thankfully received.

4. BRITISH.

The president of the British Medical Council, in an address at the meeting of the British Medical Association, in Toronto, Canada, outlined the possibilities of an Imperial Pharmacopœia which would properly represent the needs of the medical profession throughout the British dominions.—Am. J. Pharm., Phila., 1906, v. 78, p. 578.

An editorial expresses the belief that the idea of an imperial pharmacopœia will meet with a hearty response everywhere throughout the Empire, and we trust, now the matter is looked upon so favorably by the chairman of the committee, that his suggestion will be fully realized.—Canad. Druggist, Toronto, 1906, v. 18, p. 494.

An editorial discusses the recently published invitation, by the General Medical Council of Great Britain, that the pharmaceutical societies of Great Britain and Ireland appoint a committee who are to be known as a "Committee of Reference in Pharmacy," and expresses the belief that this change will be decidedly to the advantage of the pharmacopœia.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 60.

Hills, Walter, on behalf of the Committee of Reference, requests pharmacists and members of the British pharmaceutical societies in general to cooperate in the revision of the British Pharmacopœia by contributing the results of their investigations or such suggestions as may tend to increase the accuracy or the utility of the work.—Pharm. J., Lond., 1906, v. 22, p. 4.

The Committee of Reference in Pharmacy, of the Ph. Brit., nominated by the pharmaceutical societies of Great Britain and of Ireland, have presented an exhaustive report to the General Medical Council, consisting principally of recommendations regarding criticisms of articles official in the Ph. Brit. IV. The committee consists of Walter Hills (chairman); W. N. Allen; G. D. Beggs; F. C. J Bird; J. E. Brunker; M. A. W. Inglis Clark, D. Sc.; D. B. Dott; W. Kirby; E. W. Lucas; G. F. Merson; J. C. Umney; E. White, B. Sc.; R. Wright; and H. G. Greenish (secretary). The report is sold for the Medical Council by Messrs. Spottiswoode & Co., Ltd., 54 Gracechurch st., London, E. C., price 1s. 1d.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

An editorial comments on the report of the Committee of Reference in Pharmacy, calling attention to the value of publication of comments and criticisms of the pharmacopœia in advance of the actual work of revision.—Brit. Med. J., Lond., 1906, v. 2, p. 1736.

Bennett, C. J., asserts that a grave danger to the public and the medical profession is the fact that many of the mostly used preparations of the Ph. Brit. are prepared by persons who are not qualified, and demands that Parliament should insert a clause in the new government bill, insuring that all drugs and medicinal preparations should be prepared under the direct supervision of a qualified chemist.—Chem. & Drug., Lond., 1906, v. 69, p. 46.

"A Pharmacist" says that the authority of the Ph. Brit. in relation to the sale of food and drugs act remains nebulous in the extreme. The descriptions and tests of the pharmacopœia are often found to be, or to become, indefinite, inaccurate, and out of date.—Pharm. J., Lond., 1906, v. 23, p. 236.

"Gnomon" points out that it would be desirable to establish a general understanding as to what should be supplied when medicine is ordered under a name which does not appear in the British Pharmacopœia.—*Ibid.*, v. 22, p. 226.

Watt, Geo., remarks that it is deplorable that in compiling pharmacopœias for India we but transcribe the reputed merits of drugs. Of hardly a score, out of the 1,500 drugs known to be used, can it be said that we have satisfactorily ascertained their properties. While that is so, the natives of India possess so remarkable a knowledge of the natural products of their country that their opinions must receive careful attention.—*Ibid.*, v. 23, p. 372.

5. GERMAN.

A number of contributions (8) are presented enumerating the additions and changes that are desired in the Ph. Germ.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 325–358.

Wiebelitz, H., suggests a number of deletions from the Ph. Germ., among them: Agaricin, chloralformamid, fol. jaborandi, conium, rhatany (krameria), tincture of squill, and cantharidal ointment.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Beckstroem suggests the following additions to the Ph. Germ. which are not included in the U. S. P. VIII: Acidum acetylosalicylicum, acidum diethylbarbituricum, acidum dipropylbarbituricum, argentum proteinicum, liquor formalini saponatus, pasta zinci, pasta zinci salicylica, peptonum siccum, theophylinum natrio-aceticum, tinctura ferri composita.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 325.

An editorial reviews the suggestions made at a meeting of the German Pharmaceutical Association (Ber. d. pharm. Ges., 1906), and enumerates the additions proposed. Among them were: Acetone, acetyl-salicylic acid, diethylbarbituric acid, dipropylbarbituric acid, trichloracetic acid, adrenalin, ammonium sulphoichthyolate, anesthesin, colloidal silver, silver proteinate, calcium glycerinophosphate, chloroform pro narcosi, citrophen, dionin, guaiacol carbonate, heroin, hexamethylenamintetramine, hydrogen peroxide, potassium sulphoguaiacolate, mesotan, migranin, orthoform, peptone, pyramidon, pyrenol, stypticin, tannigen, tannin albuminate, theocin, xeroform, and cacao.—Pharm. Ztg., Berl., 1906, v. 51, p. 1090.

" Derlin " reviews the needs and wants manifest in connection with a revision of a national pharmacopœia and points out a number of subjects that must be considered in connection with the revision of such a work. He asserts that the Ph. Germ. is sadly in need of an elaboration of the galenical preparations offered to physicians. Both apearance and taste should be considered and the pharmacist should be in position to offer to physicians such a varied assortment of elegant pharmaceuticals that the latter would have no occasion to patronize or use the products of the proprietary manufacturer.—*Ibid.*, v. 51, p. 992.

An editorial discusses the changes made in the several revisions of the German pharmacopœia, enumerates the preparations deleted and the several articles added. It also comments on the interest manifested on the part of the apothecaries of Germany in the proposed revision of the Ph. Germ.—*Ibid.*, v. 51, pp. 1013–1015.

Ergänzungsbuch zum Arzneibuch für das Deutsche Reich. Dritte. Ausgabe Berlin, 1906, 8vo, 429 pages contains 19 animal drugs, 204 vegetable drugs, 225 chemicals, and 528 preparations—a total of 976.

6. FRENCH.

C. E. L. quotes Bourquelot as expressing regret that the Codex will not include doses, the medical element of the committee being hostile to its adoption.—Chem. & Drug., Lond., 1906, v. 68, p. 133.

Crinon comments on an innovation in the new pharmacopœia: The lists *Separanda* and *Venenosa*.—J. de pharm. et de chim., Par., 1906, v. 23, p. 164.

7. DUTCH.

Hérissey, H., presents a very complete and interesting critique of the Dutch Pharmacopœia, and points out that this work, being obligatory in all the Dutch possessions throughout the world, contains numerous medicaments wholly unused in Europe. It includes vulgar names given the drugs by natives.

The descriptions of simples are minute, constants by which the purity of the product may be ascertained are included with the formulas of chemical compounds. The botanical nomenclature follows the Kew Index.

While the mode of preparation of chemical medicaments is not given, tests for identity and purity are given with great precision and clearness. He concludes that the Ph. Ndl. IV has followed the path traced by the pharmacopœias published in recent years; it respects the decisions of the international pharmacopœia, inserts lists of maximal doses, indicates numerous processes for the control and analysis of medicaments; from the latter point of view, however, there is manifest throughout a prudent reserve, desirous, no doubt, of utilizing processes which have been subject to the control of a prolonged experience; for many essences, in effect, quantitative analysis of the principle compound which they contain is not indicated.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 477–484.

Schoepp-Maastricht reviews the Ph. Ndl. IV, which was prepared by a permanent pharmacopœia commission consisting of an inspector of the health office as chairman, five university professors—two pharmaceutical, and one each medical, chemical, and botanical—and four apothecaries.—Apoth. Ztg., Berl., 1906, v. 21, pp. 873–876, 888–889, 900–901, 926–927, 939–941, 961–962, 985–986, 1020–1021, 1031–1034, 1058–1059, 1064–1065, 1072–1073, 1086–1087.

Weigel, G., reviews the Ph. Ndl. IV, and points out a number of excellent features which have been incorporated.—Pharm. Zentralh., 1906. v. 47, pp. 371–376, 396–402, 419–424, 439–442.

8. SPANISH.

Hérissey, H., in reviewing the new Spanish Pharmacopœia, comments on the large number of products and especially of formulas of a kind which make it seem rather a vast therapeutic compendium than an official book. Thinks the omission of processes of assay and of more specific instructions as to the preparation of test solutions a grave fault. * * * Notes the absence of indication as to the relative toxicity of medicaments, such as *Venenosa* and *Separanda* of the Codex. * * * Thinks the retention of hartshorn and the introduction of the Behring-Roux antidiphtheric serum somewhat incongruous.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 185–188.

Weigel, G., reviews Ph. Hisp. VII. He points out that while this book has adopted the provisions of the Brussels Conference and is modern in many other respects, the tests and requirements provided for chemical substances can not be considered as being free from objectionable features. In many respects they are inadequate and even misleading.—Pharm. Zentralh., 1906, v. 47, pp. 575–580.

A correspondent notes the appearance of new editions of the "Petitorio" and the "Tarifa," official pharmaceutical works based on the Ph. Hisp. VII, edited by the Pharmacopœia Revision Committee and approved by royal order. The "Petitorio" is a list of the drugs and medicaments which must be kept in stock (as a minimum) by every pharmacist keeping an open shop, and also by hospitals. The "Tarifa" gives the maximum price at which the medicaments may be sold. As compared with the 1889 editions, 91 articles have been deleted and 69 added.—Chem. & Drug., Lond., 1906, v. 68, p. 108.

A book review calls attention to a volume of observations, corrections, and additions to the Ph. Hisp. VII, by Eduardo Esteve y Fernandez Cabellero, and says this little book comes fortunately to complete and rectify on a great number of points the last edition of the Spanish pharmacopœia. * * * It contains not less than 340 to 350 articles.—J. de pharm. et de chim., Par., 1906, v. 24, p. 190.

3. COMMENTS ON THE U. S. P., VIII, RELATIVE TO REQUIREMENTS OF THE BRUSSELS CONFERENCE.

Bougault, J., reviews the new pharmacopœia of the United States, notes the preparations in which the international standards have been adopted, and gives a list of those in which they were not. He concludes with a general statement that a step has been made toward unification and practical adherence, and prophesies that the next

U. S. P. will conform even more completely.—J. de pharm. et de chim., Par., 1906, v. 23, p. 292.

Schamelhout, A., discusses the degree of compliance in the U. S. P. VIII with the protocol of the Brussels Conference for the Unification of the Formulae for Potent Medicaments and points out a number of preparations which do not comply with the provisions of the protocol.—Bull. Soc. roy. de pharm. Brux., 1906, v. 50, p. 115.

Tschirch, A., does not approve of the lack of compliance with the provisions of the Brussels Conference evidenced in the U. S. P. VIII, and asserts that many of the resolutions do not appear to have been at all considered.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 419.

Wilbert, M. I., points out that despite the fact that the International Conference for the Unification of the Formulae of Potent Medicaments was held practically three years before the eighth decennial revision of the pharmacopœia was published, the members of the Committee on Revision did not see their way clear to adopt fully all of the provisions of the resulting protocol, and the Pharmacopœia of the United States, in place of being one of the first to indorse this admittedly desirable innovation will probably be the last, of those represented in the conference, to adopt the several provisions in their entirety.—J. Am. M. Ass., 1906, v. 47, p. 1990.

Payne, George F., a member of the Committee on Revision, points out that the reason the strength of the tinctures of aconite and veratrum viride was reduced to 10 per cent was because these two tinctures were so much stronger than those of the civilized countries from which we receive many prescriptions. * * * To further simplify the matter of tinctures, it was decided to make all of the potent tinctures of 10 per cent strength with the exception of tincture of iodine.—Proc. Georgia Pharm. Ass., 1906, p. 73.

SPANISH EDITION OF THE U. S. P. VIII.

Whelpley, Henry M., asserts that the United States Pharmacopœia is either the chief or one of the several pharmacopœias recognized in the Central American States, Liberia, Peru, Uruguay, and Venezuela. Our pharmacopœia is also gaining favor in Cuba, Hawaiian Islands, Porto Rico, and the Philippines since our closer commercial and political relations with these countries. Costa Rica has gone so far as to make the United States Pharmacopœia the official standard for that country, although but few of the physicians and pharmacists practicing there can read English.—Meyer Bros., Drug., St. Louis, 1906, v. 27, p. 332.

A news note asserts that the society of pharmacists in Cuba is engaged in the translation of the United States Pharmacopœia from English into Spanish, and that when this translation is completed it will be put into use, as no Cuban pharmacopœia yet exists.—Pharm. Era, N. Y., 1906, v. 36, p. 154.

An editorial discusses the possibility of developing a Pan-American Pharmacopœia and points out that the proposed translation of the Pharmacopœia of the United States into Spanish should prove to be a step in this direction, and would cause physicians and pharmacists of the southern continent to turn their eyes toward American medicine and pharmacy.—*Ibid.*, v. 35, p. 45.

An editorial refers to the translation of the U. S. P. into Spanish as "What might be called a scientific or pharmacopœial adoption of the Monroe Doctrine."—Bull. Pharm., Detroit, 1906, v. 20, p. 7.

III. COMMENTS ON OFFICIAL ARTICLES.

ACACIA.

Smith, R. Grieg, discusses the bacterial origin of vegetable gums and describes the isolation of the several bacteria of the acacia type. He concludes that the natural gums are of bacterial origin and not due to the activity of higher plants, and that the differences in the several gums are due to the differences in the bacteria producing them.—Pharm. Prax., 1906, v. 5, pp. 113–114. (Evidently an abstract from J. Soc. Chem. Ind.)

The Ph. Brit. Committee of Reference in Pharmacy asserts that Alcock's suggestion to limit the insoluble matter in acacia to 0.2 per cent is not supported, as a small proportion of insoluble matter might disqualify a very good gum.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Philipp Röder, Wien, reports on 5 samples of acacia which were found to vary from 2.69 to 3.08 per cent of ash. The maximum ash content permitted by the Ph. Austr. VIII is 3 per cent, which Röder believes too low as only 2 of the 3 samples enumerated above came fully within the prescribed limits.—Pharm. Post., Wien, 1906, v. 39, p. 264.

G. Hell & Co., in Troppau, found the ash of commercial samples of acacia to vary from 2.25 to 3.35 per cent while the acid number varied from 10.08 to 18.20.—*Ibid.*, v. 39, p. 181.

Dieterich, Karl, reports on 5 samples of acacia. The ash content varied from 2.85 to 3.20 per cent and the acid number from 12.56 to 15.12.—Helfenberger Annalen 1905, 1906, v. 18, p. 83.

Ohliger, Willard, reports acacia containing pieces of bark from the tree.—Proc. Michigan Pharm. Ass., 1906, p. 46.

The editor of Notes & Queries explains the absence of reaction between bichloride of mercury and the new mucilage of acacia as follows:

> It frequently happens that a viscid body like mucilage or syrup will prevent the precipitation of metallic salts. This is due in part to the viscid character of the vehicle, but it is also thought that a salt is formed—in this case mercury arabinate—which remains in solution. Such salts of feebly acting radicals are soluble in alkaline solutions, but may be precipitated in neutral solutions. The salt in this case is similar to the albuminates, which are soluble in an excess of albumin and alkali, but are decomposed by acids.—Drug. Cir. & Chem. Gaz., N. Y., 1906, v. 50, p. 93.

Francis, John M., comments on the addition of lime water to the formula, and the old pharmaceutical puzzle as to why bichloride of mercury is not precipitated by lime water in the presence of acacia.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

Bedall, C., suggests that mucilage of acacia be made with distilled water that has been boiled and allowed to cool in a closed vessel so as to exclude as much as possible the absorption of air. The mucilage is to be made in a bottle that is completely filled by the mixture of acacia and water, the object being to exclude air and prevent decomposition of the acacia.—Apoth. Ztg., Berl., 1906, v. 21, p. 852.

Wippern, Franz, recommends the making of mucilage of acacia with recently boiled distilled water. He asserts that when made with distilled water free from micro-organisms, air, and carbon dioxide mucilage of acacia is clear and keeps well, particularly if preserved in small, well-stoppered bottles.—Pharm. Ztg., Berl., 1906, v. 51, p. 807.

Beckstroem, R., suggests that the Ph. Germ. require that mucilage of acacia be made with freshly boiled and cooled water.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 326.

Buhrer, C., discusses the preparation of mucilage of acacia and points out that all acacia contains an oxydase which may be destroyed by heating for twelve minutes or more on a water bath. The sterilized mucilage is opalescent, but is otherwise not changed.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 543.

Alpers, W. C., points out that mucilage of acacia can readily be prepared by means of circulatory displacement and outlines the method that he uses.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 506.

Watson, W. H., suspends the acacia in a cheese-cloth or other suitable strainer in the lime water with an equal amount of water and places the apparatus on ice or in the cool for a few hours, then withdraws the strainer and adds water to make the required weight.—Drug. Cir. & Chem. Gaz. N. Y., 1906, v. 50, p. 133.

ACETANILIDUM.

The Ph. Austr. VIII, and the Ph. Belg. III, include antifebrinum as the synonym for acetanilide.

Riedel's Berichte points out that the melting point of acetanilide is variously given as being 113, U. S. P. VIII; 113–114, Ph. Germ. IV; 112, Ph. Austr. VIII; 112–113, Ph. Helv.; 113.5, Ph. Brit.; 114, Ph. Fr. Riedel points out that for concordant results it is necessary to dry the acetanilide carefully over sulphuric acid. With recrystallized material he found the melting point to be 113.5° C., and in an air bath, 114.5° C.—Riedel's Berichte, Berl., 1906, p. 21.

The Ph. Brit. Committee of Reference in Pharmacy recommends the omission of the ferric-chloride test for acetanilide. Melting point might be 113° C.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Ritter, John, calls attention to the fact that the pulvis acetanilidi compositus of the pharmacopœia is a suitable substitute for any of the many acetanilide combinations on the market, which differ but little in composition.—J. Am. Med. Ass., 1906, v. 47, p. 683.

Wilbert, M. I., considers the dose of acetanilide in the U. S. P. VIII, to be too high.—Am. J. Pharm., Phila., 1906, v. 78. p. 151.

Mason, Harry B., in discussing legislation and patent medicines, suggests the advisability of prohibiting any proprietary headache powder or tablet from containing more than 3 grains of acetanilide, and of directing that the dose shall not exceed one at a time.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 221.

Puckner, W. A., calls attention to the fact that there is a general misapprehension that sodium bicarbonate renders acetanilide more soluble, whereas his experiments seem to show that it has no such effect.—J. Am. M. Ass., 1906, v. 47, p. 1206.

Blackburn, A. E., relates a case of acetanilide poisoning from bromo-seltzer.—*Ibid.*, v. 46, p. 1767.

An answer to a correspondent asserts that bromo-seltzer, as found in the trade, contains: Potassium bromide, 10.53 parts; acetanilide, 4.58 parts; caffeine, 1.20 parts, with sufficient diluent to make 100 parts.—*Ibid.*, v. 46, p. 454.

A contributor to the "Therapeutics" column quotes L. Williams, in the Clinical Journal, as saying that he considers acetanilide our most valuable and powerful antineuralgic next to morphine. He does not consider a slight cyanosis as necessarily alarming.—*Ibid.*, v. 47, p. 1326.

Goepp, R. M., reports a case of acetanilide poisoning resulting from the long-continued use (eleven months) of acetanilide on an ulcer. There was great emaciation. Recovery followed the discontinuance of the drug.—*Ibid.*, v. 47, pp. 359–361.

Tyrrell, John Boyd, reports a case of acute acetanilide poisoning from the free use of acetanilide following the ingestion of other headache remedies.—*Ibid.*, v. 46, p. 955.

Herrick and Irons report a comprehensive study of a case of chronic acetanilide poisoning, with details regarding the urinary findings and some additional animal experiments.—*Ibid.*, v. 46, pp. 351–357.

An editorial comments on chronic acetanilide poisoning.—*Ibid.*, v. 46, p. 365.

Fonteyne, A., gives a number of historical and pharmacologic references in addition to the details of his own researches on the effect of intravenous injections of acetanilide.—Arch. internat. de pharmacod. et de thérap. 1906, v. 16, pp. 410–416. (See also "General Conclusions," *Ibid.*, p. 449 ff.)

Nicks, A. M., discussing the treatment of pneumonia, says, "Where the fever is high, give a medium dose of acetanilide with every other dose of the veratrum mixture. * * * I know from experience that this treatment is safe and wholly without danger."—Eclectic M. J., Cincin., 1906, v. 66, p. 37.

Russell, Wm. H., asks: "What is a medium dose?" and adds: "The consensus of opinion among the leading thinkers of all schools of medicine is that the coal-tar group of drugs are extremely dangerous and should not be prescribed."—*Ibid.*, p. 125.

Russell, W. H., criticises Floyd Clendennin's statement (p. 386) that in fifteen years' experience in no single instance had he seen any bad effects from acetanilide; Russell considers it a dangerous drug, the continued use of which, in the form of headache powders, will cause weakness of the heart muscle, attacks of syncope, cyanosis, and in extreme cases death.—*Ibid.*, p. 488.

Walton, C. E., says, "For post-operative pain on the first night I give one dose of acetanilide, 15 grains, if severe enough to need anything."—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. II, p. 213.

ACETONUM.

Francis, J. M., says 90 per cent pure acetone is not easily obtained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Taylor, Millicent, discusses the constitution of acetone.—J. Chem. Soc., Lond., 1906, v. 89, pt. 2, pp. 1258–1267.

Auld, S. J. M., presents a method for the volumetric estimation of acetone depending on the formation of bromoform and its subsequent hydrolysis with alcohol potash. The residual potassium bromide is estimated by means of standard silver nitrate solution. The complete analysis can be performed in one and one-half to two hours.—J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 100.

Jolles, Adolf, outlines a method for the quantitative determination of acetone by means of sodium bisulphite.—Ber. d. deutsch. chem. Gesellsch., Berl., 1906, v. 39, pp. 1306–1307.

Graham, Willard, reports examining a sample of commercial acetone which he found to contain 86.5 per cent of absolute acetone, with a trace of empyreumatic substances.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Hankey, William T., has found the specific gravity of acetone to run from 0.7880 to 0.7889. He suggests that a minimum and a maximum gravity be given. He found acetone to distill at from 56° to 58.5° C.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Ohliger, Willard, reports acetone with boiling point and specific gravity a little too high.—Proc. Michigan Pharm. Ass., 1906, p. 46.

ACETPHENETIDINUM.

The Ph. Austr. VIII includes phenacetin as the synonym for acetphenetidin, while the Ph. Belg. III uses phenacetinum as the title.

The Council on Pharmacy and Chemistry mentions phenacetin as a name applied to acetphenetidin.—J. Am. M. Ass., 1906, v. 47, p. 1565.

An editorial discusses the comparative price of phenacetin and acetphenetidin.—*Ibid.*, v. 46, p. 598.

An abstract (from Ztschr. f. analyt. Chem.) outlines a method of detecting acetanilide in phenacetin. 0.01 gm. of the suspected material is boiled for one minute with 1 c. c. of strong hydrochloric acid, then diluted with 10 c. c. of water, and filtered. The filtrate is then treated with 3 drops of a 3 per cent solution of chromic acid. If the phenacetin is pure a permanent ruby red color is obtained. If it contains acetanilide the color will be deep green and ultimately a precipitate will be formed.—Pharm. J., Lond., 1906, v. 22, p. 65.

Riedel's Berichte asserts that the melting point of phenacetin is uniformly 134° for a recrystallized, carefully dried material. In an air bath it melts at from 135.5 to 136° C.—Riedel's Berichte, Berl., 1906, p. 24.

Lefeldt, Max, asserts that he has found the melting point of an otherwise excellent phenacetin to be 133°, and suggests that the variation of the melting point be extended to read from 133 to 135° C.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 341.

Mannich, C., describes a sample of phenacetin adulterated with parachloracetanilide and calls attention to the care that must be exercised by the pharmacist to regularly examine all medicinal substances for identity and purity.—Arb. a. d. pharm. Inst. d. Univ. Berl., 1906, pp. 172–176.

Gane, E. H., reports that phenacetin is occasionally adulterated with parachloracetanilide. Melting point 119 to 120° C.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Baird, J. W., reports 31 samples examined in 1904, 5 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

An editorial discusses the reasons for the disrepute into which acetanilide has fallen, largely owing to its indiscriminate use by the laity, and the substitution of phenacetin for acetanilide in popular remedies. Attention is called to the fact that while phenacetin is less toxic in equal amounts the effective dose of phenacetin is larger than that of acetanilide.—J. Am. M. Ass., 1906, v. 47, p. 1923.

An editorial comments on a case reported by W. W. Bell (Lancet), of a girl, 23 years of age, who took 125 grains of phenacetin and 10 grains of antipyrine without fatal results.—Pharm. J., Lond., 1906, v. 23, p. 450.

An editorial, commenting on the regulations for the enforcement of the Food and Drugs Law, asserts that the inclusion of acetphenetidin, phenacetin, citrophen, and lactophenin in the list of "principal derivatives of acetanilide" strikes one as constituting a severe strain on the elasticity of the law.—Am. Druggist, N. Y., 1906, v. 49, p. 234.

ACETUM AROMATICUM N. F.

Caldwell, Paul, points out that in the formula for aromatic vinegar the acetic acid is the only ingredient specified to be of U. S. P. strength and questions the advisability of making such distinctions. He also criticises the manner in which aromatic vinegar is directed to be prepared and suggests that the oils be directed to be added to the alcohol and the requisite amount of water and the resulting solution filtered through magnesium carbonate until the filtrate will mix clear with water; then add the acid.—Drug. Cir. & Chem. Gaz., N. Y., 1906, v. 50, pp. 351, 393.

ACIDUM ACETICUM.

Lenze, W. J., outlines a process for the production of vinegar and acetic acid by the fermentation method.—Chem. Ztg., Cöthen, 1906, v. 30, p. 1299.

Buchner and Gaunt review the literature relating to the theory of acetic acid fermentation, discuss the bacteria causing the fermentation, and report a series of experiments made to demonstrate the presence of an oxydase in the expressed juice of acetic acid bacteria. This latter has as yet not been accomplished.—Ann. d. Chem., Leipz., 1906, v. 349, pp. 140–184.

Eberlein, L. (Pure Products, 3, 1907, No. 4, pp. 173–177), describes the manner in which pure cultures of acetic acid are used in vinegar making.—Exp. Sta. Rec., 1906, v. 18, p. 1079.

Alilaive, E. (C. R., 1906, v. 143, p. 126), discusses the composition of an acetic acid ferment and presents an analysis of the dried bacteria used in the production of acetic acid in a commercial way.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 745.

The Ph. Brit. Committee of Reference in Pharmacy suggests that for acetic acid a test for butyric acid should be inserted.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Arny, H. V., thinks that, for the assay process, it would have been far better to have retained the formerly prescribed quantity—6 gm. He discusses the impracticability of measuring 59.6 c. c. of the solution in view of the fact that the average burette delivers but 50 c. c.—Am. J. Pharm., Phila., 1906, v. 78, p. 17.

Philipp Röder, Wien, outlines a method for the determination of absolute acid in acetic acid. Also criticises some of the Ph. Austr. requirements.—Pharm. Post, Wien, 1906, v. 39, p. 195.

Ehman, J. W., reports that H. Seidman found great variations in the strength of diluted acetic acid obtained from both wholesale and retail sources: three from wholesale stores assayed 8.25 per cent, 10.44 per cent, 13.09 per cent; three from retail stores, 5.25 per cent, 5.83 per cent, 11.04 per cent; none of the six showed more than traces of impurities.—Am. J. Pharm., Phila., 1906, v. 78, p. 417.

Caspari, Chas. E., reports 3 samples examined: 1 U. S. P.; 1 contained sulphuric acid; 1 reduced potassium permanganate.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Blome, W. H., reports on ten samples of acetic acid varying from 5.55 to 31 per cent of absolute acid; almost all of these contained empyreumatic matter. The odor of some was quite unpleasant. The facts adduced, he thinks, suggest the necessity of all manufacturers and wholesalers declaring the strength of this article on the label.—Proc. Michigan Pharm. Ass., 1906, p. 106.

Miller, Wayne T., reports on three samples of acetic acid which contained, respectively, 98.61 per cent, 4.55 per cent, and 27.16 per cent of absolute acid; one contained a small amount of sulphuric acid and two empyreumatic substances. The article gives the calculations in full.—Proc. Indiana Pharm. Ass., 1906, pp. 200–202.

ACIDUM ACETICUM GLACIALE.

Fernan, Albert, reports that a sample of concentrated (glacial) acetic acid contained 94.1 per cent of absolute acid, but evidenced a decided empyreumatic odor. Ztsch. d. allg. österr. Apoth.-Ver., Wien, 1906, v. 18, p. 79.

The Ph. Brit. Committee of Reference in Pharmacy reports that for glacial acetic acid titration requires 98.9 per cent, and melting point 99.5 per cent. They recommend to change the latter from 15.5° to 14.7° C.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

ACIDUM BENZOICUM.

Graham, Willard, points out that the physical properties of benzoic acid are not necessarily an indication of its quality. Several samples were examined, and in one or two cases the acid was found to be unfit for manufacturing purposes, as it contained a coloring matter which produced a bright purple color with solution of sodium carbonate.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Cormimboeuf and Grosman find that the odor developed by the addition of carbonate of soda to a hot solution of natural benzoic acid is aromatic, very agreeable, and *sui generis*, while that developed by the synthetic product is pungent, very different, and resembles parsley; this latter odor, however, is easily masked. For further differentiation they mix intimately, in a mortar, 5 gm. of the product with 5 gm. carbonate of soda, absolutely free from Cl; ignite, to the complete combustion of the organic matter, in a platinum crucible; allow to cool; treat with hot distilled water, filter, acidify with HNO_3, and add nitrate of silver. The natural acid gives only an insignificant chlorine reaction, while that with the synthetic is quite visible and characteristic.—Ann. de chim. analyt., Paris, 1906, v. 11, pp. 243, 244.

Belloni, E. L., questions the value of the above observations.—*Ibid.*, p. 370.

Cormimboeuf and Grosman reaffirm their proposition, quoting from the English, German, and Italian pharmacopœias. They assert that there is in commerce no synthetic benzoic acid which does not contain chlorine.—*Ibid.*, 463.

Blarez, C. H., outlines a method for detecting benzoic acid in wines, using ether as the solvent.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 292–295.

Akiyama, T., has devised a method for separating salicylic acid and benzoic acid with a solution of borax and glycerin. He believes that 1 part of benzoic acid in 50,000 parts of saké can thus be separated and identified.—J. Pharm. Soc. Japan, 1906, p. 118.

Bigelow, W. D., outlines the provisional methods for the determination of benzoic acid adopted by the Association of Official Agricultural Chemists.—Circ. Bur. Chem., U. S. Dept. Agric., 1906, No. 28, pp. 5, 6.

Paietta, Raffaello, records a number of experiments to determine the solubility of the benzoates of strontium, potassium, and zinc, and gives the solubility of these several salts at different degrees.—Boll. chim. farm. Milan, 1906, v. 45, pp. 485–488.

Brugsch and Hirsch report observations made to determine the elimination of benzoic acid in dogs, and conclude that only a minor portion of the acid is eliminated as hippuric acid and that quite an appreciable portion of the administered benzoic acid leaves the body unchanged.—Ztschr. f. expt. Path. u. Therap., 1906, v. 3, pp. 663–674.

ACIDUM BORICUM.

Reichert, Fr., describes the deposits of boron compounds found in Argentina and gives the composition and location of the several deposits.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 150–152.

Mellor, Ernesy M., presents a description of a trip to the boric acid fields of Tuscany and includes a number of illustrations showing the method of preparing and marketing boric acid.—Brit. & Col. Drug., Lond., 1906, v. 49, pp. 269–273.

Arny, H. V., points out that the volumetric assay process, while admirably exact, is somewhat costly, in that 50 c. c. of glycerin must be used for each operation.—Am. J. Pharm., Phila., 1906, v. 78, p. 16.

The Ph. Brit. Committee of Reference in Pharmacy suggests that titration of boric acid with alkali in presence of glycerin might be substituted for the present quantitative test, and should indicate 98 per cent at least. No test for free sulphuric acid at present.—Chem. & Drug., Lond., 1906, 69, p. 862.

Manning and Lang (J. Soc. Chem. Ind., 1906, v. 25, p. 397; from J. Chem. Soc., 1906, v. 90, p. 491) propose a method for the quantitative analysis of boric acid, alone or in the presence of phosphoric acid. It involves the separation of boric acid as a trimethylic ether and its gravimetric estimation as a salt of barium.—Abstr. in J. de pharm. et de chim., 1906, v. 24, p. 424.

Wolfrum and Pinnow discuss the sensitiveness of the boric acid reaction with curcuma paper, and report a series of experiments with curcuma paper made according to the directions suggested by different investigators.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 11, pp. 144–154.

Jorgensen, Gunner, discusses the titration of boric acid and replies to some criticisms by A. Beythien.—*Ibid.*, v. 11, pp. 154, 155.

Fendler, G., presents a comprehensive study of the tests for boric acid and particularly of the official (German) method prescribed for the detection of this substance in meats and meat products.—Arb. a. d. pharm. Inst. d. Univ. Berl., 1906, pp. 296–318.

Cribb and Arnaud outline a simple method for the approximate determination of boric acid as a useful check on the results obtained by other methods.—Analyst, Lond., 1906, v. 31, pp. 147–149.

LaWall, Chas. H., presents some notes on the detection of boric acid, in which he discusses the shortcomings of the several methods now in use and the precautions to be taken.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 169–171.

Bigelow, W. D., outlines the provisional methods for the determination of boric acid and borates adopted by the Association of Official Agricultural Chemists.—Circ. Bur. Chem., U. S. Dept. Agric., No. 28, 1906, p. 7.

A New Jersey correspondent writes that he is unable to procure boric acid soluble in 18 parts of water as required by the U. S. P. VIII. His most soluble sample is dissolved by not less than 20 parts of water.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 59.

Caspari, Chas. E., reports 15 samples examined: 5 U. S. P.; 1 contained chloride; 4, metallic impurities; and 5 sulphate.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Ehman, J. W., reports that F. A. Butter found in seven samples of boric acid a purity of 92.39 per cent to 98.47 per cent, average 94.82 per cent; traces of sulphuric acid were found in three samples.—Am. J. Pharm., Phila., 1906, v. 78, p. 417.

Nyman, Max, reports a series of experiments made to determine the antiseptic properties of boric acid ointment.—Südd. Apoth. Ztg., 1906, v. 46, p. 546.

Taylor, S., thinks the glycerin of boric acid is a preparation which most pharmacists will agree would be better were it weaker. Further dilution with glycerin yields a suitable product.—Pharm. J., Lond., 1906, v. 23, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy recommends to amend the process for glycerite of boric acid, so as to give a more uniform result.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Spiegel, L., reviews Liebreich's criticism of the report by H. W. Wiley on the influence of boric acid and borax on the human organism.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 14, 15.

Harrison, A. (Lancet, Lond., Sept. 22), believes that boric acid may be a cause of appendicitis by reason of its inducing severe digestive disturbances.—J. Am. M. Ass., 1906, v. 47, p. 1332.

An editorial calls attention to the fact that the diagnosis of appendicitis is more common, whether the disease actually is or not, and, at the same time, attention is directed to the increasing use of boric acid as a food preservative, and to the experimental proof that boric acid may act as an irritant to the alimentary canal.—N. York M. J., 1906, v. 83, p. 718.

Duret (Bull. Acad. Med., Par., v. 70, No. 26) suggests that the use of boric acid and other preservatives may be responsible in part for the extraordinary frequency of intestinal affections, including cancer.—J. Am. M. Ass., 1906, v. 47, p. 464.

Chevalier (Pharm. Prax) points out that opinions of experts on the harmfulness of boric acid vary widely. He believes that while the number of acute poisoning cases from the ingestion of boric acid is small there is a possibility of acute kidney irritation, due to faulty elimination, and that in all cases where boric acid is used, even as a dusting powder, it is well to watch the urine closely.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 67.

Busy (Rec. d'Alfort, 1906, 15 Sept.; Berl. tierärztl. Wchnschr., 1906, No. 44) discusses a new method of treating wounds, by means of crystallized boric acid, of interest to veterinary surgeons. His observations show that in the solid form it greatly exceeds corrosive sublimate or carbolic acid in power; it is even said that boric acid acts as an anæsthetic.—Abstr. in Merck's Ann. Rep., 1906, v. 20 (Darmstadt, May, 1907), p. 2.

Felter, Harvey Wickes, quotes T. W. Kennedy, who has had uncommon results from boric acid in diabetes—a No. 2 capsule full every four hours until the quantity of both water and sugar is lessened, then three or four times a day until the patient is well. Kennedy claims that it acts specifically in irritation of the bladder or urethra; for five years he has employed no other internal agent in gonorrhœa.—Eclectic M. J., 1906., v. 66, p. 343.

ACIDUM CAMPHORICUM.

Riedel's Berichte reports that recrystallized camphoric acid melts at from 186 to 186.5° C., while in an air bath it requires 188° C.—Riedel's Berichte, Berl., 1906, p. 22.

Renouf, Nora, reviews the development of our knowledge of the composition of camphor and camphoric acid and discusses the chemistry that is involved.—Pharm. J., Lond., 1906, v. 22, p. 158.

Fujitani, J., makes a contribution on the pharmacology of camphoric acid, and reports the results of experiments on frogs, as well as on warm-blooded animals.—Arch. int. de pharmacodyn. et de thérap., 1906, v. 16, p. 273.

Perkin and Thorpe report experiments on the synthesis of camphoric acid. Part IV. The action of sodium and methyl iodide on ethyl dimethylbutanetricarboxylate.—J. Chem. Soc., Lond., 1906, v. 89, pt. 1, pp. 778–795.

ACIDUM CARBOLICUM IODATUM N. F.

Caldwell, Paul, believes that iodized carbolic acid could be made more practical by reversing the quantities of carbolic acid and glycerin and adding sufficient water to make 250 parts. He thinks the preparation too strong to be prescribed for either internal or external use.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ACIDUM CITRICUM.

Restuccia has discovered a method of manufacturing citric acid directly from the waste of lemons, and an appropriation has been secured from the Italian minister of agriculture for his experiments. Korner, of Milan, appointed by the minister to study the process, has issued a very optimistic report. A contract has been closed with the Citrica Sicula, which will undertake all the expenses for the production of citric acid by the new process.—Chem. & Drug., Lond., 1906, v. 68, p. 32.

Tocher, J. F., gives a table for the differentiation of tartrates, citrates, and malates.—Pharm. J., Lond., 1906, v. 23, p. 87.

Kahn, Joseph, points out that citric acid is sometimes adulterated with tartaric acid, and outlines several readily applied tests for detecting the latter.—Am. Druggist, N. Y., 1906, v. 49, p. 6.

Ohliger, Willard, reports citric acid with traces of tartaric acid and solubility in alcohol not U. S. P.—Proc. Michigan Pharm. Ass., 1906, p. 46.

Kebler, Lyman F., reports citric acid that contained lead and trace of sulphate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Macfadden, A. W. J. (Local. Govt. Bd. [Gt. Brit.], Med. Dept., Rpts. Insp. Foods, 1906, No. 2, p. 10), reports on a large number of samples of citric acid. Small quantities of lead were found in nearly every sample and very small quantities or traces of arsenic in a number of samples, these metals being accidental impurities.—Exper. Sta. Rec., 1906, v. 18, p. 1149.

Evans Sons, Lescher & Webb point out that citric acid is, as a rule, free from adulterations, and assert that the examination of a large number of samples revealed only one case in which the lead reached 0.002 per cent, a great majority containing 0.001 per cent and under, and that in all cases the quantity of arsenium has proved to be below one part per million.—Analytical Notes for 1906, 1907, p. 13.

ACIDUM CITRICUM SACCHARATUM N. F.

Caldwell, Paul, doubts the practicability of saccharated citric acid and its companions elsewhere in the N. F. III, and says " it is hardly possible to carry them in stock without fear of deterioration."—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ACIDUM GALLICUM.

The Ph. Brit. Committee of Reference in Pharmacy points out that the tartarated-antimony statement, in connection with gallic acid, is incorrect.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

ACIDUM GLYCEROPHOSPHORICUM N. N. R.

Alpers, W. C., points out that with the preparation of glycerophosphates sterilized water only should be used. His experience had been that when dissolved in ordinary water glycerophosphates rapidly deteriorate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 487.

Dunning, H. A. B., discusses the glycerophosphates and presents a tried formula for the compound elixir, which can be used for the plain elixir also.—Bull. Pharm., Detroit, 1906, v. 20, pp. 157–159.

The writer presents further remarks and formulas.—*Ibid.*, pp. 214, 245.

Patch, E. L., reports that sodium glycerophosphate is sometimes acid and sometimes alkaline; varies from 1.4 per cent H_3PO_4 to 0.175 per cent NaOH.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

ACIDUM HYDRIODICUM DILUTUM.

Bodraux, F., outlines a method for the rapid preparation of solutions of hydriodic acid by combining iodine with barium dioxide in the presence of water, adding an additional amount of iodine and treating this resulting solution with sulphur dioxide.—Bull. de la soc. chim. de Par., 1906, v. 35, pp. 493, 494.

Arny, H. V., questions whether the dilute hydriodic acid will keep any better than does diluted hydrobromic acid or syrup of hydriodic acid; also whether the addition of potassium hypophosphite will accomplish the preservation of the hydrogen iodide any better than it did in the syrup of 1890.—Am. J. Pharm., Phila., 1906, v. 78, p. 10.

ACIDUM HYDROBROMICUM DILUTUM.

Eberle, E. G., suggests that a formula for diluted hydrobromic acid by double decomposition between potassium bromide and tartaric acid be included in the Pharmacopœia.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

ACIDUM HYDROCHLORICUM.

Meyer, Theodor, illustrates and describes Oehler's method for the production of hydrochloric acid and sulphates by heating a mixture of sodium chloride and sodium bisulphate.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 1295–1299.

Reusch, K., reviews some of the economic conditions affecting the production of hydrochloric acid in Germany.—*Ibid.*, v. 30, pp. 327–328.

Wiebelitz, H., points out that it is difficult to find acids having exactly the specific gravity prescribed in the pharmacopœia, and recommends that for hydrochloric acid, at least, a slight variation in specific gravity be permitted, and that the limits of this variation be stated.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Yates, Ora, reports three samples of hydrochloric acid all labeled "C. P." (one "arsenic-free"), all of which contained arsenic.—Proc. Kansas Pharm. Ass., 1906, p. 35.

Caspari, Chas. E., reports two samples examined: One U. S. P.; one contained arsenic.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Kebler, Lyman F., reports that a sample of hydrochloric acid (C. P.) was found to contain a considerable quantity of fibrous matter. The nonvolatile matter, largely ferric chloride, in 50 c. c. amounted to 9.2 milligrams. A sample labeled "free from arsenic" was found to contain arsenic.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Ling, Arthur R., presents a note on the removal of arsenic from hydrochloric acid for use in the Marsh-Berzelius method, in which he reviews the several methods proposed and outlines a process for further purifying the acid.—Analyst, London, 1906, v. 31, pp. 37–38.

Thorne and Jeffers discuss the purification of hydrochloric acid from arsenic.—*Ibid.*, v. 31, pp. 101–103.

Luther and MacDougall discuss the reaction between chloric and hydrochloric acids and the influence of the liberated chlorine on the further progress of the reaction.—Ztschr. f physik. Chem., 1906, v. 55, pp. 477–484.

Heinsheimer, F. (Arch. f. Verdauungs-Krankh., Boas, Berl., vol. 12, No. 2), experimented on dogs with Pawlow fistula, finding that hydrochloric acid had no more influence on secretion than water had, if given before feeding, but if the acid was given at the beginning of secretory activity this continued longer than if water were given at that time.—J. Am. M. Ass., 1906, v. 46, p. 1733.

ACIDUM HYDROCYANICUM DILUTUM.

Greshoff, W., enumerates a number of plants found to yield hydrocyanic acid.—Arch. d. Pharm., 1906, v. 244, pp. 397–400.

Presents additional comments on the above list, including a list of the cyanogen glucosides, the date of their discovery, and the name or names of the discoverer. Also a list of the hydrocyanic acid yielding plants in alphabetical order.—*Ibid.*, pp. 665–672.

He also prints, at Guignard's request, a paper read before the British Association for the Advancement of Science on the distribution of hydrocyanic acid in the vegetable kingdom, together with a list of plants. It is followed by a paper from Guignard on the existence of a cyanic compound in the Passifloræ.—Bul. des sc. pharmacol. Par., 1906, v. 13, pp. 589–605.

Thiéry proposes a method for the detection of hydrocyanic acid based upon the employment of an alkaline solution of phthalophenone in the presence of sulphate of copper. The reagent may be used in the form of a paper in the place of picro-sodic paper. It keeps well and is very sensitive.—J. de pharm. et de chim. Par., 1906, v. 24, p. 565.

Bourquelot comments on this reaction and finds it of the same order as that of Schönbein.—*Ibid.*, 565.

Caspari, Charles E., reports one sample examined: Contained 1.6 per cent hydrocyanic acid.—Proc. Missouri Pharm. Ass., 1906, p. 101.

DeDominicis, Angelo, discusses the action and the elimination of hydrocyanic acid and records a number of experiments.—Boll. chim. farm., Milan, 1906, v. 45, pp. 367-372.

Tinteman (Deutsche med. Wchnschr., Berl. Leipz., v. 32, No. 42) relates that a chemistry student dropped a reagent glass containing some hydrocyanic acid, and, stooping to pick up the glass, he inhaled some of the acid. He suffered from vertigo, headache, motor unrest, small filiform pulse, cyanosis, enlargement of the right heart, and albuminuria. The symptoms, except the albuminuria, disappeared in a week.—J. Am. M. Ass., 1906, v. 47, p. 1963.

Sundwik, Ernst E., discusses the antidotes suggested for poisoning by cyanides. He concludes that hydrogen peroxide is of no use at all, and that, so far as known, the widely known arsenic antidote, ferric hydroxide with magnesium, is the most satisfactory and the most generally reliable antidote for cyanides. He suggests the addition of some ferrous salt, and in this respect agrees with the report of a commission of the Chemical, Metallurgical and Mining Society of South Africa, which also suggested that hydrogen peroxide was unsuited as an antidote for cyanide and recommended an alkaline solution of a ferrous salt.—Pharm. Zentralh., 1906, v. 47, p. 519.

ACIDUM HYPOPHOSPHOROSUM.

Eberle, E. G., suggests that hypophosphorus acid be made 50 per cent, instead of 30 per cent, strength.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

The author of an unsigned article thinks that the hypophosphites have no place in therapeutics.—J. Am. M. Ass., 1906, v. 46, p. 1550.

ACIDUM LACTICUM.

Buchner and Meisenheimer discuss lactic acid fermentation and the several bacilli known to cause it. They review the literature relating to the theory of lactic acid fermentation, report a number of experiments, and describe the nature of the lactic acid produced.—Ann. d. Chem., Leipz., 1906, v. 349, pp. 125–139.

They also (Lieb. Ann., 1906, v. 349, pp. 125–139) report experiments with the production of lactic acid by means of fermentation of sugars by micro-organisms.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 744.

Herzog, R. O. (Zeitschr. f. physiol. Ch., 1906, v. 49, p. 482), discusses the work done by Buchner and Meisenheimer and controverts some of the objections to his previous work.—*Ibid.*, p. 947.

Kayser (Indus. Lait. [Paris], 31, 1906, No. 36, pp. 586–589) briefly discusses the principles involved in the manufacture of lactic acid and acetic acid from milk sugar and gives figures showing the profits of this industry.—Exper. Sta. Rec., 1906, v. 18, p. 373.

Wiebelitz, H., points out that lactic acid is strongly hygroscopic and that a statement regarding this property, in the Pharmacopœia, would be desirable.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Irvine, J. C. (J. Chem. Soc., 1906, v. 89 and 90, pp. 935–938), discusses the resolution of lactic acid, by morphine, into the optically active components.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 575.

Lange, V. (Therap. Monatsh., 1906, No. 12), repeats his recommendation, confirmed by twenty years' practice, of lactic acid in the treatment of chronic suppurative middle ear disease. In case of fibrous vegetations he did not obtain favorable results, since the acid did not penetrate to a sufficient depth. In the frequently relapsing cases of acute inflammation of the auditory meatus, he obtained good results by painting the meatus with 40 per cent lactic acid.—Abstr. in Merck's Ann. Rep., 1906, v. 20 (Darmstadt, May, 1907), p. 12.

ACIDUM NITRICUM.

Wenzel, Franz, reviews the production of nitric acid and nitrates, particularly the economic utilization of atmospheric nitrogen.—Oesterr. chem. Ztg. Wien, 1906, v. 9, pp. 34–36.

Reusch, K., reviews the literature of the year relating to the production of nitric acid and discusses the economic conditions.—Chem. Ztg. Cöthen, 1906, v. 30, p. 328.

Guttmann, O. (Ztschr. ges. Schiesz- u. Sprengstoffwesen, 1906, v. 1, p. 376), discusses the economic production of nitric acid.—Chem. Repert. Cöthen, 1906, v. 30, p. 352.

An editorial discusses the utilization of atmospheric nitrogen and describes, with illustrations, some of the machinery in use in Norway for the production of nitric acid and nitrates.—Pharm. Ztg., Berl., 1906, v. 51, p. 97.

Bodenstein, Max, discusses the formation of nitric acid from atmospheric nitrogen.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, pp. 14–21.

Neuburger, Albert, describes and figures a number of pieces of apparatus for the utilization of atmospheric nitrogen in the production of nitric acid.—*Ibid.*, v. 19, pp. 977–985.

Thompson, Silvanus, gave, before the Royal Institution, a demonstration of the method used in Norway for the manufacture of nitrates from the air.—Notes with figures in Chem. & Drug., Lond., 1906, v. 68, p. 225.

Wagner, Rinck, and Schultze call attention to the absence, in the Ph. Germ. IV, of tests for the lower oxides of nitrogen in nitric acid, and point out that the presence of these lower oxides materially affects the use of nitric acid in connection with the immersion refractometer.—Chem. Ztg. Cöthen, 1906, v. 30, p. 1182.

Reichard, C. (Chem. Ztg., 30, 1906, No. 11, pp. 790–791), briefly describes the color reactions of berberin and arbutin with nitric acid, and explains their application.—Exper. Sta. Rec., 1906, v. 18, p. 208.

Bornwater, J. T. (Chem. Weekbld., 1906, v. 3, pp. 30–31), proposes to reduce the nitrate by means of potash solution and aluminum foil and to distill the ammonia in a Kjeldahl apparatus.—*Ibid.*, v. 17, No. 11, p. 1037.

Leffman, Henry, discusses the use of nitron as a precipitant for nitric acid and nitrates and outlines the chemistry involved.—Oil, Paint and Drug Rep., 1906, v. 70, Dec. 3, p. 23.

Soltsien, P., discusses the several reactions proposed for the identification of nitric acid, the diphenylamine reaction, the brucine reaction, and the reduction of nitric acid to nitrous acid by means of zinc and testing this by means of potassium iodide and sulphuric acid.—Pharm. Ztg., Berl., 1906, v. 51, pp. 765–766.

Caspari, Chas. E., reports one sample examined: Weak in strength and contained arsenic.—Proc. Missouri Pharm. Ass., 1906, p. 100.

ACIDUM NITROHYDROCHLORICUM.

Eliel, Leo, says that as the undiluted nitrohydrochloric acid is stable the dilution may be freshly prepared by adding enough distilled water to 24.2 gm. nitrohydrochloric acid to bring the measure up to 100 c. c.—Proc. Indiana Pharm. Ass., 1906, p. 70.

ACIDUM OLEICUM.

Harries, C. (Chem. Ber., 1906, v. 39, pp. 3728–3732), presents some additional remarks on the constitution of oleic acid and the products derived from the action of ozone on oleic acid.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 881.

Harries and Türck (Chem. Ber., 1906, v. 39, pp. 3732–3738) present the results of further investigations on oleic acid ozonides.—*Ibid.*, p. 882.

The Ph. Brit. Committee of Reference in Pharmacy asserts that the Ph. Brit. tests for oleic acid exclude samples suitable for medicinal use.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Dieterich, Karl, reports the examination of a total of 38 samples of oleic acid and records the results. The acid number varied from 177.60 to 200.18 and the iodine number from 73.67 to 96.21. The specific gravity of the samples reported varied from 0.894 to 0.922 at 15° C.—Helfenberger Annalen 1905, 1906, v. 18, pp. 69–70.

Blome, W. H., reports a laboratory sample with a high congealing point and the presence of palmitic and stearic acids.—Proc. Michigan Pharm. Ass., 1906, p. 104.

de Vevey, Artault, recommends oleic acid as a specific remedy "par excellence" in hepatic colic and biliary lithiasis.—Bull. des sc. pharmacol. Paris, 1906, v. 13, pp. 297–298.

ACIDUM PHOSPHORICUM.

Schucht, Ludwig, makes a contribution on the titration of phosphoric acid with an alkali and methyl orange as an indicator; also considers the oxalate method.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, part 2, pp. 1708–1711.

Jörgensen, Gunner, presents a new modification of the method for estimating phosphoric acid as magnesium ammonium phosphate.—Ztschr. f. anal. Chem., Wiesb., 1906, v. 45, pp. 273–315.

Schmitz, B., discusses the estimation of phosphoric acid as magnesium pyrophosphate; outlines his method and reports experimental work.—*Ibid.*, pp. 512–522.

The Ph. Brit. Committee of Reference in Pharmacy points out that the U. S. P. volumetric test for concentrated phosphoric acid is simpler that the Ph. Brit. lead oxide test.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Cowley, R. C., criticises the lead oxide test, which he says has at least two defects: The lead oxide is assumed to be perfectly free from water, which it is not; and, especially with acids of high specific gravity, the chemical action between the acid and the lead oxide causes the evolution of so much heat as to vaporize a portion of the water produced before weighing is completed.—Pharm. J., Lond., 1906, v. 23, p. 540.

Joyce, T. G., presents the results of his analyses of samples from four different makers and asks if it be not possible to produce phosphoric acid free from injurious substances, and, at the same time, free from those that are incompatible with others, which in pharmaceutical preparations it may be necessary to use in conjunction.—*Ibid.*, 145.

Evans Sons, Lescher & Webb report on the examination of one small bottle of phosphoric acid, labeled "Pure B. P.," which was heavily contaminated with iron and chlorides.—Analytical Notes for 1906, 1907, p. 27.

Patch, E. L., reports that different lots of phosphoric acid contained phosphates and sulphuric acid.

Gane, E. H., found an excess of silica cloudy with small gelatinous precipitate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Graham, Willard, found, on diluting some samples of phosphoric acid with an equal volume of water, that a flocculent precipitate was produced. On examination this impurity proved to be silica. One sample was found to contain considerable iron and sulphates.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Kebler, Lyman F., reports two samples of phosphoric acid, supposedly U. S. P.: one contained silicious matter and the other iron.—Proc. Am. Pharm Ass., 1906, v. 54, p. 348.

Harvill, J. Paul, combines iodine and phosphoric acid in the treatment of the cough, night sweats, and gastric derangements of phthisis.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 282.

ACIDUM SALICYLICUM.

Tijmstra and Eggink discuss the probable reactions involved in the synthesis of salicylic acid and point out that sodium phenolate absorbs carbon dioxide at 85° and above with the formation of phenolsodium-orthocarbonic acid, a product that is isomeric with sodium salicylate.—Pharm. Ztg., Berl., 1906, v. 51, p. 190.

Van Charante, Jacob Moll, (Proc. K. Akad. Wetensch. Amsterdam, 1906, v. 9, pp. 2033) describes the formation of salicylic acid from sodium phenoxide.—Abstr. in J. Chem. Soc. Lond., 1906, v. 90, pt. 1, p. 665.

An abstract (from Ztschr. f. Angew. Chem.) outlines the experiments reported by Chr. Rudolph in connection with the production of salicylic acid from orthocresol.—Pharm. Zentralh., 1906, v. 47, p. 648.

Zernik, F., discusses the production of derivatives of salicylic acid, discusses the relation of these derivatives, and classifies them into two general groups depending on the replacement of the H atom in the carboxyl or in the hydroxyl group by the second body. The first of these groups is represented by salol and the second by acetylsalicylic acid.—Apoth. Ztg., Berl., 1906, v. 21, pp. 962–964.

Vinci, Gaetano. continuing his studies on salicylic acid concludes that (1) the determination of salicylic acid in the tissues and organic liquids must, if one would avoid error, eliminate lactic acid, which, on account of its great solubility in ether, is found in connection with salicylic acid in the ethereal extract; (2) lactic acid masks the characteristic reaction of salicylic acid with perchloride of iron when present in quantity of about 15 times the weight of the salicylic acid, and completely obscures it when present to the extent of 200 or 300 times its weight; (3) the preferable method is first to extract with sulphuric ether and then with chloroform or with carbon disulphide or petroleum ether, which dissolves the salicylic acid, but not the lactic. The salicylic acid is determined in this solution.—Arch. di farmacol. sperim., 1906, v. 5, pp. 179–187.

Spaeth, Edward, reviews the several methods proposed for determining the presence of salicylic acid.—Südd. Apoth. Ztg., 1906, v. 46, pp. 2–3, 10–11, 19–20.

Vitali, Dioscoride, discusses the determination of salicylic acid in wine and foods.—Boll. chim. farm., Milan, 1906, v. 45, pp. 701–708.

Gigli, Torquato, discusses the enormous abuse of salicylic acid as a food preservative.—*Ibid.*, pp. 773–774.

Bigelow, W. D., outlines the provisional methods for the determination of salicylic acid adopted by the Association of Official Agricultural Chemists.—Circ. Bur. Chem. U. S. Dept. Agric., 1906, No. 28, pp. 3–5.

Riedel's Berichte reports that, on slowly heating, salicylic acid melts quite uniformly at 157° C.; on heating more rapidly it melts at from 157 to 158° C.—Riedel's Berichte, Berlin, 1906, p. 22.

Ohliger, Willard, reports salicylic acid which contained easily carbonizable impurities.—Proc. Michigan Pharm. Ass., 1906, p. 46.

Franceschini, Francesco, presents a study of the absorption of salicylic acid, as indicated by its elimination through the urine, after the external application of various preparations; hydroalcoholic solution, ointment with and without turpentine, methyl salicylate with olive oil, methyl salicylate, mesotan, mesotan with olive oil, and mesotan with turpentine.—Arch. di farmacol. sperim., 1906, v. 5, pp. 539–547.

Rodríguez Carracido, José (Vortrag, gehalten vor der Königl. med. Akad. in Madrid, 4/I/06, p. 47), discusses salicylic acid in the rôle of an agent modifying organic oxidation. Eliminated as salicyluric acid, there is a saving in the amount of oxygen required to oxidize glycocol. * * * In every gramme of glycocol which is paired with salicylic acid the organism is spared 622 milligrammes of oxygen.—Abstr. in Biochem. Centralbl., Leipz., 1906, v. 5, p. 131.

Stockman, R. (Brit. M J., Nov. 24), states that there can be no reasonable doubt that compounds of salicylic acid, or those yielding it in the body, have a specific action against the poison of acute rheumatism. This action is often too feeble to cut short an attack, and this is particularly true when the inflammation is seated in the fibrous tissues connected with the muscles and joints, or the valves of the heart.—J. Am. M. Ass., 1906, v. 47, p. 2124.

Shoemaker, John V., condemns the use of salicylic acid and all other coal-tar derivatives in the treatment of acute articular rheumatism.—N. York M. J., 1906, v. 83, p. 378.

Lafay, L., commenting on a laryngologist's prescription for salicylic acid, takes up the general question of the solubility of salicylic acid and the advisability of the physician giving the pharmacist some hint as to the exact end sought to be attained through his prescription.—Bull. des sc. pharmacol., Paris, 1906, v. 13 (Compt. rend. des soc. sav.), pp. 126–127.

Kionka, H., reports that his experiments appear to confirm the previously made observation that salicylic acid has a marked influence on biliary secretion.—Ztschr. f. exper. Path. u. Therap., 1906, v. 2, p. 15.

Wilcox, Reynold Webb, recommends the use of salicylic acid in gall-stone disease and presents a formula for a combination which, in his hands, has proved efficient in a number of instances.—Trans. Am. Therap. Soc., 1906, pp. 114–117.

Wiley, H. W., presents the general results of the investigations showing the effects of salicylic acid and salicylates upon digestion and health and outlines the method of conducting the experiments.—Circ. Bur. Chem. U. S. Dept. Agric., 1906, No. 31, pp. 12.

Duret (Bull. Acad. Méd., Paris, v. 70, No. 26) suggests that the use of salicylic acid and other preservatives may be responsible in part for the extraordinary frequency of intestinal affections, including cancer.—J. Am. M. Ass., 1906, v. 47, p. 464.

The compiler of the "Therapeutics" column mentions some of the principal external uses of salicylic acid, such as pruritus, corns, bromidrosis, eczema, and chancres, with appropriate forms of administration.—*Ibid.*, v. 47, p. 716.

ACIDUM STEARICUM.

Dieterich, Karl, reports the examination of 11 samples of stearic acid, which varied in melting point from 51° to 57° C. The acid number varied from 201.85 to 207.95.—Helfenberger Annalen, 1905, 1906, v. 18, p. 63.

MacFadden, W. Lester, says that stearin is always in a more or less rancid condition and is only excusable in ointments in small amounts. It is a satisfactory hardener, if that effect is desired regardless of results, but it is little used. Through its crystalline structure it is disposed to impart roughness. He discusses the uses of ammonium, sodium, and potassium stearates in the making of ointments, and asserts that stearic acid lends to ointments its property of absorptiveness, but it must be used with judgment. It has distinctly acid properties, which render chemical action possible if basic substances are present.—Bull Pharm., Detroit, 1906, v. 20, pp. 203–204, 293.

ACIDUM SULPHURICUM.

Winteler, F., describes the contact process for the production of sulphuric acid as carried out at Niagara Falls, N. Y.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 87–90.

Feigensohn, M., discusses the manufacture of sulphuric acid as carried out at the present time. (1) The contact process. (2) The chamber process.—*Ibid.*, v. 30, pp. 851–853, 865–867, 879–880.

Reusch, K., reviews the progress made in the production of sulphuric acid during the past year and considers the economic conditions that prevail.—*Ibid.*, v. 30, pp. 326–327.

Lunge and Berl discuss the chemistry of the lead-chamber process for making sulphuric acid.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, pp. 881–894.

Inglis, J. K. H., presents some observations on the loss of nitre in the chamber process of making sulphuric acid.—Oil, Paint, and Drug Rep., 1906, v. 70, July 23, p. 16.

Silberrad, Oswald, presents the results of experiments to determine the rate of removal of nitrous acid from concentrated nitric acid.—*Ibid.*, v. 69, May 21, p. 40.

Littmann, Sigmund, discusses the relation of selenium to the manufacture of sulphuric acid and points out some of the difficulties encountered, due to its presence in all kinds of pyrites.—Chem. Eng., Phila., 1906, v. 14, pp. 190–197.

Scholtz, M. outlines a method for the titrimetric estimation of combined sulphuric acid. (From Arch. d. Pharm.).—Pharm. Zentralh., 1906, v. 47, p. 319.

Caspari, Chas. E., reports two samples examined: One U. S. P.; one contained arsenic.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Kebler, Lyman F., reports a sample of sulphuric acid extremely dark in color, due to action of acid on the luting employed in closing packages.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Kraemer, Henry, reviews the history and use of sulphur in connection with disinfection, and records experiments made with the use of sulphuric acid as a fungicide. He concludes that dilute solutions of sulphuric acid appear to have a beneficial effect on the plants treated apart from fungicidal action.—Proc. Am. Philosoph. Soc., 1906, v. 46, pp. 157–163.

ACIDUM SULPHUROSUM.

Coblentz, Virgil, gives the results of a number of experiments in the extemporaneous preparation of sulphurous acid and the reason for the use of charcoal as over against copper.—Am. J. Pharm., Phila., 1906, v. 78, p. 389.

Ehman, J. W., presents the work of F. L. Cheney in the preparation of extemporaneous sulphurous acid by a process similar to that of compound solution of chlorine.—*Ibid.*, v. 78, p. 333.

An abstract from U. S. patent No. 829765 outlines the production of sulphurous acid from sulphur-containing ores.—Chem. Repert., Cöthen, 1906, v. 30, p. 352.

Denigés, G., discusses the application of a characteristic reaction for sulphurous acid and sulphites, depending on the reducing action of the lower oxides of phosphorus.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 161–164.

Bigelow, W. D., outlines the methods adopted by the Association of Official Agricultural Chemists for the determination of sulphurous acid in foodstuffs and allied products.—Circ. Bur. Chem. U. S. Dept. Agric., 1906, No. 28, pp. 11–12.

Kirk, C. D. R. (Mod. Eclecticism, December, 1905), considers the red tongue, with dirty coating (in typhoid), an unmistakable appeal for "specific sulphurous acid." The case was not one for echafolta, echinacea, baptisia, or sodium sulphocarbolate, all good remedies, but here clearly not indicated. When the whole field of medicine shall be covered by direct indications, as were here presented by sulphurous acid, then will the practice of medicine be greatly simplified.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 94.

ACIDUM TANNICUM.

Dekker, J., discusses the constitution of tannin and proposes the empiric formula $C_{14}H_{10}O_9$ (Ber. d. D. Chem. Ges., 1906, v. 39, p. 2597).—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 651.

The Ph. Brit. Committee of Reference in Pharmacy points out that water of crystallization in tannic acid is doubtful.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Thoms, H., presents a discussion of the nature and composition of tannins with extensive reference to the literature of the subject and a report of experiments made to determine the characteristics of the several tannins that are available.—Arb. a. d. pharm. Inst. d. Univ., Berl., 1906, pp. 61–82.

Glücksmann, C., discusses the valuation of tannin and controverts the criticisms made by Thoms.—Pharm. Prax., 1906, v. 5, pp. 33–49, 86–95.

Franke, H., discusses the production of pure tannin, reviews the work done by Thoms on commercial tannins, and records the several methods used in the production of this material.—Pharm. Zentralhl., 1906, v. 47, pp. 795–798.

Vaubel and Scheuer discuss the determination of tannic acid and of tannin-containing materials.—Ztschr. f ang. Chem., Berl., 1906, v. 19, pt. 2, pp. 2130–2133.

Franke, H., discusses the chemistry of several of the newer, medicinally important, combinations containing tannin.—Pharm. Zentralhl., 1906, v. 47, pp. 534–538.

Rosenthaler, L., criticises the statement made by Franke and quotes other authors.—*Ibid.*, v. 47, p. 604.

Franke, H., discusses the direct estimation of tannic acid, reviews some of the methods previously used, and reports experiments with the use of formaldehyde as a precipitant.—*Ibid.*, v. 47, pp. 599–604.

He proposes the use of sodium chloride to aid in the precipitation of tannin in the analysis of this substance.—*Ibid.*, v. 47, pp. 887–889.

He also discusses the nature and composition of tannin and reviews the literature relating to the chemical examination of this substance.—*Ibid.*, v. 47, pp. 983–987. (See also p. 1052.)

Fernan, Albert, discusses the several methods for the valuation of tannins and asserts that there is no one method that will give generally acceptable results in all cases.—Pharm. Post, Wien, 1906, v. 39, pp. 37–39.

Boudet describes a modification of the method of F. Jean for the estimation of tannin; applicable also for gallic acid.—Bull. Soc. de chim., Par., 1906, v. 35, pp. 760–762.

Philipp Röder, Wien, discusses the recent literature relating to the valuation and testing of tannin, and points out that much of the criticism of Glückmann's formaldehyde method of testing tannin is based on insufficient data, and that it is essential in all cases to determine the composition of the material qualitatively.—Pharm. Post, 1906, v. 39, pp. 216.

G. Hell & Co.. in Troppau, point out that tannin is frequently of poor quality; of 12 samples examined 6 did not comply with the requirements for a medicinally pure article.—*Ibid.*, v. 39, p. 150.

Caspari, Chas. E., reports one sample examined; contained much insoluble matter.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Kebler, Lyman F., reports that samples of tannic acid were, with one exception, extremely poor in quality. In nearly all cases a considerable amount was insoluble in water.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Dixon, W. E. (Lancet, Lond., Mar. 24, 1906), thinks that the tannins are worse than useless in internal hæmorrhage.—J. Am. M. Ass., 1906, v. 46, p. 1242.

An editorial calls attention to W. E. Dixon's work (Lancet, Mar. 24, 1906, p. 826) showing the uselessness of adrenalin, ergot, and astringents in general taken internally to control hæmorrhage.—*Ibid.*, v. 47, p. 41.

ACIDUM TARTARICUM.

Charles, P., proposes a modification of the method of Goldemberg and Geromon for the industrial determination ("Dosage") of tartaric acid.—Bul. Soc. de chim.. Par.. 1906, v. 35, pp. 171–174.

An additional note.—*Ibid.*, pp. 571–575.

See also Chem. News, Lond.. 1906. v. 93, pp. 107–108: Ann. de chim. analyt., Par., 1906, v. 11, pp. 58–62.

Tocher, J. F., gives a table for the separation of tartrates, citrates, and malates.—Pharm. J., Lond., 1906, v. 23, p. 87.

Sullivan and Crampton conclude. from a large number of experiments with their test, that it is a convenient and reliable method for detecting tartaric acid in wines, ciders, fruit syrups, etc., and it is believed to be possible to adapt it to other substances as occasion may arise.—Am. Chem. J., 1906, v. 36, pp. 419–426.

Kahn, Joseph I., discusses the detection of tartaric acid in the presence of citric acid.—Proc. New York Pharm. Ass., 1906, p. 205.

Patch, E. L., points out that in the test for sulphuric acid in tartaric acid the strength of the solution, ten times that given for citric acid, is stated, but the amount of barium chloride and the time limit are omitted.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Blome, W. H., reports a sample of tartaric acid with a suspicious label which showed the presence of appreciable quantities of iron.—Proc. Michigan Pharm. Ass., 1906, p. 107.

Caspari, Chas. E., reports one sample examined; contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Hankey, William T., asserts that the best obtainable tartaric acid is nearly 100 per cent pure, but still shows, by the U. S. P. method, slight traces of heavy metals, usually a mixture of lead and zinc.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

G. Hell & Co., in Troppau, refused 4 out of 10 samples of tartaric acid because of contamination with sulphates, heavy metals, and an excess of ash.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Evans Sons Lescher and Webb report that out of 110 lots of tartaric acid tested during the year only 3 were rejected as containing too much lead, and that only one sample contained more than one part of arsenium per million.—Analytical Notes, for 1906, 1907, pp. 31, 32.

MacFadden, A. W. J. (Local. Govt. Bd. [Gt. Brit.], Med. Dept., Repts. Insp. Foods, 1907, No. 2, pp. 10), reports on a large number of samples of tartaric acid. Small quantities of lead were found in nearly every sample, and very small quantities or traces of arsenic in a number of samples, these impurities being accidental.—Exper. Sta. Rec., 1906, v. 18, p. 1149.

ACONITINA.

Schulze, Heinrich, discusses the production of aconitine, the chemistry of the alkaloid, some of the derivatives obtained, the composition of the alkaloid, and its decomposition products. He is not willing to decide, as yet, whether the formula $C_{34}H_{47}NO_{11}$ or the formula containing two less atoms of hydrogen, $C_{34}H_{45}NO_{11}$, be the correct one.—Arch. de Pharm., Berlin, 1906, v. 244, pp. 136–159, 165–196.

Gordin, H. M., reviews the progress in the chemistry of aconite and of the several aconitines during 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 98–104.

Monti, N. (Gaz. chim. ital., 1906, v. 36, [2], pp. 477–480), comments on the fact that most of the reactions of aconitine, including the one proposed by Alvarez, are stated not to be characteristic of that alkaloid. He recommends the following: From 0.0002 to 0.001 gm. of the alkaloid is treated in a porcelain capsule with 2 to 4 drops of sulphuric acid of sp. gr. 1.75–1.76, and the mixture is heated on the water bath for five to six minutes. Aconitine is colored by this treatment at the most only a faint yellow, but if a crystal of pure resorcinol be now added and the heating continued, a yellowish-red coloration is produced, which gradually becomes stronger, being at its maximum intensity after heating for about twenty minutes. It is stated that no other alkaloid gives this reaction.—J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 1171.

McNair, F. H., points out that aconitine is a dangerously potent drug and should be used with care in veterinary practice. He reports a fatality.—Am. Vet. Rev., N. Y., 1906, v. 30, p. 1311.

ACONITUM.

Senft, Em., describes and figures *Aconitum napellus*, *Aconitum stoerkianum*, and *Aconitum variegatum*. He devotes considerable attention to the microscopy of various portions of these plants. Also discusses the composition of the root, reviews some of the history of the drug, and gives a bibliography relating to the history of its introduction.—Pharm. Prax, 1906, v. 5, pp. 1–11.

Stapf, O. (Annals of the Royal Botanic Garden, Calcutta, v. 10, pt. 3, pp. 115–197), presents a monograph on the aconite of India in which he discusses the history and the structure of the several aconites found in India.—Bot. Jahrb. Engler, Leipz., 1906, v. 37, p. 46.

Schulze, Heinrich, discusses the early knowledge of the poisonous properties of aconite and the literature relating to aconitine.—Arch. d. Pharm., Berlin, 1906, v. 244, pp. 136–159, 165–196.

Wentrup, Franz, reports on the comparative content of aconitine of the mother and daughter tubers of aconite. He concludes that the older tubers contain on an average but a slightly smaller amount of aconitine than the tubers of the current year.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 180–183.

See also Pharm. Zentralh., 1906, v. 47, p. 915.

The Ph. Brit. Committee of Reference in Pharmacy believes that the exclusion of the Japan variety of aconite root is necessary, owing to the difference in nature and physiological action of the alkaloids. The assay for total alkaloids has been decided upon and undertaken by the Brussels Conference, but ether-soluble alkaloid (chiefly aconitine) is preferable.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Philipp Röder, Wien, reports on two samples of aconite which were found to contain, respectively, 3.84 and 4.26 per cent of ash and 0.573 and 0.366 per cent of alkaloid. He suggests a limit of not more than 5 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 284, 523.

Caesar and Loretz report that various samples of aconite root examined by them varied in alkaloidal content, yielding 0.530, 0.617, 0.638, 0.775, and 0.797 per cent of aconitine.—Ges.-Ber. v. Caesar & Loretz, in Halle a. S., 1906, p. 70.

They suggest the determination of the moisture content and the assay for alkaloids according to the method given by them for belladonna root.—*Ibid.*, p. 119.

Patch, E. L., reports 5 assays of aconite root which varied from 0.62 to 0.45 per cent of aconitine, only one being below the official 0.5 per cent.

Gane, E. H., found one sample of aconite which contained only 0.20 per cent of aconitine.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Lyons, A. B., reports that but 1 out of 12 replies received considered 0.4 gm. of aconitine in 100 c.c. of fluid extract of aconite as being too exacting. He also suggests that the result of assay should always be confirmed by Squibb's test.—*Ibid.*, pp. 437, 438.

Moerk, Frank X., points out that in place of the fluid extract of aconite representing 100 per cent, or 1 gram in each c.c., it in reality is required to represent but 80 per cent of the alkaloidal strength of the drug. The tincture, in place of being 10 per cent, is 9 per cent of the active constituents.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Puckner, W. A., reviews the recent literature relating to the assay of aconite and points out that the valuation of aconite by the U. S. P. VIII process consumes much time because of the low temperature prescribed for the evaporation of the percolate and the difficulty of obtaining a clear filtrate when the evaporation residue is dissolved in dilute sulphuric acid and filtered. He believes, however, that the procedure is so simple, the results so satisfactory, and the decomposition of the alkaloid so effectually avoided that the extra time may well be ignored.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 231, 232.

Philipp Röder, Wien, outlines a method of assay for tincture of aconite similar to that given for extract of belladonna. Two samples of tincture yielded, respectively, 0.041 and 0.056 per cent of tincture.—Pharm. Post, Wien, 1906, v. 39, p. 297.

Caspari, Chas. E., asserts that the U. S. P. VIII assay of tincture of aconite is laborious and tedious. When it comes to filtering, it takes three days to filter it, to say nothing of washing.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 455.

Gordin, H. M., thinks the assay method for aconite root and its fluid extract unworkable. The first acid liquid obtained, which is directed to be filtered, is thick and contains sticky resinous substances that soon completely clog the filter. He suggests a method and the use of a shaking-tube percolator with special separating funnels, which he asserts is simple, short, and exact.—Am. J. Pharm., Phila., 1906, v. 78, pp. 454, 460.

See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 379.

Hankey, William T., has found the U. S. P. VIII method of assay for aconite rather tedious. He believes that more reliable results might be obtained if the drugs were previously dried to constant weight.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Dohme, A. R. L., asserts that seven reputable chemists operating upon the same sample of drug by the same process varied in the percentage content of alkaloid from 0.81 to 1.21 per cent.—*Ibid.*, v. 49, p. 268.

Vaughan, W. S., apropos of the change in strength of tincture of aconite, asks if there is any good reason for upsetting physicians, dentists, veterinarians, and people in general in nine-tenths of the changes made in the Pharmacopœia, other than that we must make a sale for the books? The editors, in reply, express the hope that the next Committee of Revision will give publicity to its work.—Bull. Pharm., Detroit, 1906, v. 20, p. 75.

Kaupp, B. F., reports the effect of a poisonous dose of aconite on a horse and notes the observed symptoms in detail.—Am. Vet. Rev., N. Y., 1906, v. 30, pp. 454–456.

Felter says specific aconite is the remedy for the small and rapid feeble pulse, with increase of temperature. Asthenia is marked. The dose should be small. Large doses fail to accomplish the required sedation (cardiac stimulation) and produce heart depression. Given exactly according to its indication, it is one of the most uniformly successful of remedies.—Eclectic Med. J., Cincin., 1906, v. 66, p. 203.

An unsigned article suggests that aconite probably deserves a more extended use as an antipyretic.—J. Am. M. Ass., 1906, v. 46, p. 1164.

A contributor to the "Therapeutics" column states that Grayson recommends drop doses of tincture of aconite in the treatment of acute laryngitis in connection with local measures.—*Ibid.*, v. 47, p. 1591.

Carmichael, T. H. points out that—

> Aconite was proved with a tincture made by mixing the expressed juice of the plant with equal parts of spirits of wine. Hahnemann considered this tincture to be 50 per cent drug strength, but it was probably not over 6 per cent. The proving was also made with the soid extract, with extracts of the whole plant and of the roots only. Siegel chewed the root and Stoerck took on his tongue a little of the powdered stalks and leaves. Different species of aconite were used, such as *Aconitum anthora*, *A. cammarum*, *A. neomontanum*, *A. ferox*, and the *Aconitum napellus* which is at present used.—Trans. Am. Inst. Homœop., 1906, 62d sess., p. 225.

Collins, C. D., in discussing the treatment of pruritus vulvae, says:

> Aconite is the remedy where the itching is of a tingling sensation with fine prickings and the skin is hot and dry and the patient restless and anxious.—*Ibid.*, 62d sess., Pt. II, p. 286.

Haines, Oliver L., has abiding faith in the power of *Aconitum napellus* to lessen an endocardial inflammation in its acute or early stage.—*Ibid.*, 62d sess., Pt. I, p. 426.

ADEPS.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the iodine value for lard be introduced and saponification omitted. The monograph should be rewritten.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Kühn and Bengen discuss the testing of lard for cotton seed oil, point out the conditions under which the Halphen test fails to indicate the presence of this adulterant, and suggest the use of Bömer's phytostearin acetate test in doubtful cases.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 145–153.

Evans, John, comments on the testing of lard for beef stearin and cotton seed oil; for the latter he mentions the Ph. Brit. and the Halphen tests.—Apothecary, Boston, 1906, v. 18, p. 907.

Dunlop, H., gives a number of tables showing the results of his experiments. He thinks the Keating-Stock method not altogether conclusive or satisfactory, and quotes with approval Hehner's remarks on the Belfield test. J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 458–461.

Barnard, H. E., reports that of 42 samples of lard examined during the year 15, or 35.6 per cent, were adulterated, either by the addition of cotton seed oil or beef stearin.—Rep. Indiana Bd. Health, 25th Ann., 1906, pp. 292, 293.

Dieterich, Karl, reports on a total of 30 samples of lard. The melting point of these samples was found to vary from 38° to 46° C., the samples prepared by Dieterich himself melting at from 42° to 45° C. The acid number varied from 0.44 to 3.75 and the iodine number from 44.21 to 65.27.—Helfenberger Annalen, 1905, 1906, v. 18, pp. 64, 65.

Smith, Kline & French Co. report on the examination of 4 samples of benzoinated lard. One sample was rancid, having an acid number of 18.6. Another sample which was claimed by the manufacturer to be pure proved to be a vanillated lard, or one odorized with vanillin.—Lab. Rep. S. K. & F., 1906, p. 18.

Dott, D. B., thinks a combination of the German process, with the addition of a simple and direct method of imparting a suitable odor, seems likely to give the best result. He has found 60 grains of benzoic acid and 40 grains of prepared storax to the pound of melted lard give a good result, and he approves the U. S. P. idea of adding a little white wax.—Pharm. J., Lond., 1906, v. 23, p. 431.

Taylor, S., finds Dott's product somewhat dark in color, and still requiring to be strained.—*Ibid.*, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy suggests that benzoinated lard be prepared with Sumatra benzoin.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

MacFadden, W. Lester, discusses the disadvantages and difficulties in the use of lard, none of which, he thinks, can be wholly overcome. Chemical action is very likely to take place, bringing about decompositions that carry on further disintegration, or cause reactions with basic substances that ruin the final product utterly. Zinc ointment is notorious in this latter respect, and ointments containing mercury oxides are positively dangerous.—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

ADEPS LANÆ.

The Ph. Austr. VIII includes Lanolinum anhydricum as the synonym for Adeps Lanæ and Lanolinum as the synonym for Adeps Lanæ Hydrosus. The Ph. Belg. III designates Adeps Lanæ as Lanolinum and Adeps Lanæ cum Aqua as "Lanolinum cum Aqua."

The Ph. Brit. Committee of Reference in Pharmacy report that Elborne's modification of the cholesterin test for wool-fat is unnecessary. The iodine value is not of much use.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Endlicher (Pharm. Ztg., li, No. 28, 1906, 321; from Pharm. Post, 1906, No. 7) points out that commercial adeps lanæ should always be identified by the pharmacopœial cholesterin test, since it is frequently substituted in the (Austrian) market by products intended for cosmetics, which contain no wool-fat at all.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 805.

Lifschütz, J. (N. Erfind. u. Erf.), has been able to separate from wool-fat the constituents which give it its water-absorbing properties by treating a solution of wool-fat in benzine with animal charcoal. The latter appears to have the property of absorbing a portion of the wool-fat that is not readily soluble in the benzin, but is soluble in alcohol, ether, acetone, chloroform, carbon tetrachloride, and carbon disulphide. It is asserted that 2 parts of this substance mixed with 98 parts of paraffin ointment give to the latter a high degree of water absorbing property.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 23.

Dieterich, Karl, reports the examination of a total of twenty samples of wool-fat. The residual ash varied from 0.00 to 0.07 per cent, the acid number from 0.11 to 0.87, and the water-absorbing property from 130 to more than 250.—Helfenberger Annalen, 1905, 1906, v. 18, p. 133.

Caspari, Charles E., reports two samples examined; both contained fatty acids.—Proc. Missouri Pharm. Ass., 1906, p. 101.

MacFadden, W. Lester, considers the virtues of wool-fat to be threefold: Its unique property of taking up water, its textureless nature, and the property of ready absorption. By its use ointments become directly and genuinely curative media. Medicaments soluble in water are easily incorporated, as are also solid extracts, fluid extracts, and coloring agents. The danger of absorbing too much water may be overcome, if permissible, by dispensing the product in collapsible tubes. Owing to its stickiness and its odor, not to be masked by delicate perfumes, as little should be employed as will accomplish the result desired. Its "tackiness" is utilized in giving massage creams the necessary "draw."—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

ÆTHER.

The Ph. Brit. Committee of Reference in Pharmacy suggests that ether should distil at a temperature not under 34° C.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Rosenthaler, L., discusses the rise in temperature which takes place on mixing ether and chloroform, and believes this rise to be due to chemical combination of the two substances and a rearrangement of the ether molecule.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 65, 66.

Nicloux, Maurice, describes his method for the estimation of small quantities of ether and discusses the estimation of ether in various materials.—Compt. rend. Soc. de biol., Par., 1906, v. 61, pp. 577–579, 606–609, 665–668, 728–731.

Guiges, P., presents a rapid method of obtaining pure ether without serious loss; this is not intended to be used with impure ether nor to replace purification.—J. de pharm. et de chim., Par., 1906, v. 24, p. 204.

Weigel, G., calls attention to the requirements of the Ph. Ndl. IV, for "Æther ad Narcosin." The main features of this requirement are that the ether produces no reaction with Nessler's reagent within fifteen minutes, and that it evaporates without residue or the production of any visible change in blue litmus paper.—Pharm. Zentralh., 1906, v. 47, p. 397.

The Ph. Brit. Committee of Reference in Pharmacy reports on purified ether, and suggests that the aldehyde test should be with solid caustic potash. The test by odor requires more detailed instructions.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Patch, E. L., found a sample of ether, sold as 90 per cent, contained only 74 per cent. Two samples, of U. S. P. strength, had an acid reaction and yielded residue, and one sample answering all other tests gave a brown residue.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Graham, Willard, reports that out of 5 samples of ether examined one showed the presence of an excessive amount of aldehyde.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Baird, J. W., examined 3 samples in 1904 and found one genuine, two adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

Ohliger, Willard, finds that ether sometimes contains water and has an evil odor.—Proc. Michigan Pharm. Ass., 1906, p. 47.

According to Fonteyne, A., (1) respiration is accelerated by small, slowed by large, doses of ether. (2) Intravenous injections are more toxic than subcutaneous injections: 0.022 c. c. per rabbit-kilo intravenously produced almost identical phenomena with 2.5 c. c. subcutaneously. (3) Small doses increase the volume of air expired per minute, followed by a diminution, and fall to about normal with large doses. (4) The volume of the respiratory movement varies from injection to injection. He gives a number of historical and pharmacologic references besides detailing his own researches.—Arch. internat. de pharmacod. et thérap., Par., 1906, v. 16, pp. 369–377. (See also "General Conclusions." *Ibid.*, p. 449, ff.)

Kennedy, J. W., thinks ether preferable as an anæsthetic, and discusses the technic of its administration.—N. York M. J., 1906, v. 83, pp. 1186–1188.

Lull, C. (Alabama Med. J., April, 1906), is quoted on statistics of deaths by ether and chloroform anæsthesia, as well as the respective after effects.—J. Am. M. Ass., 1906, v. 47, p. 51.

Beesly, L. (Brit. M. J., Lond., May 19), states that ether anæsthesia invariably induces temporary acute acetonuria, which may be serious.—*Ibid.*, 1906, v. 46, p. 1890.

Armstrong, G. E. (Brit. M. J., Lond., May 19), studied 2,500 cases of ether anæsthesia with 55 cases of lung complications, and concludes that the ether *per se* is of minor importance in causing these complications.—*Ibid.*, v. 46, p. 1889.

Shipp, F. U., relates experience with ether by the drop method.—*Ibid.*, v. 46, p. 1317.

See also Metzenbanum, Myron. *Ibid.*, v. 47, pp. 1653–1655.

Vidal, E. (Presse méd., Par., v. 14), describes an apparatus for the administration of ether by the rectum.—*Ibid.*, 1907, v. 48, p. 458.

References to ether narcosis by rectum.—*Ibid.*, 1906, v. 47, p. 300, 1057.

Thompson, W. H. (Brit. M. J., Lond., Mar. 24, 1906), considers the action of ether and A. C. E. on renal activity.—*Ibid.*, v. 46, p. 1242.

An editorial calls attention to the celebration of Æther Day, October 16, at the Massachusetts General Hospital, being the sixtieth anniversary of the performance of the first operation under ether at that hospital.—*Ibid.*, v. 47, p. 1199. (See also Bost. Med. and Surg. J., 1906, v. 155, p. 450.)

ÆTHER ACETICUS.

Graham, Willard, examined 4 samples of acetic ether which varied from 86.5 to 98.5 per cent pure in strength, and had a boiling point varying from 71° to 72° C. rising to from 79° to 100° C. The specific gravity at 15° C. varied from 0.892 to 0.895.—Proc. Pennsylvania Pharm. Ass., 1906, p. 174.

Patch, E. L., reports on a sample of acetic ether which was only 83.6 per cent pure.—Proc. Am. Pharm. Ass., v. 54, p. 337.

Ohliger, Willard, reports a sample of ethyl acetate containing over 10 per cent impurities.—Proc. Michigan Pharm. Ass., 1906, p. 47.

ÆTHYLIS CHLORIDUM.

Webster, W., finds that ethyl chloride, ethyl bromide, ethyl iodide, and somnoform all have practically the same physiological action. Such differences as exist between them are only of degree, and appear to depend on the extent of their volatility. His results as regards the effects of ethyl bromide and somnoform on the vagus are diametrically opposed to those of Cole (Brit. Med. J., June 20, 1903), but in Swale Vincent's opinion are fully justified by the tracings.—Biochem. J., Liverpool, 1906, v. 1, pp. 328–340.

Hawley, G. F., reviews the literature of ethyl chloride and discusses the technic of anæsthetization with it.—J. Am. M. Ass., 1906, v. 47, pp. 502–505.

Osmond, A. E., illustrates a method of using an ordinary funnel for the administration of ethyl chloride for anæsthesia.—*Ibid.*, v. 47, p. 1655.

Syme, W. S., describes a simple method of administering ethyl chloride, which he has used three or four hundred times and which provides for the continuous admission of the air.—Brit. Med. J., Lond., 1906, v. 2, p. 197.

Manwaring, J. G. R., (J. Mich. State Med. Soc., Detroit, Nov.) used ethyl chloride for anæsthesia in 104 cases. Nausea was as frequent as it would have been with chloroform.—J. Am. M. Ass., 1906, v. 47, p. 2038.

Luke, T. D., (Lancet, Lond., May 5) refers to 22 fatalities occurring under ethyl chloride anæsthesia.—*Ibid.*, v. 46, p. 1731.

Friedland, M. M., cites 2 deaths in New York during the decade 1895–1905 in an estimated number of 2,190,000 administrations of nitrous oxide; ethyl chloride, 12,436 cases with but 1 bona fide death, though he cites 2 fatalities under ethyl chloride.—Dental Cosmos, Phila., 1906, v. 48, pp. 835–839.

Ware, Martin W., criticises Friedland's presentation and thinks a death rate for ethyl chloride of 1:40,000 is more nearly correct.—*Ibid.*, p. 1022.

Friedland replies.—*Ibid.*, p. 1207.

A nurse about to undergo an operation succumbed to ethyl chloride. The percentage of deaths of persons under ethyl chloride was estimated by a doctor at the inquest to be 1 in 10,000.—Pharm. J., Lond., 1906, v. 23, p. 419.

Ibid., p. 475, a little boy died while under the influence of ethyl chloride for operation purposes.

Barden, A., (Rev. gén. de l'Art Dent., Paris, April, 1906) shows that entirely too much confidence has been placed upon innocuousness of ethyl chloride, which, according to statistics collected up to date and referred to in his article, is responsible for 20 fatal cases.—Dental Cosmos, Phila., 1906, v. 48, p. 788.

Long, Eli H., says that the chief objection to ethyl chloride is that it is still a new agent; he thinks it safer than chloroform and compares favorably with ether.—*Ibid.*, v. 48, p. 817.

An editorial calls attention to the discussion of ethyl chloride, and to the fact that it is far from being the safe agent that some supposed. Serious damage to the heart was found to have resulted in a number of fatal cases.—Brit. M. J., Lond., 1906, v. 1, p. 1058.

ALCOHOL.

Lackey, R. H., quotes a correspondent who points out that the U. S. P. requirements are for what is practically known as 190° alcohol, and asserts that it is still a common practice to send out 188° alcohol.—Proc. Pennsylvania Pharm. Ass., 1906, p. 115.

Thurston thinks the manufacturers have overlooked the change in strength of alcohol, as alcohol of the U. S. P. 1890 strength is being generally supplied on orders.—Proc. Ohio Pharm. Ass., 1906, p. 67.

Vanderkleed, C. E., asserts that all alcohol stamped 190 proof, that he has examined, answered the U. S. P. requirements.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Ziegler, J., commends the modification of the official, German, process for the demonstration of acetone in alcoholic preparations, proposed by Eschbaum.—Apoth. Ztg., Berl., 1906, v. 21, p. 72.

Klason and Norlin (Arkiv. Kem. Min. Geol., 1906, v. 2, No. 24, pp. 1–7) describe a method for preparing a chemically pure ethyl alcohol and give its specific gravity as 0.794130 at 15° C.; the value 0.79429, on which Windisch's tables are calculated, indicates that the alcohol used by this author contained 0.05 per cent of water.—Abstr. in J. Chem. Soc. Lond., 1906, v. 90, pt. 1, 921.

Buchner and Meisenheimer discuss the chemical changes that take place in the course of alcoholic fermentation, and the products that are formed (Chem. Ber., 1906, v. 39, pp. 3201–3218).—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 743.

Mann, E. A., discussing a possible new commercial source of alcohol, gives the yield from various materials in proof gallons per bushel.—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 1076–1078.

An article translated from "Sa Majesté l'Alcool," by L. Baudry de Saunier, discusses the modern manufacture of alcohol, the various processes involved, the materials used, the mechanism of the modern still, the by-products, and the yield in pints of alcohol per 100 pounds of the several materials.—Sci. Am. Suppl., 1906, v. 62, pp. 25680–25681, 25696–25697, 25716–25718.

Wiley, H. W., discusses the sources of industrial alcohol, the sources of potable alcohol, the agricultural sources of industrial alcohol, and the composition and yield of alcohol-producing crops.—*Ibid.*, 1906, pp. 25814–25815, 25834–25835.

Gehe & Co. discuss the production and consumption of alcohol and spirit and point out that the consumption for beverage purposes has again decreased during the past year, while the use of alcohol for commercial and manufacturing purposes has increased. The decrease for beverage purposes is the more remarkable as it is actual, despite a steady increase in the total population.—Handels-Ber., Gehe & Co., 1906, p. 56–58.

An abstract from a recent contribution to the "Liquor Problem," by John S. Billings, presents the per cent, average, and the alcohol range in a number of alcoholic beverages. American beer has an average of 3.8 per cent and an alcohol range of from 1 to 7. American red wine has an average of 9 per cent and an alcohol range of from 6 to 12, and American whisky has an average of 43 per cent and an alcohol range of from 41 to 48.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 12.

Bartlett, Wm. W., in a hearing before the Massachusetts legislature, refers to the amount of alcohol required to exhaust the drugs in pharmacopœial preparations and the percentage by weight and by volume.—Proc. Massachusetts Pharm. Ass., 1906, p. 54.

Mann, E. A., discusses the determination of the spirit strength of essences by various methods. He concludes that all of the methods tried gave very concordant results when the spirit strength of the distillate was taken with a picnometer, but both the specific gravity balance and Sike's hydrometer seriously sacrificed accuracy to speed.—Pharm. J., Lond., 1906, v. 22, p. 682.

Caldwell, Paul, presents a list of the pharmacopœial preparations containing alcohol, and gives the percentage of alcohol contained therein.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp, 434, 435.

An article in Notes and Queries points out that while an approximation of the percentage of alcohol in medicines may be arrived at by computation, the only way of making an accurate estimation is by distilling off the alcohol.—*Ibid.*, v. 50, p. 445.

Dieterich, Karl, asserts that a number of samples of alcohol that were examined did not comply with the Ph. Germ. silver nitrate test.—Helfenberger Annalen for 1905, 1906, p. 18.

Leach, Albert E., reports that of 10 samples of alcohol classed as adulterated several were found to be bad enough for prosecution.

The poorest sample contained only 48.43 per cent alcohol, and 4 others were found to contain less than 80 per cent. Three samples purchased for alcohol in paint shops were found to consist of wood alcohol, without the required poison label.—Rep. Massachusetts Bd. Health, 1906, p. 400.

Barnard, H. E., reports that of 132 samples of alcohol analyzed 32 were found to be impure or below standard. In almost every case the alcohols were but slightly below the U. S. P. VIII requirement. One sample only was diluted with water, and in no case was methyl alcohol substituted for grain alcohol.—Rep. Indiana Bd. Health, 1906, pp. 363–365.

Baird, J. W., reports that of 6 samples examined in 1904, 3 were adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

Havenhill and Pedroja report 7 samples with specific gravities at 15° of 0.8196, 0.8220, 0.8196, 0.8209, 0.8182, 0.8158, 0.8189; no methyl alcohol present.—Proc. Kansas Pharm. Ass., 1906, p. 35.

Ohliger, Willard, reports alcohol which contained traces of aldehyde and methyl alcohol.—Pros. Michigan Pharm. Ass., 1906, p. 46.

Bachem, C., discusses the influence of small quantities of alcohol containing liquids on the blood pressure of man (Pflüger's Arch., 1906, v. 114, p. 508).—Biochem. Centralbl., Leipz., 1906, v. 5, p. 750.

Dow, Herm (Pflüger's Arch., v. 112, 500–622), reports observations on the action of ethyl alcohol on the isolated frog's heart and the relation to the corresponding action of the higher alcohols.—Jahresb. ü. Tier Chem. Wiesb. for 1906, 1907, v. 36, p. 481.

Fonteyne, A., gives a number of historical and pharmacologic references in addition to the details of his own researches on the action of alcohol on respiration.—Arch. internat. de pharmacol. et de thérap., Par., 1906, v. 16, pp. 357–369. (See also "General Conclusions," *Ibid.*, p. 499 ff.)

According to Billard, G. (Soc. de Biol., 16/VI/06; v. 60, p. 1011), alcohol in small dose favors gastric absorption by lowering the superficial tension of the gastric juice.—Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 189.

Whitmore, W. V., concludes a somewhat detailed paper with the statement that alcohol still retains an important place in our list of remedial agents. Its field of usefulness is undoubtedly more limited than was formerly supposed. Almost all writers state that it should be used tentatively, and never as a routine treatment. They all urge that it be administered with judgment and used in moderation.—Merck's Archives, 1906, v. 8, p. 345.

Raphael, Alex, quotes numerous operators, from the good Samaritan down, as to the efficacy of external applications of alcohol in inflammatory processes.—Thérap. Monatsh., Berl., 1906, v. 20, pp. 436–443.

An editorial calls attention to the statement of Pfuhl (Ztschr. f. Hyg. u. inf. Krankh., XLVII, 3; Berl. Klin. Wchnschr., Feb. 12), that the antiseptic action of alcohol is increased by dilution with water up to 40 or 50 per cent, but diminished by further dilution. Whether this is due to direct action as an antiseptic or to the enhanced resistance of the tissues is not determined.—N. York M. J., 1906, v. 83, p. 981.

v. Herff, O. (München. med. Wchnschr., v. 53, No. 30), approves of the Ahlfeld technic of hot-water-alcohol disinfection for obstetric practice and laparotomies. The alcohol shrivels the skin and tans it, as it were, preventing the escape of germs.—J. Am. M. Ass., 1906, v. 47, p. 1424.

Füth, H. (Cent. f. Gynack., Leipsic, v. 30, No. 33), calls attention to the constant rise of temperature of the skin when it is treated with alcohol, and he considers this increased temperature as an important factor in disinfection.—*Ibid.*, v. 47, p. 1333.

Cook, George W., discusses the wide range of usefulness of alcohol in dental therapeutics (Amer. Dent. J.).—Dental Cosmos, Phila., 1906, v. 48, p. 252.

Tyson, James, states that there are times when alcohol may be useful in nephritis for a time, for example, when there is a want of appetite or disgust for food, but as a rule alcohol should be prohibited in this condition.—N. York M. J., 1906, v. 83, p. 222.

Blackader, A. D., states that alcohol may be used as a food in fever and certain other conditions, and it may also stimulate the hepatic cells to increased secretion. It should be used cautiously in all infections.—Brit. Med. J. Lond., 1906, v. 2, pp. 1461–1463.

Meltzer, S. J., believes the facts as known to-day are favorable to the use of alcohol in therapeutics. The various beneficial actions are enumerated.—*Ibid.*, pp. 1463–1464.

Dixon, W. E., describes the special action of alcohol on the heart. By eliminating disturbing influences he has been able to show that alcohol has a slight but constant stimulant action upon the circulation, though it had but little influence upon the rate of the heart.—*Ibid.*, p. 639.

An editorial calls attention to the views held on the question of the value of alcohol by Sims Woodhead, Blackader, Meltzer, Dixon, and Osborne.—J. Am. M. Ass., 1906, v. 47, p. 1101.

Kinkead, R. J. (Dublin J. Med. Sc., Nov.), states that alcohol prevents that perfect coördination of mental and bodily functions of energy and activity, which we sum in the term "Being fit."—*Ibid.*, v. 47, p. 2125.

Fock (München. med. Wchnschr., v. 53, No. 44) sent letters of inquiry to a large number of internists asking the results of their experience in the use of alcohol in pneumonia. The general conclusions from the large number of replies being that alcohol had very little influence on the course of the disease.—*Ibid.*, v. 47, p. 2178.

An editorial calls attention to the comparative expenditure for milk and alcohol in the London hospitals, which, according to Horsley, were $40,000 for alcohol and $15,000 for milk forty years ago, but now the amounts are reversed, $15,000 for alcohol and over $40,000 for milk.—*Ibid.*, v. 47, p. 941.

A contributor to the "Pharmacology" column calls attention to the fact that statistics for the consumption of alcohol in this country do not include that used in the form of nostrums, an amount which is characterized as formidable.—*Ibid.*, v. 47, p. 2023.

An additional number of references on the uses and the effects of alcohol are included in the Index Medicus and the J. Am. M. Ass.

ALCOHOL DENATURED.

Denatured Alcohol, Regulations No. 30, is the title of a pamphlet published by the United States Bureau of Internal Revenue which contains the regulations promulgated concerning the manufacture and sale of denatured alcohol.—Am. J. Pharm., 1906, v. 78, p. 575.

An abstract from a report by Yerkes and Hill on the practices relating to the production of denatured alcohol in European countries recounts in detail the methods used in Great Britain and Germany.—Oil, Paint, and Drug Rep., 1906, v. 70, Oct. 1, p. 17.

A compilation of consular reports gives the regulations concerning the manufacture and sale of denatured alcohol in Italy, France, Cuba, and Belgium.—*Ibid.*, v. 70, Aug. 13, p. 25.

Hill, Ebenezer J., as a member of the committee sent abroad to study the process, conditions, and government regulations surrounding the manufacture of denatured alcohol, presents a report on the practice in Great Britain, France, and Germany.—*Ibid.*, v. 70, Sept. 17, p. 16.

Abstracts from reports prepared by Consul-General Alexander M. Thackara, of Berlin, and Consul-General Frank M. Mason, of Paris, present a review of conditions regulating the manufacture and sale of denatured alcohol in Germany and in France.—*Ibid.*, v. 70, Sept. 17, p. 16.

An abstract from a report by Consul-General W. A. Rublee reviews the production and use of denatured alcohol in Austria.—*Ibid.*, v. 70. Sept. 24, p. 38.

The regulations adopted for the manufacture and marketing of denatured alcohol are reproduced.—*Ibid.*, v. 70, Oct. 8, pp. 28D–28F.

Some additional regulations for the production, storage, and sale of denatured alcohol.—*Ibid.*, v. 70, Nov. 12, pp. 9–10; Nov. 26, pp. 52–53; Dec. 31, p. 55.

A digest of the regulations and instructions concerning the denaturing of alcohol is presented.—Sci. Am. Suppl., 1906, v. 62, pp. 25754–25755, 25758–25759, 25778–25779.

Baskerville, C. (Amer. Mo. Rev. of Reviews, 34, 1906, No. 199, pp. 211–214), discusses briefly the uses of alcohol, its manufacture, and denaturization. Also suggests certain social and economic conditions likely to result from the removal of the tax upon denatured alcohol.—Exper. Sta. Rec., 1906, v. 18, p. 191.

Diedericks, H. (Internat. Mar. Engin., 1906, pp. 263–270), gives a very complete résumé of the use of alcohol as a fuel for gas engines, discusses the fuel value of alcohol generally, and presents some information on the denaturing agents used in different countries, this information being drawn mostly from German practice. He considers the fuel value and physical properties of alcohol and the details of the alcohol engine wherever they may be different from the gasoline or crude oil engine.—Exper. Sta. Rec., 1906, v. 18, p. 190–191.

Ladd, E. F., urges the association to use its influence to have denatured alcohol designated by some other distinctive name that could not be mistaken for alcohol, as now used; this, he thinks, would prevent serious mistakes.—Proc. North Dakota Pharm. Ass., 1906, p. 39.

Thurston says the use of wood alcohol, internally or externally, should be severely condemned. He has found it in a number of preparations, such as liniments, bay rum, spirit of camphor, tincture of iodine, and witch hazel.—Proc. Ohio Pharm. Ass., 1906, p. 67.

Coblentz, Virgil, having found, in New York, many samples of tincture of arnica, iodine, and some of camphor made up with pure wood alcohol, presents an abstract of Schmidt's article in Arch. d. Pharm., 243, 555, with additions.—Apothecary, Boston, 1906, v. 18, p. 910.

Scudder and Riggs discuss the detection of methyl alcohol and outline a modification of the Shanglé-Ferriére-Cumiasse test.—J. Am. Chem. Soc., 1906, v. 28, p. 1203.

Voisenet, E., describes a method of detecting methyl alcohol in ethyl alcohol, consisting in the obtaining of a violet coloring matter when an albuminoid substance is treated with hydrochloric or sulphuric acid slightly nitrous in the presence of traces of formic aldehyde. It is very sensitive (1 : 20,000), simple, and rapid.—Bull. Soc. de chim. Par., 1906, v. 35, pp. 748–760.

ALOE.

The Ph. Brit. Committee of Reference in Pharmacy asserts that no aloin-assay method is accurate. The monographs for aloes require complete revision.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Weigel, G., points out that the nitric acid test in the U. S. P. VIII limits the official varieties of aloes to such as contain isobarbaloin, while the Ph. Germ. IV restricts the use of aloes to African varieties giving a green coloration with nitric acid.—Pharm. Zentralh., 1906, v. 47, p. 43.

G. Hell & Co., in Troppau, assert that the water content of aloes that complies with the requirements of the Ph. Germ. IV will vary from 8.26 to 9.40 per cent. and the ash content of the water free drug varies from 1.05 to 1.87 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Lackey, R. H., quotes a correspondent who asserts that it is quite common to supply Curaçao aloes, especially the powdered, when Barbadoes aloes is ordered.—Proc. Pennsylvania Pharm. Ass., 1906, p. 115.

Eberle, E. G., suggests that the aloin content of aloes be stated.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Eldred and Jennings outline a method for the estimation of aloin in aloes and record some experiments with several modifications.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 423–425.

Hankey, William T., points out that the U. S. P. VIII test for solubility in alcohol is rather indefinite. He believes that a satisfactory method of valuation based on the aloin content would be of great value.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Naylor, W. A. H., summarizes our knowledge of aloes and suggests that the most rational method of assaying the drug would be to estimate the nonresinous constituents either directly or by difference. He notes that the accuracy of the Tschirch-Hoffbauer process has been disproved by van Itallie and adds that a series of experiments with the object of determining the proportion of nonresinous constituents and aloin would be of service in helping to fix standards for this important drug.—Pharm. J., Lond., 1906, v. 23, p. 73.

Holmes, E. M., points out that the opaque variety of aloes formerly known as Natal aloes has disappeared entirely from the market; that the aloes that is now made in Natal corresponds with the variety known as Cape aloes, and that there is some uncertainty as to where the so-called Natal aloes was made. It was exported from Port Natal, and J. Medley Wood, the curator of the Botanic Gardens at Durban, Natal, has come to the conclusion that it was prepared either in the Transvaal or Rhodesia.—*Ibid.*, v. 22, p. 314.

Léger has extracted from Natal aloe, among other products, the methylnataloemodine, which is changed by fuming HCl 130° into trioxymethylanthraquinone, the nataloemodine.—J. de pharm. et de chim. Par., 1906, v. 23, pp. 134–135.

Seel, Eugen, discusses the oxidation products of aloes constituents.—Pharm. Zentralh., 1906, v. 47, pp. 850–852.

Oesterle, O. A., reports some experiments on the production of aloe-emodine and describes the methods used.—Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich, 1906, v. 44, pp. 509–512.

Evans Sons Lescher & Webb found that five samples of aloes examined were almost entirely soluble in 60 per cent alcohol. They also fell within the Ph. Brit. IV requirements as to solubility in water.—Analytical Notes, for 1906, 1907, p. 5.

Jones, Williams, discusses the production of concentrated compound decoction of aloes, the possible deterioration of the preparation, and the needs for keeping the decoction for a "reasonable" time only.—Pharm. J., Lond., 1906, v. 22, pp. 257–258.

Alcock, F. H., discusses some of the complications arising in the preparation of compound decoction of aloes and concludes that much of the trouble is due to the compound tincture of cardamom, the carmine color of which forms with calcium phosphate present in the drugs an insoluble compound.—*Ibid.*, v. 22, p. 283.

Leming, William (Modern Eclecticism), uses aloes where there is muscular relaxation and fullness of the pelvic viscera; chronic congestion and relaxation of the rectal tissues, with feeling of want of power.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, p. 441.

Fyfe, John William, says that *Aloe spicata* was prescribed in habitual constipation, on account of its power of "warming the habit and quickening the circulation."—*Ibid.*, v. 66, p. 320.

Pfaff and Nelson find that croton oil, aloes, and podophyllin increase markedly the peristalsis of the whole gastrointestinal tract. With aloes the peristaltic waves began high up in the fundus of the stomach and made very deep constrictions, the organ emptying itself with great rapidity.—J. Am. Med. Ass., 1906, v. 47, p. 1820.

ALOINUM.

Ohliger, Willard, reports aloin which left 0.1 per cent ash.—Proc. Michigan Pharm. Ass., 1906, p. 46.

Francis, John M., points out that the aloin generally used does not answer the U. S. P. VIII description.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Caspari, Chas. E., reports one sample examined, insoluble in water and in alcohol.—Proc. Missouri Pharm. Ass., 1906, p. 103.

ALTHÆA.

Henkel, Alice, mentions *Althæa officinalis* L., commonly known as althæa, marshmallow, sweatweed, and mortification root, as found in salt marshes on the coast of Massachusetts and New York and in Pennsylvania. Naturalized from Europe.—Bul. Bur. Plant Ind., U. S. Dept. Agric., No. 89, 1906, p. 10.

Fyfe, John William, says that *Althæa officinalis* was used in wrongs of the urinary organs, especially when there was irritation and pain. He quotes an early writer: " It relaxes the passage in nephritic complaints."—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

An unsigned article (abs. from Pharm. Ztg., 1906, li, No. 89, 985) recommends an improved method for the preparation of sirup of althæa to take the place of the official, Ph. Germ., method.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 691, 692.

ALUMEN.

Coblentz, Virgil, in explanation of the retention of potassa alum, quotes a letter in which it is shown that ammonium sulphate is rarely used in making alum on account of the cost; soda can not be used for its manufacture for the reason that it makes a very soluble salt, and impurities, associated with the sulphate of aluminum and sulphate of sodium used, are not removed by crystallization from the alum.—Am. J. Pharm., Phila., 1906, v. 78, p. 390.

Vanderkleed, Chas. E., found one sample of powdered alum adulterated with talc.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Hankey, William T., asserts that powdered alum usually contains small amounts of ammonia and is not always entirely soluble in water.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

ALUMEN EXSICCATUM.

Ohliger, Willard, reports a sample of burnt alum of low solubility.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Wiebelitz, H., points out that the solution of exsiccated alum, in water, proceeds very slowly, requiring from twenty-four to forty-eight hours, and there is usually a residue, upward of 4 per cent, that will not dissolve.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Lefeldt, Max, asserts that additional concessions should be made by the Ph. Germ. for the solubility of exsiccated alum, as it is practically impossible to find a commercial sample of exsiccated alum that is completely soluble in 30 parts of water.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 332.

ALUMINI SULPHAS.

Coblentz, Virgil, says that while the U. S. P. stands almost alone in recognizing aluminum sulphate with 16 molecules of water crystallization, all other pharmacopœias requiring 18, examination of American-made samples showed that the percentage of water varies from 45.49 to 45.6 per cent; 16 molecules of water of crystallization represent 45.7 per cent.—Am. J. Pharm., Phila., 1906, v. 78, p. 391.

AMMONII BENZOAS.

Smith, F. A. Upshur, points out that ammonium benzoate gradually loses ammonia on exposure to air.—Pharm. J., Lond., 1906, v. 22, p. 63.

Coblentz, Virgil, says the solubility of this salt varies according as it is of neutral or acid reaction; the latter condition is more usual because of the readiness with which the salt loses in ammonia gas on standing.—Am. J. Pharm., Phila., 1906, v. 78, p. 391.

Sayre, L. E., reports that one sample of ammonia benzoate examined was soluble in about 200 parts of water, in place of 10.5 parts as the U. S. P. VIII requires. He believes that this sample had been very poorly kept.—Bull. Kansas Bd. Health, 1906, v. 2, p. 173.

AMMONII BROMIDUM.

Caspari, Chas. E., reports three samples examined: One U. S. P., two contained excess of chloride.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Gane, E. H., found ammonium bromide to be 96.4, 98.5, 99, 98.5 per cent pure.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

AMMONII CARBONAS.

Coblentz, Virgil, says that the U. S. P., 1890, standard of 100 per cent was difficult to comply with; with the improvements made recently, the standard of 97 per cent is not difficult to maintain.—Am. J. Pharm., Phila., 1906, v. 78, p. 391.

Smith, F. A. Upshur, points out that ammonium carbonate, on exposure to air becomes opaque, losing ammonia and CO_2, the final product being a white powder which consists chiefly of ammonium bicarbonate.—Pharm. J., Lond., 1906, v. 22, p. 63.

The Ph. Brit. Committee of Reference in Pharmacy suggests that ammonium carbonate have slightly lower volumetric test requirements.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Macleod and Haskins present a contribution to our knowledge of the chemistry of carbamates in which they report an exhaustive study of the relation of the carbamate content of freshly prepared solution of ammonium carbonate of varying strength. (J. Biol. Chem., v. 1.)—Biochem. Centralbl., Leipz., 1906, v. 5, p. 318.

Patch, E. L., reports finding ammonium carbonate 94.59 to 97.93 per cent pure.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Tyrer, Thomas, reports on a bulk sample of “ammonium carbonate” of foreign origin which on anaylsis proved to be chiefly ammonium bicarbonate and to contain only 21.8 per cent of ammonia, showing a deficiency, according to Ph. Brit. standards, of 35 per cent.—Pharm. J., Lond., 1906, v. 23, p. 478.

AMMONII CHLORIDUM.

Wiebelitz, H., points out that the neutrality of ammonium chloride required by the Ph. Germ. IV is only applicable to a solution that has as yet not been decomposed by the water.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Lefeldt, Max, asserts that the solution of ammonium chloride in water (1=20) always reddens blue litmus paper, and this should be permitted by the pharmacopœia.—Ber. d. pharm. Gesellsch., Berl., 1906. v. 16. p. 332.

Hankey, William T., asserts that a good quality of ammonium chloride that is white and sightly, usually contains from 0.5 to 2 per cent of nonvolatile matter, consisting of sodium sulphate and chloride with traces of calcium and iron. The higher grade brings a very much increased price and he doubts whether the end sought will justify paying the difference.—Am. Druggist. N. Y., 1906, v. 49, p. 360.

G. Hell & Co., in Troppau, point out that ammonium chloride is not infrequently contaminated with iron. Of six samples examined three were rejected because of their excess of iron or because of empyreumatic contamination.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Patch, E. L., found ammonium chloride that was 65.33, 67.42. 77.3. 92.67, 94.59, 98, and 98.7 per cent pure.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Caspari, Chas E., reports four samples examined: One U. S. P.: three contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906. p. 100.

Ohliger. Willard, reports ammonium chloridum containing iron sufficient to darken an ammoniacal liniment, normally white, by reason of the ferric hydroxide.—Proc. Michigan Pharm. Ass., 1906. p. 46.

Chiron, Paul (L'Art Méd.), recommends ammonium mure in severe and long-continued sciatica, with pain in the left side, as if the tendons were too short: lame while walking and while sitting.—Abstr. Hahneman. Month., Phila., 1906, v. 41. p. 796.

AMMONII IODIDUM.

Smith, F. A. Upshur, points out that ammonium iodide may be deprived of free iodine by adding to its concentrated aqueous solution sufficient ammonium sulphide to render it colorless, then filtering and evaporating to dryness.—Pharm. J., Lond., 1906, v. 22, p. 32.

AMMONII SALICYLAS.

Coblentz, Virgil, notes that ammonium salicylate is furnished either as a crystalline anhydrous salt or crystalized with one-half molecule of water * * * the 98 per cent salt adopted by the U. S. P.

VIII allows 2 per cent for free salicylic acid and moisture.—Am. J. Pharm., Phila., 1906, v. 78, p. 391.

AMMONII VALERAS.

Caspari, Chas. E., reports examining one sample of ammonium valerate which contained chloride.—Proc. Missouri Pharm Ass., 1906, p. 101.

AMYGDALA AMARA.

Nelson, Burt E., describes and illustrates some of the characteristic structures of the almond and enumerates the constituents.—Merck's Report, 1906, v. 15, p. 67.

Velardi, G. (Bull. Chim. farm., 1906, pp. 65–67), concludes that at 103° the emulsin contained in bitter almond loses its activity. (2) At 170° only, one may be certain of the nontoxicity of bitter almond, because parting with amygdalin at that point it is incapable of producing hydrocyanic acid under the action of ferments. (3) Heated slowly amygdalin undergoes chemical transformation at 180°.—Abstr. in Bull. des sc. pharmacol., Par., 1906, v. 13, p. 518.

Fyfe, John William, says that *Amygdalus communis* was a favorite remedy in tickling coughs and hoarseness, and in the scalding urine in diseases of the kidneys it was deemed especially serviceable.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

AMYLIS NITRIS.

The Ph. Brit. Committee of Reference in Pharmacy suggests the omission of the words "the bulb of the thermometer not dipping below the residual fluid" in connection with amyl nitrite.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Hérissey, H., commenting on the Ph. Ndl. IV standard of at least 80 per cent for amyl nitrite, remarks that it is not always easy to obtain a preparation containing a large quantity of the active product; a method of analysis is given.—J. de pharm. et de chim., Par., 1906, v. 23, p. 480.

Wells, G. Harlan, says that three to five drops of "amyl nitrite" by inhalation will usually promptly relieve the urgent symptoms of angina pectoris.—Hahneman. Month., Phila., 1906, v. 41, p. 262.

Doyon, M., describes the method by which he has determined that amyl nitrite causes relaxation of the bronchial muscles.—Compt. rend. Soc. biol., Par., 1906, v. 61, p. 522.

Pic and Petitjean maintain that, parallel with the vasodilatation in the general circulation, amyl nitrite causes a vasoconstriction in the pulmonary circulation, as is indicated by (1) the elevation of pressure in the pulmonary artery, and (2) by a change of color (pallor) of the lungs.—*Ibid.*, v. 60, p. 131.

Plumier, Léon, controverts these statements, and declares that the pulmonary pressure is dependent upon modifications in the general circulation and the change in color is due to profound modifications in the color of the blood produced by the intravenous injection of the amyl nitrite.—*Ibid.*, p. 282.

Hare, F. (Clin. J., Lond., Aug. 29), ascribes the therapeutic action of amyl nitrite to the periphereal vasodilation, and argues that in the absence of an increased heart rate with it there must be vasoconstriction elsewhere, its usefulness in menorrhagia and dysmenorrhœa are explained by the disappearance of uterine congestion. A similar action is the basis for its use in hæmopthisis and other internal hæmorrhages.—J. Am. M. Ass., 1906, v. 47, p. 1231.

Evans, G. H. (J. Am. M. Ass., 1906, XLVII, 1399), discusses the action of amyl nitrite inhalations on the blood pressure.—Reference from Index Med., 1906, p. 1318.

Keith, J. R., reports a case of profuse post-partum hæmorrhage immediately arrested by inhalation of a capsule of amyl nitrite.—Brit. Med. J., Lond., 1906, v. 2, p. 1125.

AMYLUM.

The Ph. Brit. Committee of Reference in Pharmacy suggest:

Determine with different starches the relative covering power and differences in mucilages. The litmus reaction is not given by most commercial starches (as a rule, maize).—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Lutz, L., discusses the morphology of starch, structure, physical properties, and formation of the grains, mechanism of growth, etc.—Bull. des sc. pharmacol., Par., 1906, v. 13, pp. 475–479, 540–548.

Maquenne and Roux have studied particularly the rôle of two important factors in the diastasic action of malt: The reaction of the medium and the influence of time * * * They conclude that amylopectine is itself susceptible of furnishing maltose under the influence of malt amylase. * * * The reaction of the malt changes in the course of saccharification. (See also Demoussy, C. R. Ac. des Sciences, t. CXLII, p. 933, 1906.)—J. de pharm. et de chim., Par., 1906, v. 24, pp. 123–126.

Maquenne, L., presents a comprehensive study of the diastasic saccharification of starch.—Bull. Soc. de chim., Par., 1906, v. 35, Appendix, pp. I–XV.

G. Hell & Co., in Troppau, report that three samples of starch, offered as wheat starch, were found to be pure corn starch. The ash content of wheat starch was found to vary from 0.22 to 0.40 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Schürhoff, P., reports finding corn starch substituted for wheat starch and points out the ease with which such adulteration may be detected.—Pharm. Ztg., Berl., 1906, v. 51, p. 479.

Liverseege, J. F., points out that of 200 samples of arrowroot that have been analyzed only two were adulterated. One consisted of tous-les-mois starch and the other of maize starch.—Year Book of Pharmacy, 1906, p. 265.

Hess, Eugen, presents a description, illustrated, of a number of tropical starches.—Ztschr. d. allgem. österr. Apoth.-Ver. Wien, 1906, v. 44, pp. 25–29.

ANTHEMIS.

Taylor, S., calls attention to the work of Greenish on the extraction of the chamomiles.—Pharm. J., Lond., 1906, v. 23, p. 669.

Fyfe, John William, says *Anthemis nobilis* was believed to be an efficient medicament in pulmonary diseases, and it was also much used in glandular swellings.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

ANISUM.

The Ph. Brit. Committee of Reference in Pharmacy points out that anise should be examined to determine whether it has been partially exhausted or not, as caraway, fennel, and cloves so treated are mixed with unexhausted fruits, and so marketed. The ether extract might detect the fraud.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Spaeth, Edward, suggests that anise be required to consist of the whole fruit, not deprived of any of the volatile oil; it should not contain any appreciable amount of stems; it should contain not more than 10 per cent of ash and not more than 2.5 per cent of ash insoluble in hydrochloric acid.—Südd. Apoth. Ztg., 1906, v. 45, p. 168.

Utz suggests that anise should contain not more than 10 per cent of ash.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

ANTIMONII ET POTASSI TARTRAS.

Graham, Willard, reports examining one sample of antimony and potassium tartrate, representing a shipment of 800 pounds, which contained only 94 per cent of pure antimony and potassium tartrate; another sample, representing 500 pounds, contained but 87 per cent of the pure salt.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Hankey, William T., asserts that he has examined many samples of antimony and potassium tartrate and has found none entirely free from arsenic.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Patch, E. L., reports that lots of antimony and potassium tartrate from two manufacturers contained an excess of arsenic.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

Ferraro and Varobbio (Pharm. Ztg., li. No. 19, 1906, 214; from Boll. chim. farm., 44, 805, through Chem. Centralbl., 1906, i, No. 5) point out that antimoniates, when treated with a modification of

Bettendorf's reagent for arsenic, will yield an immediate black deposit of metallic antimony, and the supernatant liquid—if As is absent—appears colorless.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 850.

The Ph. Brit. Committee of Reference in Pharmacy reports on tartrated antimony. Alcock's test also applies here. (See Antimonii oxidum.)—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Tocher, J. F., says the effect of an alkaline cobalt solution of tartar emetic adds weight to the belief that this compound is not strictly a tartrate: its high rotatory power, its cryoscopic value, and other considerations tend to prove that it is a tartra-antimoniate of potassium.—Pharm. J., Lond., 1906, v. 23, p. 87.

Duncan, J. B., outlines a modification of Nisseuson and Siedlein's method for the volumetric estimation of antimony.—Chem. Eng., Phila., 1906–7, v. 5, pp. 265–267.

Darroch, James, outlines a modified iodine method for the volumetric estimation of antimony, using a standard solution of stannous chloride in place of the solution of sodium thiosulphate ordinarily employed.—*Ibid.*, v. 4, pp. 162–165.

St. John, D. (J. Med. Soc., N. J., Newark, Sept.), "Value of tartar emetic in the treatment of traumatic tetanus and cerebrospinal meningitis."—J. Am. Ass., 1906, v. 47, p. 1139.

NONOFFICIAL COMPOUNDS.

Havard, F. T., discusses the economic conditions regulating the production of antimony, the new uses for antimony, and the several processes employed in the production of metallic antimony.—Chem. Eng., Phila., 1906–7, v. 5, pp. 140–145.

The Ph. Brit. Committee of Reference in Pharmacy points out that few samples of antimonium oxide pass the cream of tartar test. Alcock's method (dissolving in hydrochloric acid in the cold with the addition of Rochelle salt and excess of sodium bicarbonate before titrating with standard iodine solution) is preferable. Also applies to antimony and potassium tartrate.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Coblentz, Virgil, says that little, if any, antimonium oxide is made in this country. Analysis would indicate that the samples, although from distant sources in this country, were obtained from the same parties abroad. It evidently consists of a mixture of various antimonic acids, is of little medicinal use, and, since no standards could be drafted with which it might possibly comply, it is better out of the pharmacopœia than in it.—Am. J. Pharm., Phila., 1906, v. 78, p. 392.

Arny, H. V., thinks the omission of sulphurated antimony was unnecessary, as it is a very popular expectorant among French physicians of the South.—Am. J. Pharm., Phila., 1906, v. 78, p. 11.

Barnard, H. E., reports that of 45 samples of black antimony examined but 2 were pure antimony sulphide. All the others were almost entirely fraudulent. But 7 of the entire number contained any antimony sulphide whatever.—Rep. Indiana Bd. Health, 1906, pp. 367, 368.

ANTIPYRINA.

Gunn, Alexander, quotes Attfield on the use of the word "Phenazone" as follows: "I brought this word before the Pharmacopœia Committee on July 7, 1890. It was accepted and will be found in the 'B. P. Additions,' published in December, 1890." In December, 1891, it was suggested by Ernest Taüber (Berichte, v. 24, 3883) as a convenient short name for diphenylenazone. Other citations are: Loth, Meyer, jr. (Berichte, v. 26, 2238–2242, 1903). Zur Kentniss des Phenazons, abstracted in J. Chem. Soc. Beilstein, IV. Auflage, III, 1899, p. 1403; Diphenylazon, Phenazon $C_{12}H_8N_2$. Brühl's Chemie Sechsgliedern Heterocyclischen Systeme, 1899, p. 779, Dibenzopyridazine, which is called phenazon $C_{12}H_8N_2$, and again on p. 801, etc. Gunn suggests that as phenazon is now so generally used for diphenylenazone, it would appear advisable to drop the word as a synonym for the medicinal phenyl-dimethyl-iso-pyrazolone and revert to antipyrine, quoting the U. S. P. VIII as further authority.—Pharm. J., Lond., 1906, v. 23, p. 6.

Riedel's Berichte points out that the melting point of antipyrine is variously given as being from 105° to 113°. A pure preparation was found to melt uniformly at 111° C. In an air bath it required 112° C.—Riedel's Berichte, Berl., 1906, p. 25.

Lefeldt, Max, asserts that he was unable to obtain pyrazolonum phenyldimethylicum having the melting point prescribed in the Ph. Germ. (113° C.), the melting point being from 110° to 111° C.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 341.

Utz asserts that antipyrine melts at from 111° to 112°.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Fernan, Albert, reports finding one sample of antipyrine, melting point 106° C., decided coloration with solution of silver nitrate.—Ztschr. d. allgem. oestrr. Apoth.-Ver., 1906, v. 44, p. 79.

Sperling, Friedrich, discusses the "Isonitroso reaction" of antipyrine as outlined in the Ph. Austr., and points out some of the shortcomings and limitations of this test.—*Ibid.*, v. 44, pp. 51–52.

Thornton, P. Leuthardt, gives some interesting figures, based on a yearly production of 100 tons, showing what is required to manufacture antipyrine. The yield is given as 224,000 lbs.; value, £38,889 7s. 10d., or 3s. 5¾d. per lb.—Chem. & Drug., Lond., v. 69, p. 469.

Zernik, F., records a comparative examination of the several mixtures of antipyrine, caffeine, and citric acid that are offered in Germany as headache cures. This mixture originated with Overlach, who, in 1893, proposed such a mixture. (Deutsche. Med. Wchnschr., 1893, No. 47.)—Apoth. Ztg., Berl., 1906, v. 21, pp. 673–674, 686–687.

Jonescu, D., discusses the elimination of antipyrine from the human organism, and concludes that antipyrine is largely eliminated, unchanged, through the kidneys. Presents the literature on the subject.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 133–141.

Fonteyne, A., finds that (1) respiration is accentuated from the first injection to the end of the experiment. (2) The volume of each respiration is increased with medium doses of 4.6 gm. followed by diminution and a fall to about normal depth with 16 gm. (3) The respiratory volume per minute follows the same fluctuation.—Arch. internat. de pharmacod. et de thérap., Par., 1906, v. 16, pp. 403–410. (See also "General Conclusions," *Ibid.*, p. 449 ff.)

Fonteyne gives a number of historical and pharmacologic references besides detailing his own researches.

Valente (Ann. d'Oculist. March, 1905) has used antipyrine with good results in cases of optic atrophy following acute cerebral accidents, although it is of no value in simple, tabetic, toxic, or retrobulbar cases.—Abstr. in Merck's Archives, 1906, v. 8, p. 15.

A correspondent calls attention to a patient in whom, on three occasions, antipyrine produced urticaria; twice, the dose was 5 grains, the other time it was 10.—Chem. & Drug., Lond., 1906, v. 68, p. 899.

Hotz, F. C., (Arch. Ophth., N. Y.) reports a case of antipyrine amaurosis induced by 130 grains taken in forty-eight hours.—J. Am. M. Ass., 1906, v. 47, p. 153.

APOCYNUM.

Henkel, Alice, mentions *Apocynum androsæmifolium* L., commonly known as bitterroot, spreading dogbane, and honey-bloom, as being native in fields and thickets from Canada south to Georgia and Arizona. The most common species in Canada and the Northeastern States.

Apocynum cannabinum L., commonly known as apocynum, Canadian hemp, black Indian hemp, and amy-root, is also mentioned. Native in moist ground and borders of fields throughout the United States.—Bul. Bur. Plant Ind., U. S. Dept. Agri., No. 89, 1906, p. 11.

Schneider, Albert, points out that the fiber of *Apocynum cannabinum* L., is used by the Indians of California for making all manner of cordage, and for weaving, but that it apparently is not used medicinally.—Merck's Rep., N. Y., 1906, v. 15, p. 65.

Kraemer, H., asserts that a spurious root is being substituted for Apocynum. It has a circle of stone cells in the bark near the cambium.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 333.

Felter, Harvey Wickes, commenting on the description of the U. S. P., says:

> The indications for "Apocynum" have been evolved from *A. Cannabinum;* therefore the pharmacopœial tincture is not likely to meet the object of the prescriber.—Eclectic Med. J., Cincin., 1906, v. 66, p. 234.

Fyfe, John William, says that *Apocynum cannabinum* was then, as now, highly esteemed as a remedy in some forms of dropsy. It was also employed in indigestion, and the dose administered was "as much as the stomach will bear."—*Ibid.*, v. 66, p. 320.

Heeve, William H., (Eclectic Rev.) reports marked benefit from apocynum in sciatica, after failure with many remedies. The classic indication—œdema at the ankle—led him to give it. This is not a common use of apocynum, though the indication is old and well tried. "Dr. Heeve's success depended upon the recognition of the œdema, and not the sciatica, and this is what specific medication teaches."—Abstr. *Ibid.*, v. 66, p. 96.

APOMORPHINÆ HYDORCHLORIDUM.

The Ph. Brit. Committee of Reference in Pharmacy requires that apomorphine hydrochloride should be soluble in 4 (not 6) parts of water; 1 gram dissolves in 48 c. c. of 90 per cent alcohol.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

Dott, D. B., discusses the solubility of apomorphine hydrochloride as given by different authorities and points out that the U. S. P. figures, 1 in 39.5 parts of water at 25° C., are incorrect and that the statement should be 1 in 49 or thereby.—Pharm. J., Lond., 1906, v. 22, p. 345.

Leffman, Henry, comments on the rubric as an illustration of the excessive elaboration of tests. It gives the solubility of the salt in several liquids that would not be used for dissolving it in medical work, together with the melting and even the decomposing point, the latter certainly of little interest. Sixteen tests are given, several of them with unusual and expensive reagents, and almost all of them of interest and value only to the specialist in pharmaceutic chemistry and toxicology.—Am. J. Pharm., Phila., 1906, v. 78, p. 85.

Pschorr, R., (Chem. Ber., 1906, v. 39, pp. 3124–3128) discusses the constitution of apomorphine and some of its derivatives. Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 763.

Herting, Otto, discusses the chemistry of apomorphine and its uses and calls attention to Euporphine, apomorphinbrommethylate, a derivative of apomorphine which is said to be less sensitive to the influences of air and light.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 16.

An abstract from a German patent outlines a process for the preparation of a readily soluble and permanent alkyl derivative of apomorphine.—Chem. Ind., Berl., 1906, v. 29, p. 148.

AQUÆ.

Caspari, Chas., jr., calls attention to the need for care in connection with aromatic waters and the possibility of precipitation or separation at low temperature.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 261.

Glass, W. S., discusses the official aromatic waters and strongly urges their preparation by dissolving the respective oils, by agitation, in hot water and filtering when cold through double well-wetted filtering paper.—Pharm. J., Lond., 1906, v. 22, pp. 344–345.

Hill, J. Rutherford, calls attention to the possibly dangerous incompatibility of medicated waters, made by using magnesium carbonate as the clarifying agent, and alkaloidal salts like strychnine hydrochloride.—*Ibid.*, v. 22, pp. 224–225.

Dunning discusses the presence of alkali in aromatic waters and thinks it will be avoided by following the methods of the U. S. P. VIII.—Proc. Maryland Pharm. Ass., 1906, p. 62.

Dunning, H. A. B., recommends the use of powdered paper as a vehicle for distributing the oil in making medicated waters. He asserts that the solution of the oil filters off perfectly clear and will be found to be highly flavored.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 484.

An unsigned article discusses the production and the uses of concentrated aromatic waters.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 66–68.

Bougault, J., wonders how many pharmacists are able to profit by the latitude given them as to the method of preparation of aromatic waters.—J. de pharm. et de chim. Par., 1906, v. 23, p. 287.

Cook, E. Fullerton, reports that Franklin W. Earl, after experiments with the official, U. S. P. VIII and Ph. Brit., processes for the preparation of aromatic waters, concludes that the hot water agitation method is the best, in that the water does not change on keeping and the process produces a saturated solution which is clear and requires less time for preparation. Cinnamon water can not be made by this method, however, as a turbid liquid results at once which will not clear. With purified talc, he found difficulty in freeing the water from the fine suspended particles which can not be filtered out. Paper pulp is unpleasant to handle and does not seem to yield as strong a solution. Distillation invariably yields a supersaturated milky liquid which must be filtered. The flavor, when distilled from the drug as directed in a number of British formulas, is finer, but the water is not transparent and requires filtering. He suggests that the waters be made in larger stock containers, an excess of oil being allowed to remain in contact with the water and the shelf bottles filled from this, as needed, by filtering through a wet filter.—Am. J. Pharm., Phila., 1906, v. 78, p. 418.

Stevens, A. B., says that some good practical men believe that better results are obtained by using magnesium carbonate than by using talc in the manufacture of aromatic waters. The method for the manufacture of this class of preparations has been changed every decade for the past forty years, and we need not be surprised to find it changed again in the next revision. Magnesium carbonate in 1870, absorbent cotton in 1880, calcium carbonate in 1890, and talc in 1900. What next?—Proc. Michigan Pharm. Ass., 1906, p. 96.

Medicated waters in the Ph. Ndl. IV, unless otherwise specified, are to be prepared by distillation from the drug. The directions usually require a certain time for maceration of the crude drug.—Pharm. Zentralh., 1906, v. 47, p. 397.

Wippern, Franz, suggests that the coming revision of the Ph. Germ. should permit the preparing of medicated waters by solution of volatile oils with the inclusion of the requirement that those waters contain a minimum content of 0.06 per cent.—Pharm. Ztg. Berl., 1906, v. 51, p. 806.

"K" (Pharm. Ztg., li, No. 51, 1906, 565) discusses the question of preparing aromatic waters and advocates preparing them directly from the volatile oils instead of from the drug. A formula for making aromatic waters is given.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 614.

Hérissey, H., commenting on the Ph. Ndl. IV, notes that the distilled aqua laurocerasi contains 0.1 per cent of hydrocyanic acid; the preparation of orange flower water is not indicated. In addition to these two and simple distilled water he mentions distilled water of cinnamon (10 per cent), of fennel (4 per cent), and of mentha piperita, and notes that the rose water of the Ph. Ndl. IV is prepared by agitating 1 gm. of the essence of rose with 5,000 c. c. of water and filtering.—J. de pharm. et de chim., Par., 1906, v. 23, p. 480.

AQUA.

Leffman, Henry, criticises severely the standard for water; 500 parts per million total solids, equivalent to 29 grains per gallon, is an amount unusual in natural waters, except from deep sources. Even with this limit the water must be neutral to litmus paper, a condition to which high-class natural waters will not conform, and yet for the rejection of which no good reason seems to be offered. To evaporate 1,000 c. c. is tedious and inconvenient; 100 c. c. should be evaporated in a platinum basin and a good balance is necessary. Very few natural waters will fail to give upon the evaporation of 1,000 c. c. a residue that does not blacken. For nitrates, the delicate and inconvenient diphenylamin test will probably exclude most natural waters, even the high-class spring and river waters of this region [Philadelphia]. The limits for sulphates and chlorides seem to be chosen with more regard to uniformity in the reading matter than in the standards. * * * Boiling is not needed, and it is especially out of place in the case of the test for chlorides. * * * Decanting will suffice instead of filtering. The limits allowed for sulphates and chlorides do not seem coordinated nor based on the study of analytic data. The extremely delicate napthylamin test for nitrites is troublesome in application. No caution is given to the liability to error from the common occurrence of nitrite in the air and dust, nor is it pointed out that deep waters will often give marked reactions for nitrates and yet be unobjectionable. In fact, the whole water rubric indicates that its authors are unaware that the standards of purity in water are correlated with the class to which the water belongs. The tests for ammonium compounds and oxidizable organic matter are also under the same spell.—Am. J. Pharm., Phila., 1906, v. 78, p. 83.

Coblentz, Virgil, says that a bacteriological examination is more to be relied upon than chemical tests, for the exclusion of sewage contamination from Aqua U. S. P. Since it is the chief object of the pharmacopœia to exclude such waters as are grossly contaminated, the revised tests will, in careful hands, accomplish this object.—*Ibid.*, v. 78, p. 393.

Grosse-Bohle, H., discusses the examination of water and the determination of its purity. He points out that in addition to local inspection it is necessary to utilize the chemical bacteriologic and biologic methods.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 53–60.

Wyeth, John A., calls attention to the fact that water alone may be used as a local anæsthetic after the manner of Schleich method.—N. York M. J., 1906, v. 83, p. 29.

AQUA DISTILLATA.

The Ph. Austr. VIII directs that distilled water only is to be used in the making of pharmacopœial preparations and in applying the required tests.—Ph. Austr. VIII, p. XXIV.

The Pharmacopœia of Japan directs that in every article, where properties or tests are described, "water" always means "distilled water."—Ph. Japon. III, p. XXII.

Leffman, Henry, commenting on the standards for purity, says: The editor of this part [of the pharmacopœia] seems to have an idea that the nitrates, nitrites, and ammonium compounds often found in water are in themselves objectionable, whereas they are merely indexes of past impurity. In the case of distilled water, small amounts of the above compounds can have no significance. The application of difficult and delicate tests will produce nothing but confusion, and, perhaps, the rejection of a sample that is entirely suited to pharmaceutic purposes. It is certainly strange that those members of the Committee of Revision who have been for years in general analytic practices allowed such absurd rubrics to appear. He further comments on the defense of the water rubric by a member of the revision committee.—Am. J. Pharm., Phila., 1906, v. 78, p. 84.

Coblentz, Virgil, says that the tests for ammonia were omitted. owing to the readiness with which this gas is taken up by distilled water when handled about the store; traces (more or less) of ammonia would have no bearing on the purity of the distilled water anyhow. Because of the solubility of the glass of containers in distilled water, the presence of soluble matter must be permitted; this was not recognized in the last revision and caused hardships in the enforcement of the pharmacy laws. * * * Ordinary water, containing 75 mgm. per liter, can scarcely pass the U. S. P. tests for distilled water, hence such a substitution is not probable.—*Ibid.*, v. 78, p. 393.

Baird, J. W., reports that of nine samples of distilled water examined in 1904, nine were found to be adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

An abstract describes and illustrates an apparatus for the economic production of distilled water.—Chem. Ztg., Cöthen, 1906, v. 30, p. 1302.

AQUA AMMONIÆ.

Ohliger, Willard, reports that ammonia water frequently contains excess of coal-tar impurities and of pyridine in particular.—Proc. Michigan Pharm. Ass., 1906, p. 46.

Barnard, H. E., reports that of 75 samples of ammonia water, collected from varying sources, but 7 were up to the required strength; 90.8 per cent were weak, dilute solutions, ranging from 20 to 90 per cent of the U. S. P. VIII strength.—Rep. Indiana Bd. Health, 1906, pp. 365–367.

Sayre, L. E., reports that of three samples of ammonia water examined one contained 27.2 per cent of gas, one 5.08 per cent, and the third 6.8 per cent.—Bull. Kansas Bd. Health, 1906, v. 2, p. 173.

Havenhill, L. D., reports two samples, one labeled "Aqua ammonia" the other "Ammonia," which contained, respectively, 27.2 per cent and 5.8 per cent of gas.—Proc. Kansas Pharm. Ass., 1906, p. 35.

Mims, J. C., reports 30 samples examined, 2 above, 28 below U. S. P. standard, the latter ranging from 1.15 to 6.66 per cent of gas.—Proc. Louisiana Pharm. Ass., 1906, p. 62.

Ehman, J. W., reports that S. E. Thorly compared the quality of ammonia water obtained from drug stores with that obtained from groceries and department stores, with the following results: Two drug store samples assayed 7.534 per cent and 9.287 per cent ammonia gas; three from department stores, 3.236, 6.572, 12.8 per cent; three from groceries, 1.837, 2.025, 8.399 per cent. The department store sample, assaying 12.8, was found to be the only one containing more than traces of impurities, such as solid residue on evaporation and carbonate.—Am. J. Pharm., Phila., 1906, v. 78, p. 416.

Wiebelitz, H., asserts that in view of the fact that ammonia water is frequently used to neutralize acids and acid salts, in the test for heavy metals it should itself be absolutely free from such contaminations.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Buisson, A., (Compt. Rend. Acad. Sci. [Par.], 143, 1906, No. 5, pp. 289–291; abs. in Bul. Soc. Chim. Par., 3. ser., 35, 1906, No. 24, p. 1320) reports on the determination of ammonia in water by Nessler's reagent.—Exper. Sta. Rec., 1906, v. 18, p. 609.

AQUA AMMONIÆ FORTIOR.

Baird, J. W., reports that of eleven samples of stronger ammonia water examined in 1904 nine were found to be adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

The Ph. Brit. Committee of Reference in Pharmacy report on liquor ammoniæ fortis says:

> The official sp. gr. 0.891 corresponds to 31.5 per cent NH_3 instead of 32.5 per cent. Sulphuric acid should be substituted for hydrochloric acid in the test for "tarry matters." Absence of residue after evaporation and ignition would be a useful test.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

AQUA HYDROGENII DIOXIDI.

La Wall, Charles H., calls attention to a strong odor resembling nitrobenzol in several samples of hydrogen peroxide solution. Upon investigation he found this to be due to the addition of acetanilide as a preservative. In the freshly made and odorless product this can be detected by shaking out about 25 c. c. of the solution with a few c. c. of chloroform, evaporating to dryness and applying the isonitrile test for the presence of acetanilide.—Am. J. Pharm., Phila., 1906, v. 78, p. 582.

An abstract from a patent granted to W. Heinsich would indicate that a weak aqueous solution of hydrogen peroxide can be preserved by the addition of small quantities of organic compounds, all of which may be regarded as derivatives of ammonia. These compounds include amides, imides, acetyl, and like derivatives of aromatic bases, and derivatives of urea. The list includes such well-known substances as acetanilide, acetamide, phenacetin, and succinmide.—Pharm. J., Lond., 1906, v. 22, p. 231.

Allain asserts that the stability of solution of hydrogen peroxide is much increased by the addition of sodium or of magnesium chloride. He prefers sodium chloride, because it not only increases the antiseptic power of hydrogen peroxide, but also favors cicatrization.—J. de pharm. et de chim., Par., 1906, v. 24, p. 84.

Allain's paper is given at length, with table.—*Ibid.*, pp. 162–165.

Vanderkleed, Charles E., points out that recent advances in the metallic peroxide industry would appear to guarantee the quality of hydrogen peroxide solutions. All of the samples examined tested about 3 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Von Foregger, Richard, asserts that it has been shown by various authors that hydrogen dioxide produced by the decomposition of calcium peroxide is much more efficient than an equal quantity of aqua hydrogenii dioxidi. He also discusses the reactions which take place when magnesium peroxide is dissolved in water acidulated with citric acid or when sodium perborate is dissolved in water.—Am. Druggist, N. Y., 1906, v. 48, pp. 155–157.

The Ph. Brit. Committee of Reference in Pharmacy report on solution of hydrogen dioxide says:

> Magnesium sulphate solution should be used in the gasometric assay, but a volumetric process (iodine and thiosulphate or potassium bichromate) would be preferable. Tests for limit of free acid and for fluoride should be added.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Hughes, J. A., finds titration with permanganate solution exceedingly simple and expeditious. He prepares a solution of potassium permanganate 5.62 gm. to the liter, each volume of which is then equivalent to an equal volume of oxygen. The number of drachms of permanganate solution required will give strength of the peroxide in volumes.—*Ibid.*, v. 68, p. 211.

Denigés, G., suggests the use of benzidine acetate as a reagent for hydrogen dioxide.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 325–327.

He also points out that the interesting reaction proposed by Barreswill for the detection of hydrogen dioxide by means of chromates may also be applied to the detection of chromates by means of hydrogen dioxide.—*Ibid.*, v. 46, pp. 327–329.

Havenhill, L. D., found that 5 samples of a 12 bottle lot which had assayed O. K. the previous year ranged from 2 to 2.8 per cent, or a depreciation of 6.6 to 20 in a year's time.—Proc. Kansas Pharm. Ass., 1906, p. 36.

The N. Y. Committee on Adulteration reports but 4 samples efficient out of a total of 46 examined.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

Much and Romer (Berl. klin. Wchnschr., v. 43, No. 31) use peroxide of hydrogen to sterilize milk completely: the peroxide is then eliminated by means of a catalase and the milk keeps indefinitely without the use of ice.—J. Am. M. Ass., 1906, v. 47, p. 1421.

Adam, Paul, (J. de pharm. et de chim.) points out that raw fresh milk in which there is no hydrogen dioxide when treated with hydrogen dioxide and guaicol turns a garnet red; with paraphenylendiamine it turns blue; and in the presence of aldehyde decolorizes methyleneblue. Decomposed or stale milk does not give the first two reactions, but decolorizes Schardinger's reagent, which consists of a concentrated alcoholic solution of methyleneblue, 5 c. c.; formaldehyde, 5 c. c.; and distilled water, 190 c. c.—Am. Druggist, N. Y., 1906, v. 48, p. 197.

Verisenat, E., (Bull. Soc. Chim.) bases a very sensitive test for formaldehyde on the observation that when an aqueous solution or suspension of an albuminous substance is treated with hydrochloric acid containing a very slight percentage of nitrite, in the presence of a trace of formaldehyde, a faint violet pink to violet blue coloration ensues. The method is given in detail in the abstract in Drug.—Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 125.

Stone, B. H., is reported to have said that bichloride would not destroy tetanus germs, but that peroxide of hydrogen would.—J. Am. M. Ass., 1906, v. 47, p. 1677.

Sachs-Müke (München. med Wchnschr., v. 53, No. 34) states that neither peroxide of hydrogen nor bichloride will interfere with the examination of sputum. The peroxide of hydrogen breaks up the masses of sputum, which is then treated with sublimate.—*Ibid.*, v. 47, p. 1692.

AQUA SEDATIVA N. F.

Caldwell, Paul, asserts that if the spirit of camphor is vigorously shaken with the ammonia water before adding the sodium chloride, more camphor will be gotten into the preparation than if the official directions are followed.—Drug. Circ. & Chem. Gaz., 1906, N. Y., v. 50, p. 393.

ARGENTI NITRAS.

Wells, Roger Clark, summarizes as follows:

> 1. The chief sources of error in previous nephelometric work are pointed out. 2. The use of ground glass standards of reference proved advantageous in studying the variation of opalescent precipitates with time. 3. For every concentration a suitable medium and excess of precipitant is required. 4. Electrolytes both augment the maximum opalescence to be precipitated from a solution

and hasten its deposition. 5. The bearing of these facts upon other fields is pointed out. 6. Directions for procedure are given for several special cases of nephelometry.—Am. Chem. J., 1906, v. 35, pp. 99–114.

He adds, as a correction, that as far as time effects in nephelometry are concerned, the time factor must be carefully regulated for intense opalescences, but ceases to be a major variable with weak ones.—*Ibid.*, p. 509.

Richards, Theodore William, adds a word of caution concerning the use of the nephelometer.—*Ibid.*, pp. 510–513.

Caspari, Chas. E., reports 10 samples examined: 9 U. S. P.; 1 contained lead.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Patch, E. L., reports finding silver nitrate containing trace of lead.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Ronde asserts that perfectly white sticks of molded silver nitrate may be secured by keeping the melted silver nitrate slightly acid. For toughening the molded silver nitrate he prefers adding from 2 to 3 per cent of potassium nitrate, which, he asserts, will be quite sufficient to allow of the formation of very slender sticks that do not break readily.—Pharm. Ztg., Berl., 1906, v. 51, p. 1020.

Penn, B. S., suggests a packet of aseptic materials for the care of the navel and eyes of the new-born child. This packet includes silver nitrate, boric acid, bichloride tablets, gauze, and other materials.—J. Am. M. Ass., 1906, v. 47, p. 1830.

Leopold, Ch. G., (Münch. med. Wchnschr., 1906, No. 18, p. 849) attributes the occurrence of marked secondary effects to the improper execution of Credé's prophylactic method, he has also observed slight inflammation to follow the use of the 2 per cent silver nitrate solution. He used a 1 per cent solution and found that with sufficient care and conscientious use it was possible to prevent infection.—Merck's Ann. Rep. 1906, v. 20 (Darmstadt, May, 1907), p. 41.

Lewis, F. Park, pleads for the use of light proof, hermetically sealed tubes for silver salts and the use of the silver salts to protect the eyes of the new-born.—J. Am. M. Ass., 1906, v. 46, p. 1262.

DeRossi, G., (Rivista d'igine e Sanita publica, v. 17, pp. 6–19, 38–56) asserts that the silver ion, even in very dilute solutions, is actively toxic to microbes. He reports a number of experiments to show the value of silver salts, particularly the fluoride and nitrate, as germicides.—Jahresb. ü Tier. Chem., for 1906, 1907, v. 36, p. 865.

An editorial quotes Kraus, (Wien. Med. Wchnschr., 1906, No. 1, Berl. Klin. Wchnschr., July 16) in which a simple clinical method of treating gastric ulcer is outlined, the essential medicinal agent employed being silver nitrate, together with olive oil and sodium bicarbonate.—N. York M. J., 1906, v. 84, p. 345.

Baibakoff, A. A., (from Arch. f. Verdauungs-Krankheiten, Boas', Berl., XII, 1) reports a series of observations on the action of silver nitrate on gastric juice and motor functions. He concludes that silver nitrate has the property of increasing the secretion of hydrochloric acid and, hence, the total acidity of the gastric juice.—J. Am. M. Ass., Chicago, 1906, v. 46, p. 1147.

Lambert, Alexander, states that silver nitrate and iron perchloride are the principal astringents used in the treatment of gastric ulcer, the silver nitrate being by far the most useful.—*Ibid.*, v. 47, p. 847.

Belfadel, A. A., (from Gaz. d. osp., Milan) reports the use of silver nitrate in doses of 15 cg. daily. The results of his investigations and experiments do not appear to be favorable.—*Ibid.*, v. 46, p. 626.

Balzu and Tausau (Ann. d. Med. d. Org. Gess., Univ., Par., v. 24, No. 9) report cases of chronic gonorrhœa treated with solution of silver nitrate injections followed by a metallic zinc catheter, which causes slow reaction.—*Ibid.*, v. 47, p. 972.

Schindler and Siebert (Deutsche Med. Wchnschr., v. 32, No. 27) consider the early local application of some silver salt as essential in the treatment of gonorrhœa, the results being nearly always good if correct technic is folowed.—*Ibid.*, v. 47, p. 726.

Glenn, W. F., states that nitrate of silver will completely destroy the gonococcus, but its irritant action is an objection to its use. Weak solutions of silver nitrate kill the gonococci and are at the same time only slightly irritating.—*Ibid.*, v. 47, p. 1828.

Stich, C., (Centralb. f. Chir., Liepz., v. 33, No. 40) uses silver nitrate for the sterilization of catgut with increasing satisfaction.—*Ibid.*, v. 48, p. 85.

Conrad, William, recommends the use of 10 per cent nitrate of silver in the treatment of gingival recession and erosion cavities.—Dental Cosmos, Phila., 1906, v. 48, p. 559.

Shedd, P. W., discusses the action of argentum nitricum and compares it with other remedies.—Hahneman. Month., Phila., 1906, v. 41, pp. 671–677.

Allen, R. A., reports a case of argyria in a woman of 69, resulting from protracted use of pills of silver nitrate. No treatment was attempted for the discoloration, but other symptoms disappeared when the drug was discontinued.—J. Am. M. Ass., 1906, v. 47, p. 1829.

NONOFFICIAL PREPARATIONS.

The Ph. Belg. III includes argentum proteinicum and in the French edition of the pharmacopœia gives protargol as a synonym for the French title.—The Ph. Austr. VIII includes the same preparation as "Protargolum."

The Ph. Brit. Committee of Reference in Pharmacy points out that for silver oxide the silver left after heating might be a quantitative test.—Chem. and Drug., Lond., 1906, v. 69, p. 863.

Puckner, W. A., calls attention to the dearth in the English language of a systematic discussion of the many new remedies and devotes the article to a discussion of the chemistry of the organic silver compounds.—J. Am. M. Ass., 1906, v. 47, pp. 1258–1261.

Wilbert, M. I., presents a formula and outlines the method for preparing a mixture containing nascent iodide of silver.—Am. J. Pharm., 1906, v. 78, pp. 64–68.

Derby, G. S. (Boston M. and Surg. J., Sept. 29), compared the bactericidal properties of various silver preparations using the *Staphylococcus pyogenes aureus.* The results are given in the abstract.—J. Am. M. Ass., 1906, v. 47, p. 1226.

A contributor to the " Pharmacology " column quotes Myles Standish (Optha. Rec., August, 1906) to the effect that negative laboratory tests form a poor foundation for clinical advance. Referring to the experiments of Derby he thinks that clinical experience shows that the silver preparations have a greater bactericidal action than the laboratory tests would indicate. Standish concludes that the modern silver preparations are effective in gonorrhœal infections of the conjunctiva.—*Ibid.*, v. 47, p. 1393.

ARNICA.

Hartwich, C., showed a sample of arnica adulterated with flowers of *Taraxacum officinale.*—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 8.

Klobb, T., reports some experimental work on the chemistry of arnidiol, a phytosterin obtained from *Arnica montana.* (Bull. Soc. chim., Paris, 1906, v. 25, pp. 741–744).—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 907.

The Ph. Brit. Committee of Reference in Pharmacy believe that arnica rhizome should have an ash figure.—Chem. and Drug., Lond., 1906, v. 69, p. 863.

Barnard, H. E., reports that 9 of 81 samples of tincture of arnica examined were found to contain methyl alcohol.—Rep. Indiana Bd. Health, 1906, p. 384.

Chiron, Paul, (L'Art Méd.) recommends arnica after any kind of effort or exertion, burning, stinging, tearing pains; numb and bruised feeling in the affected limb. Constant change of position, as everything on which the limbs lie feels too hard. It is especially useful in women during confinement.—Abstr. Hahneman. Month., Phila., 1906, v. 41, p. 796.

ARSENI IODIDUM.

Coblentz, Virgil, commenting upon the impurity of the commercial article, says that the limits of 83 per cent [U. S. P. VIII, 82.7 per cent] of iodine and 16 per cent [U. S. P. VIII, 16.3 per cent] of arsenic, corresponding to a 99 per cent salt, are fair for all manufacturers, if they will only take the pains and extract the pure product from the fused mass [mess] they have heretofore furnished. With such a product we can safely guarantee uniformity in the strength of Donovan's solution.—Am. J. Pharm., Phila., 1906, v. 78, p. 394.

Cowley and Catford (Trans. Brit. Pharm. Conf. (Yearbook of Pharmacy), 1905, 489–493) discuss the unsatisfactory character of much of the commercial arsenous iodide and criticise some of the processes suggested for its preparation, and suggest a method of preparation by which a very pure arsenous iodide may be easily made.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 850.

The Ph. Brit. Committee of Reference in Pharmacy report on arsenous iodide says it should be recrystallized, so as to exclude a melted mixture of arsenium and iodine, which is very indefinite in composition; the aqueous solution should be acid and colorless.—Chem. and Drug., Lond., 1906, v. 69, p. 863.

Wells, G. Harlan, has found that iodide of arsenic is most effective in promoting the nutrition of the cardiac muscle, one grain of the second or third decimal trituration three or four times daily. The trituration should be carried out as quickly as possible in a dark room, put at once in a capsule to be kept in black or amber-colored bottles.—Hahneman. Month., Phila., 1906, v. 41, p. 262.

ARSENI TRIOXIDUM.

Coblentz, Virgil, says that the formula As_4O_6 used by some chemists is based on the vapor density taken between 500° and 700° C., while at 1,770° C. and above the density corresponds to the old formula As_2O_3. The determination of the solubility of arsenous oxide is very unsatisfactory; aside from temperature, time plays a very important part. He cites an interesting table from Comey and adds that there are also great discrepancies if the determinations are carried out by the cooling of a hot saturated solution.—Am. J. Pharm., Phila., 1906, v. 78, p. 392.

A news item presents some information on the production of white arsenic in the United States, also of the amount imported during the years 1900 to 1905, inclusive. The amount produced in 1905 was 1,507,386 pounds as compared with 72,413 pounds produced in 1904.—Oil, Paint and Drug Rep., 1906, v. 70, July 16, p. 41.

Rosenthaler, L., outlines a method for the estimation of arsenic acid based on the reverse of the method for the determination of arsenic trioxide according to the equation:

(1) $As_2O_3+4NaHCO_3+4I=As_2O_5+4NaI+4CO_2+2H_2O$.

The reaction proposed is based on the following equation:

(2) $2H_3AsO_4+4KI+4HCl=As_2O_3+4I+5KCl+5H_2O$.—Ztschr. f. anal. Chem., Wiesb., 1906, v. 45, pp. 596–599.

Hausmann, W., makes a contribution to our knowledge of immunity to arsenic and reports a series of experiments on dogs.—Biochem. Centralbl., Leipz. 1906–07, v. 5, p. 628.

Conzen (Neur. Centrbl. No. 1, 2, Jan., 1906) describes a case of arsenical neuritis of both hands interesting in that all general symptoms from the side of the intestinal tract and the nerve system were lacking and the local disorder appeared only where the poison had acted, on the hands. The patient had for eight weeks smeared with his fingers an arsenic solution on fur-covered buttons. There was a local absorption and percutaneous action of the poison through the uninjured cutis.—Abstr., *Ibid.*, v. 5, p. 204.

Osborne, Oliver T., thinks the explanation of the action of arsenic in chlorosis is due to its stimulation of the thyroid gland.—J. Am. M. Ass., 1906, v. 47, p. 1476.

Shurly, B. R., advises the hypodermic use of one of the arsenates in the anæmia associated with the pretubercular stage.—*Ibid.*, v. 46, p. 1835.

Hofmann, Johannes, reports observations on the influence of arsenious acid on the number of red and white blood corpuscles. He injected 1 and 2 per cent solutions of sodium arsenate, and found the number of erythrocytes to be increased in all cases. The number of leucocytes is reduced immediately after the injection, and this is followed by a hyperleucocytosis with nontoxic or slowly acting toxic doses. With rapidly acting, large doses the leucocytes are not regenerated.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 867.

Doyen and Morel report experiments to determine the resistance of the dog to arsenic, and assert that crystalline arsenious acid is not absorbed from the gastro-intestinal canal of the dog.—*Ibid.*, p. 867.

Coley, T. L. (Brit. M. J., Nov. 34) states that arsenic may be of value in certain cases of arteriosclerosis of plethoric type, but more for its general than for its depressant action on the blood pressure.—J. Am. M. Ass., 1906, v. 47, p. 2124.

Bulkley, L. Duncan, states that many consider that arsenic is about the only remedy for psoriasis. He states that it often fails to control the disease, but it often controls the eruption, its mode of action not being fully understood. It may augment the disease.—*Ibid.*, v. 47, p. 1634.

Rhodes, Frederick A., states that he has used arsenic internally, as well as nearly every other drug in the Pharmacopœia, in the treatment of psoriasis in his own person, with no other effect than to alleviate the symptoms to some slight extent.—*Ibid.*, v. 47, p. 1636.

Gottheil, William S., states that he uses sodium arseniate hypodermically in the treatment of psoriasis, and that he has found tar used externally is as useful as chrysarobin.—*Ibid.*, v. 47, pp. 1636, 1637.

White, Jas. C., states that he uses arsenic much less than formerly in the treatment of psoriasis, and relies more on potassium iodide.—*Ibid.*, v. 47, p. 1637.

Stelwagon, Henry W., states that he has found arsenic to act very well in many patients who had never taken it for psoriasis.—*Ibid.*, v. 47, p. 1637.

Jacobi, A., states that he has used arsenious acid in connection with methylthionine hydrochloride in the treatment of inoperable cancer.—*Ibid.*, v. 47, p. 5145.

Leming, William (Modern Eclecticism), uses arsenic in relaxed conditions of the mucous membrane, with diarrhœa and general bodily weakness.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, p. 441.

Wells, G. Harlan, says the beneficial results from arsenicum album are seen in all varieties of functional and organic heart disease associated with marked prostration and conditions of lowered vitality. In the cardiac failure accompanying adynamic fevers and organic diseases of the kidneys arsenic is strongly indicated.—Hahneman. Month., Phila., 1906, v. 41, p. 263.

Haines, Oliver L., says that "arsenicum album" is a remedy preeminently useful in pericarditis after effusion has taken place to a considerable extent.—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. I, p. 431.

Additional references to the use of arsenic compounds will be found in the Index Medicus and the Journal of the American Medical Association.

ASAFŒTIDA.

Hankey, William T., says that while it is possible to obtain natural gum that will correspond to the U. S. P. VIII requirements, it is practically impossible to obtain powdered asafetida that will comply with the same requirements. His records for 25 samples show a variation of from 8.85 to 28.66 per cent of alcohol soluble material in powdered asafetida. The limit of 10 per cent of ash was also exceeded.—Am. Druggist, N. Y., 1906, v. 5, p. 360.

The Ph. Brit. Committee of Reference in Pharmacy report on asafetida says:

> The monograph requires complete revision.—Chem. & Drug., 1906, v. 69, p. 863.

Moore, Russell W., tabulates the results of the analysis of 142 samples of asafetida; average resin content, 31.45 per cent; maximum, 65.15 per cent; minimum, 9.35 per cent. He also gives a table showing the comparative results in 1890, 1900, and 1901–1905. Only 15.49 per cent of the samples examined contained the 50 per cent of resin required by the [U. S.] Treasury regulations and indicate the necessity of frequent chemical examinations of the importations of the drug. Much of the inferior drug met with is fictitious in character, consisting of impure gypsum cemented together with asafetida resin. Other samples were of inferior quality, plainly due to crude and imperfect methods of collecting the drug.—J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 627.

Caesar and Loretz assert that the ash content of commercial asafetida varies from 20 to 60 per cent. Only a small amount of this drug complies with the requirements of the pharmacopœias.—Geschäfts-Ber. v. Caesar and Loretz, in Halle a. S., 1906, p. 10.

Vanderkleed, Charles E., asserts that samples of powdered asafetida testing as low as 19.5 per cent of alcohol-soluble resin have been offered. He also points out that in spite of the lowering of the standard from 60 to 50 per cent of alcohol soluble resin for asafetida it is difficult to obtain any that will test much above 40 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Graham, Willard, asserts that he has examined about 50 samples of asafetida, 47 of which assayed above the U. S. P. 1890 requirements of not less than 60 per cent of alcohol soluble matter, the other three assayed above the U. S. P. VIII requirements of not less than 50 per cent alcohol soluble matter.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Patch, E. L., reports finding powdered asafetida that contained from 20 to 38 per cent alcohol soluble matter; the whole drug was found to be from 56.5 to 70.7 per cent soluble.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

Caspari, Chas. E., reports 3 samples examined: 1 U. S. P.; 2 yielded excess of ash.—Proc. Missouri Pharm. Ass., 1906, p. 102.

Evans Sons Lescher and Webb assert that the lower qualities of this drug are heavily adulterated with mineral matter: that 2 samples of powder labeled "Commercial" were found to yield 35.32 and 65 per cent of ash, respectively, and that the extractive matter of 20 lots of tincture ranged from 9.96 to 12.43 per cent, with one notable exception which reached 15.38 per cent.—Analytical Notes, for 1906, 1907, p. 6.

Eberle, E. G., asserts that asafetida should be purified by dissolving in alcohol. The tincture should then be made from this purified asafetida.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

The inspectors of drug depots found tincture of asafetida with as little as from 2 to 5 per cent of dry residue.—J. de Pharm. d'Anvers, 1906, v. 62, p. 91.

Francis, John M., thinks that the tincture of asafetida should be made from asafetida resin because of the variability of the drug.—Bull. Pharm., Detroit, 1906, v. 20, 231.

ASPIDIUM.

Henkel, Alice, mentions *Dryopteris filix-mas* (L.) Schott., also known as *Aspidium filix-mas* Sw., and *Polypodium filix-mas* L., commonly known as aspidium and male fern, as found in rocky woods from Canada to northern Michigan, and in the Rocky Mountains to Arizona.

Dryopteris marginale (L.) Gray., also known as *Aspidium marginale* Sw., and *Polypodium marginale* L., and commonly known as aspidium, evergreen wood-fern, and marginal-fruited shield-fern is also mentioned. Found in rocky woods from Canada south to Alabama and Arkansas.—Bul. Bur. Plant Ind., U. S. Dep't. Agric., No. 89, 1906, p. 27.

Hazen, T. E. (in Fern Bull. *14:* 25, 26 [Mr.], 1906), refers to the occurrence of *Dryopteris filix-mas* in Vermont.—Bull. Torrey Bot. Club, 1906, v. 33, p. 360.

Kraemer, H., asserts that aspidium is frequently adulterated by one or more species of *Osmunda.*—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

Laurent (Répert. de thérap.) asserts that *Aspidium spinulosum*, a fern quite common in Finland, is just as useful in the treatment of tapeworm as *Aspidium filix-mas.*—Am. Druggist, N. Y., 1906, v. 48, p. 70.

Wollenweber, W., records an investigation of the tannin of aspidium, and discusses the several constituents of this drug.—Arch. d. Pharm., Berlin, 1906, v. 244, pp. 466–486.

Naylor, W. A. H., reviews the literature relating to the constituents of male fern, and points out that while the present knowledge does not permit of a correct estimation of the vermifugal activity of the drug it does permit of the application of tests for adulterants.—Yearbook of Pharmacy, 1906, pp. 216.

Philipp Röder, Wien, suggests determining the ash content and the ether extract content of aspidium. The former should not exceed 3 per cent while the ether extract should be at least 8 per cent of the weight of the drug.—Pharm. Ztg., Berl., 1906, v. 51, p. 278.

Caesar and Loretz outline a method for the estimation of crude filicin.—Geschäfts-Ber. v. Caesar & Loretz, in Halle, a. S., 1906, pp. 99.

Ohliger, Willard, finds it difficult to purchase aspidium while still green, in quantity; some samples are entirely brown and useless.—Proc. Michigan Pharm. Ass., 1906, p. 46.

Fowler, J. R. (Brit. M. J., Lond., Apr. 14), details the technic of treating tapeworm with aspidium.—J. Am. M. Ass., 1906, v. 46, p. 1479.

Krüdener (Zeitschr. f. Augenheilk., 1906, v. 16) reports some observations on the occular symptoms manifested by a patient who had been given 2 grammes each of extract and of powdered aspidium.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 802.

ATROPINA.

Riedel's Berichte points out that while atropine sulphate will usually melt at 185° C. it is possible, by careful heating, to melt it at 180° C., while on rapid heating it requires 190° C. In an air bath the melting point is approximately 180° C.—Riedel's Berichte, Berl., 1906, p. 23.

Utz asserts that atropine sulphate melts normally at from 185° to 186° C.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Ipsen, C., discusses the possibility of demonstrating the presence of atropine and presents a number of conclusions on its resistance to putrefactive changes.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, pp. 141–142.

Doyon and Kareff (J. de physiol. gén., 1906, v. 8, p. 227) reports some observations on the action of atropine on the coagulability of the blood. They find that atropine injected into the portal vein reduces the coagulability of the blood. Injection into the jugular or saphenous vein did not produce the same results.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 400.

Lennander, K. G., (Deutsch. Ztschr. f. Chim., Leip., v. 81, No. 1) states that we know too little of the action of atropine on the intestine for any rules for its use in peritonitis.—J. Am. M. Ass., 1906, v. 46, p. 1404.

French, J. M., discusses at some length the physiological action and therapeutic indications and uses of atropine, laying stress upon the difference in action between small and large doses, antagonists and incompatibles, synergists and combinations.—Merck's Archives, 1906, v. 8, pp. 35–40.

Hewlett, A. W., is reported to have called attention to the fact that the use of atropine in connection with digitalis might possible stimulate the bundle of His and prevent the occurrence of heart-block in cases when the use of digitalis is necessary.—J. Am. M. Ass., 1906, v. 47, p. 302.

Modrakowski, G., (Pflügers Arch., 1906, v. 114) reports some observations on the action of atropine on the secretions of the pancreas.—Biochem. Centralbl., Leipz., 1906–07, v. 5, p. 736.

Zuelzer, G., (Therap. d. Geg., Berl., v. 47) advises the use of atropine in the treatment of asthma, since irritation of the vagus nerve experimentally produced expansion of the lung, which atropine relieves.—J. Am. M. Ass., 1907, v. 48, p. 462.

Simon, J., reports some experiments on dogs to determine the degree of control exercised by atropine over the vomiting caused by morphine.—Arch. int. de pharm. et de thér., 1906, v. 16, p. 225.

Kohnstamm, Oscar, discusses the use of atropine in acute coryza, particularly as an abortive measure.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 526–527.

Scrini (Bull. Commerc., 1906, No. 1) recommends the use of 0.2 to 0.5 per cent solutions of atropine in peanut oil or olive oil in the eye in place of aqueous solutions of the same alkaloid.—Pharm. Ztg., Berl., 1906, v. 51, p. 301.

Grube (Inaug.-Diss., Göttingen, 1905) reports a comparative study of several mydriatics. He concludes that atropine and eumydrin 5 per cent paralyse accommodation always and fully, eumydrin 1 per cent and homatropine not without exception. The height of the paralysis lasts with atropine not quite so long as the mydriasis, but with the other medicaments quite as long: the full accommodation breadth (focal distance?) is restored with the appearance of normal pupil diameter.—Abstr. in Biochem. Centralbl., Leipz., 1906–07, v. 5, p. 249.

Lafon, Ch., points out that the continued use of atropine in the eye will, in certain cases, produce follicular conjunctivitis, that has been designated as "atropine catarrh."—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, p. 16.

Tyrrell, John Boyd, states that actute atropine poisoning is not uncommon from the use of atropine in the eye or from belladonna plaster, but he describes a possibly unique case of collapse, with other symptoms of poisoning, following the continued use of atropine in the eye.—N. York M. J., 1906, v. 84, pp. 273–274.

Howe (Ophthalmology, 1906) discusses the effects of full and of minimum doses of atropine sulphate and of homatropine hydrobromide.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 633.

Drenkbahn (from Therap. Monatsh., Berlin, v. XIX, No. 1) suggests the greater or more extended use of atropine because of its power to relax the muscles and to hold them relaxed.—J. Am. M. Ass., Chicago, 1906, v. 46, p. 996.

Bertozzi (Astenore) in the order of their comparative toxicity rates these substances as follows: Atropine sulphate, neutral=1; homatropine hydrobromate=1.21; methyl-atropine bromide=5.69; eumydrine=7.99.—Arch. di farmacol. sperim., Roma, 1906, v. 5, pp. 123–133.

Frazier, C. E., (Med. Arena) finds atropine, hypodermically, always indicated and seldom failing in post-partum hæmorrhage. Felter adds a note on the efficacy of its combination with morphine.—Eclectic Med. J., Cincin., 1906, v. 66, p. 283.

Bartlett, Clarence, discussing the dose of atropia, questions the accuracy of the statement that the twelfth of a grain has been given hypodermically without producing drug symptoms. The dose recommended is one four-hundredths to one one-hundredth of a grain three or four times daily.—Hahneman. Month., Phila., 1906, v. 41. pp. 491–499.

Additional references on the use of atropine will be found in the Index Medicus and the Journal of the American Medical Association.

AURANTII AMARI CORTEX.

Charabot and Laloue discuss the formation and distribution of the essential oil and the distribution of the several constituent principles of the oil.—Compt. rend. Acad. des. sc. Par., 1906, v. 142, pp. 798–801.

AURANTII DULCIS CORTEX.

Francis, John M., notes that the increased quantity of moist drug decreases alcoholic strength of the tincture of sweet orange.—Bull. Pharm., Detroit, 1906, v. 20, p. 231.

Lyons, A. B., believes that the quality of the tincture of sweet orange peel is satisfactory, but that the product is too costly for the druggist who buys his tinctures.

Wilbert, M. I., points out that this tincture should be prepared when fruit is readily obtainable.

Other pharmacists also favor the use of fresh peel.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 447.

Stanislaus, I. V. S., presents (Apothecary) a method of preparing a stock flavoring for elixirs, wines, and aqueous liquids and for the expeditious manufacture of syrup of orange peel.—Bull. Pharm., Detroit, 1906, v. 20, p. 215.

AURI ET SODII CHLORIDUM.

Vanderkleed, Charles E., says that it seems impossible to get gold and sodium chloride from chemical manufacturers to assay above 25 per cent of metallic gold. The U. S. P. requirement is 30 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

BALSAMUM PERUVIANUM.

The Ph. Brit. Committee of Reference in Pharmacy report on balsam of Peru says the test requires revision. The saponification should refer to a definite weight of residue; the cupric acetate test for colophony might be introduced, and one to exclude artificial substitutes.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Caesar and Loretz point out that the several pharmacopœias differ materially in their requirement for the specific gravity of balsam of Peru. The U. S. P. VIII requires from 1.140 to 1.150 at 25° C.; Ph. Germ. IV, 1.140 to 1.150; Ph. Ndl., 1.140 to 1.145; Ph. Belg., 1.137 to 1.150; and Ph. Austr. VIII, 1.14 to 1.16 at 15° C. Caesar and Loretz themselves point out that the specific gravity of an otherwise unobjectionable balsam of Peru varies from 1.140 to 1.153 in commercial samples.—Geschäfts-Ber. v. Caesar & Loretz, in Halle, a. S., 1906, p. 12.

Weigel, G., points out that the Ph. Ndl. requirements that balsam of Peru have a specific gravity of from 1.140 to 1.145 are low and that commercial samples frequently vary from 1.145 to 1.155. The lower specific gravity, he asserts, is also not in keeping with the requirements for cinnamein, which must not be less than 55 per cent. Natural balsams with 55 per cent of cinnamein always have a higher specific gravity than 1.145.—Pharm. Zentralh., 1906, v. 47, p. 398.

An unsigned critique of the Ph. Ndl. IV notes the requirement of 55 to 80 per cent cinnamein.—Chem. & Drug., Lond., 1906, v. 68, p. 828.

Evans Sons Lescher and Webb found that the percentage of cinnamein in 17 commercial samples of balsam of Peru examined ranged from 52 to 60 per cent by the Ph. Brit. IV method of extraction.—Analytical Notes for 1906. 1907, p. 6.

Weigel, G., believes that the variation in specific gravity of balsam of Peru from 1.140 to 1.160 (at 15° C.) corresponds with present-day requirements, as does the requirement for 55 per cent of cinnamein. A new test requires that balsam of Peru give a clear solution when mixed with 5 parts of 60 per cent solution of hydrated chloral.—Pharm. Zentralh., 1906, v. 47, p. 685.

Caesar and Loretz suggest limiting the specific gravity of balsam of Peru to 1.140 to 1.153 at 15° C. They also point out that the sulphuric acid test is unreliable and superfluous, and outline a method for determining the saponification number, the ester number, and the recognition of the so-called "synthetic balsam of Peru."—Geschäfts-Ber., Caesar & Loretz, 1906, pp. 89–90.

Hankey, William T., reports on 5 samples of balsam of Peru varying in sp. gr. from 1.1450 to 1.1560, amount of cinnamein from 42 to 50 per cent, and acid number from 66.3 to 75.3. He also criticises the official method for estimating cinnamein and believes that an aqueous solution of potassium hydroxide will give practically as good results as the alcoholic solution directed for determining the limit of acid resins.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Utz discusses the determination of the saponification number of balsam of Peru and records a number of experiments in which he gives the comparative results obtained by hot and cold saponification. The results obtained by cold saponification are usually somewhat higher than those obtained by the use of heat.—Apoth. Ztg., Ber., 1906, v. 21, p. 205.

Wippern, Franz, points out that balsam of Peru is not miscible with alcohol in all proportions. It is miscible with equal parts of alcohol, but larger quantities of alcohol cause more or less cloudiness, and when the proportion of six of alcohol to one of balsam of Peru is reached the mixture is quite opaque. He also suggests that the tendency to cause ointments containing it to become granular should be noted in the pharmacopœia.—Pharm. Ztg., Berl., 1906, v. 51, p. 806.

Heinrich Haensel has obtained 30 per cent of essential oil from balsam of Peru. This oil was dark yellow in color, had a sp. gr. of 1.083 at 15° C., a slight dextro-rotation, and contained 84.4 per cent of cinnamein.—Half Yearly Reports, April, 1906, p. 25.

Hubbard, Ernest V., calls attention to the value of balsam of Peru as a surgical dressing, as suggested some years previously by Van Arsdale. Pure constituents are required, and it may be necessary to sterilize the castor oil. The dressing is useless in eczematous conditions and is not protective against erysipelatous infection.—N. York M. J., 1906, v. 83, p. 505.

Schlöffer, H. (Abstract from Arch. f. Klin. Chirurgie., Berlin, LXXVII, No. 3), reports treating more than 100 cases of wounds with Peruvian balsam. He believes that this article surpasses any other substance for the treatment of wounds.—J. Am. M. Ass., 1906, v. 46, p. 391.

BALSAMUM TOLUTANUM.

The Ph. Brit. Committee of Reference in Pharmacy report on balsam of tolu says: The tests require revision.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Weigel, G., points out that the Ph. Germ. requirement that balsam of tolu be insoluble in carbon disulphide is incorrect and that the Ph. Ndl. IV requirement that it be soluble to the extent of 25 per cent is more in keeping with the fact.—Pharm. Zentralh., 1906, v. 47, p. 398.

Naylor, W. A. H., says that the bisulphide of carbon test is characterized as being valuable for discriminating between genuine and spurious balsams. The direction to evaporate the solution to dryness should be augmented by the addition, "at a temperature not exceeding 100° F. until the weight is constant," as cinnamic acid is appreciably volatile at higher temperatures, and loss would be likely to ensue. The acid determination of the U. S. P. has the disadvantage of that in the B. P. in that any acid or saponifiable body soluble in alcohol added to the balsam would be titrated and reckoned among its natural constituents. The end reaction is not so sharp.—Yearbook of Pharmacy, 1906, p. 207.

Weigel, G., points out that a new test is included in the Ph. Austr., which provides that balsam of tolu when boiled for a few minutes with ten times its weight of lime water gives a yellowish filtrate that is decolorized by the addition of hydrochloric acid, and from which, on cooling, colorless crystals separate. This test, he asserts, while added as a test for recognizing balsam of tolu, may also serve to differentiate or to detect possible admixture of rosin which gives a flocculent precipitate.—Pharm. Zentralh., 1906, v. 47, p. 685.

Dunning, H. A. B., points out that balsam of tolu does not readily dissolve at low temperature and suggests fusing the balsam and dissolving by adding alcohol while it is still hot.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 483.

Philipp Röder, Wien, reports that two samples of balsam of tolu contained, respectively, 0.12 and 0.24 per cent of ash and had a saponification number of 148 and 145.7.—Pharm. Post, Wien, 1906, v. 39, pp. 233.

Evans Sons Lescher and Webb found that the free benzoic acid content in seven samples of balsam of tolu recently examined ranged from 8.28 to 10.89 per cent, and that the combined benzoic acid ranged from 12.7 to 20.5 per cent.—Analytical Notes for 1906, 1907, p. 6.

Astruc and Cambe review various methods for the preparation of syrup of tolu and offer a formula which they assert is more practical, more efficient, and more rapid of execution than the formula of the French Codex.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 418–425.

BALSAMUM TRAUMATICUM N. F.

Caldwell, Paul, suggests several complications that may arise from the use of the synonyms for traumatic balsam and suggests that the note adds an unnecessary complication.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

BELLADONNÆ FOLIA.

The Ph. Brit. Committee of Reference in Pharmacy report on belladonna leaves says the committee is of opinion that, from some points of view, belladonna leaves are to be preferred to the root as a starting point for galenical preparations of belladonna, owing to the fact that the ratio of alkaloid to extractive is not so variable. The committee also asserts that belladonna root, if retained, in order to have preparations of uniform physical characters, must be of definite standard, and 0.4 to 0.5 per cent of the total alkaloids is suggested.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

An editorial notes that of the many important points in the report of the General Medical Council none are so revolutionary as the remarks on belladonna preparations; the retention of the root for galenicals being questioned and preference given the leaves. When the fact is recalled that tradition was departed from and the leaves abandoned in favor of the root, because more constant preparations would be obtained, the committee's remarks give rise to strange reflections.—*Ibid.*, 861.

Dohme, A. R. L., reports (Am. Druggist, N. Y., 1906, v. 49, p. 268) the per cent of alkaloid found by seven reputable chemists, operating upon the same samples of belladonna by the same process, as follows:

	A.	B.	C.	D.	E.	F.	G.
Belladonna root	0. 58	0. 72	0. 49	0. 59	0. 56	0. 65	0. 61
Belladonna leaf	0. 17	0. 33	0. 41	0. 32	0. 28	0. 24	0. 24
Ext. belladonna leaf	1. 21	1. 03	----	1. 50	1. 04	1. 46	1. 08
Fl. ext. belladonna root	0. 48	0. 37	0. 51	0. 42	0. 41	0. 46	0. 48

Evans Sons Lescher and Webb examined a sample of dry autumnal belladonna herb in which portions of the stem were present as well as leaves and fruit. The average alkaloidal content was 0.34 per cent by extraction with Prollius's fluid. The stems yielded 0.16 total alkaloid, the fruit 0.41 per cent, and the leaves 0.4 per cent. The herb yielded about 15 per cent extractive, which was of a brownish color and therefore valueless.—Analytical Notes, for 1906, 1907, p. 8.

Hankey, William T., found belladonna leaves to vary from 0.230 per cent of mydriatic alkaloids to 0.516 per cent. He suggests using a larger amount of the menstruum to exhaust the drug.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Vanderkleed, Charles E., reports the assay of 5 lots of belladonna leaf which averaged 0.481 per cent of mydriatic alkaloids. All assayed higher than the required 0.35 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

The inspectors of pharmacies found tincture of belladonna with but 0.62 per cent of dry extract.—J. de Pharm. d'Anvers, 1906, v. 62, p. 91.

Francis, John M., says the average assay of 33 lots of belladonna leaf, representing 38,648 pounds, was 0.31 per cent; 8 were above 0.35 per cent, 25 were below. The poorest was 0.23 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

Patch, E. L., reports finding from 0.25 to 0.4 per cent of mydriatic alkaloids in the several samples of belladonna leaf examined.—*Ibid.*, v. 54, p. 334.

Ohliger, Willard, finds that most samples of the leaves assay a little below the requirement; one sample, however, contained 0.67 per cent of mydriatic alkaloids. The root averages about 0.5 per cent.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Graham, Willard, examined 3 samples of belladonna leaves. They contained, respectively, 0.40, 0.36, and 0.37 per cent of mydriatic alkaloids.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Spiegel, L., discusses the chemistry of the mydriatic alkaloids, their composition and relation.—Biochem. Centralbl., Leipz., 1906–7, v. 5, pp. 156–159.

Forsberg (Pharm. Post) discusses the estimation of alkaloids in belladonna leaves and records his experiments with several processes. He recommends a method in which the finely powdered leaves are dried on a water bath in the presence of equal parts of a 20 per cent solution of sodium carbonate. This product is then treated with a mixture of ether, chloroform, and caustic soda. The ethereal solution obtained is distilled until its volume is reduced to three-quarters of the original, and titrated.—Am. Druggist, N. Y., 1906, v. 48, p. 228.

Caesar and Loretz outline a method for the assay of belladonna leaf, and suggest the advisability of determining the moisture content.—Geschäfts. Ber. v. Caesar & Loretz, 1906, p. 102.

Philipp Röder, Wien, outlines a method of assay for belladonna leaf and reports finding 15.69 per cent of ash and 0.294 per cent of alkaloids in the leaf, and 16.18 per cent of ash and 0.405 per cent of alkaloids in the herb.—Pharm. Post, Wien, 1906, v. 39, pp. 263–264.

Gordin, H. M., thinks the assay method requires only a few modifications in order to make it simple and exact, (1) the percolation ought to be continued to exhaustion, as indicated by Wagner's reagent; (2) the cause of error liable to result from transferring the "creeping" ethereal mixture from one vessel to another and the adhering of drug particles to the sides of the first vessel could be completely eliminated by carrying out the shaking and the percolation in one and the same vessel specially constructed for the purpose; (3) as these drugs are rather poor in alkaloid, at least 20 gm. of the leaves or the root ought to be taken for the assay.—Am. J. Pharm., Phila., 1906, v. 78, p. 454.

For extract of belladonna leaves he thinks it would be preferable to put an indefinite amount of extract directly into a tared separating funnel and determine the amount of extract taken by weighing the funnel together with the extract.—*Ibid.*, p. 456.

The method for the fluid extract of the root he thinks good, and it could be made still better by shaking out the first chloroformic solution once or twice more with acidulated water.

Belladonna leaves can not be exhausted if sodium carbonate be used.—*Ibid.*, p. 461.

For belladonna plaster he thinks it preferable to introduce the plaster cut into strips into a separating funnel for the extraction with chloroform. When completely extracted the strips could be removed by means of a hooked copper wire.—*Ibid.*, p. 455.

Dieterich, Karl, has made a comparative study of the Ph. Austr. VIII assay process for extract of belladonna and hyoscyamus, compared with the Ph. Germ. IV and the potassium bismuth iodide precipitation method suggested by Thoms. The results obtained by the use of the Ph. Germ. IV method are decidedly higher than those obtained by the other two.—Pharm. Post, Wien, 1906, v. 39, p. 533. (See also pp. 551–552.)

The Ph. Brit. Committee of Reference in Pharmacy recommend standardizing green extract of belladonna to 1 per cent alkaloid.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Philipp Röder, Wien, presents a modification of the assay process for extract of belladonna and reports a number of assays. The alkaloid content of the several samples reported on varied from 0.934 to 1.735 per cent of alkaloids. The Ph. Austr. VIII requires an alkaloid content of 2 per cent and the absence of chlorophyl.—Pharm. Post, Wien, 1906, v. 39, p. 249.

Matthes and Rammstedt report having examined several samples of extract of belladonna by the method proposed by Thoms to determine the acid and tannin content. They believe that the determination of these factors does not lead to correlating results, and that as yet the determination of the alkaloid content is the sole reliable factor.—Pharm. Ztg., Berl., 1906, v. 51, p. 1032.

Dieterich, Karl, reports examining a number of samples of extract of belladonna. The samples of extract of belladonna Ph. Germ. IV varied from 1.012 to 2.09 per cent of alkaloids; extract of belladonna root Ph. Germ. IV varied from 1.50 to 2.36 per cent of alkaloids, and extract of belladonna Ph. Austr. VII varied from 2.18 to 2.99 per cent of alkaloids. The alkaloid content of the extract of belladonna Ph. Austr. VIII agreed in the main with the alkaloid content of the Ph. Germ. IV extract.—Helfenberger Annalen 1905, 1906, v. 18, pp. 159-160.

Caesar and Loretz report finding admixtures of the leaves of *Scopolia carniolica* in belladonna leaves and also having offered to them the former as belladonna. G. Fromme reviews the assay of belladonna and reports a number of comparative results.—Geschäfts-Ber., v. Caesar & Loretz, 1906, p. 23–29.

Philipp Röder, Wien, reports that two samples of tincture of belladonna were found to contain, respectively, 0.023 and 0.036 per cent of alkaloid. The Ph. Austr. VIII requires 0.03 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 297.

Jacobi, A., states that he has found that belladonna relieves the dysuria seen with the internal use of methylthionine hydrochloride much better than nutmeg, which has been recommended for that purpose.—J. Am. M. Ass., 1906, v. 47, p. 5145.

Lafon, Ch., reviews the use of the several mydriatic alkaloids and their derivatives as collyria, calls attention to some of the secondary results that have been observed, and suggests the use of an aqueous solution of extract of belladonna in place of solutions of the alkaloids.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 16–18.

Solis-Cohen, S., advises the use of some form of belladonna in the treatment of hay fever when it fails to yield to pollantin and other modes of treatment.—J. Am. M. Ass., 1906, v. 47, p. 267.

Richards, Geo. L., thinks that nothing equals belladonna as an internal remedy for hay fever.—*Ibid.*, v. 47, p. 524.

Doland, C. M., reports three cases of poisoning following the use of belladonna plasters. He suggests that, as atropine is so rapidly eliminated, the removal of the plaster will probably be rapidly followed by a cessation of symptoms.—Am. J. Med. Sc., 1906, v. 131, p. 623.

Thursfield, Hugh, states that he has found belladonna, or some form of atropine, by far the most useful drug in the treatment of enuresis. He usually employs it for some months in conjunction with potassium citrate. Ergot, antipyrine, lycopodium, and other drugs proved useless.—Brit. M. J., Lond., 1906, v. 1, pp. 901–903.

Lewis, Percy G., discusses the cause and treatment of enuresis, with consideration of condition of urine, of patient, of the nervous and digestive systems, and the treatment of these. He states that belladonna is a tonic to the nervous system and will be effective in certain types of cases, when in semitoxic doses it is effective by diverting the mind.—*Ibid.*, v. 1, pp. 903–905.

Howes, Pitts Edwin (Eclectic Rev., December, 1905), observes that certain seasons present a preponderance of disorders having indications for a certain drug. The comment is added:

> In looking back over our cases of other years, I doubt not that many of us can recall such season remedies. My memory brings up a belladonna season and a bryonia season. While macrotys and bryonia are largely called for in nearly all years and all seasons, we do not so frequently find use for belladonna. These phenomena are well worthy of our notice and remembrance.—Eclectic Med. J., Cincin., 1906, v. 66, p. 96.

Mundy, in an editorial on "Seasonable remedies," says:

> The similarity of conditions or symptoms at a certain season have been frequently noted; hence the call for a special remedy. Last year it was chionanthus; this year it is acids.—*Ibid.*, p. 503. (See also p. 551.)

Fyfe, John William, quotes Wooster Beach on Atropa belladonna:

> Notwithstanding its poisonous quality, it is used with great benefit, externally in the cure of cancers, and in dispersing indolent tumors in the breasts of females. It is also applied to boils and all hard and painful glandular swellings with great benefit.—*Ibid.*, v. 66, p. 319.

Haines, O. S., describes the use of atropine and belladonna in a case of hyperchlorhydria. Atropine 3x trituration, one grain every fourth hour, soon relieved. Then belladonna 3x was given, and finally belladonna 30th. The variations in potency seem necessary, in such cases, if the progress toward recovery is not continuous.—Hahneman. Month., Phila., 1906, v. 41, p. 75.

Collins, C. D., in discussing the treatment of pruritus vulvæ, says that belladonna is indicated by—

> Bright red and shining skin. The itching is relieved by scratching, which produces a pleasant sensation. Voluptuous itching, especially adapted to nervous patients with much headache and a vindictive temperament.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 286.

BELLADONNÆ RADIX.

Lyons, A. B., reports that only 4 out of 12 replies received, thought the standard of 0.5 gm. of mydriatic alkaloids in 100 c. c. of fluid extract of belladonna root satisfactory and readily maintained. He himself found that 4 out of 7 lots of fluid extract ran over the required strength.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Patch, E. L., found from 0.53 to 0.64 per cent of alkaloids in belladonna root.—*Ibid.*, v. 54, p. 334.

Evans Sons Lescher and Webb assert that belladonna root is very variable in alkaloidal content; that the alkaloidal content of the samples examined for the year ranged from below 0.1 per cent to between 0.4 and 0.5 per cent. In one case the alkaloid was practically absent.—Analytical Notes for 1906, 1907, pp. 8–9.

Dott, D. B., asserts that belladonna root is more readily exhausted by 60 per cent than by 80 per cent alcohol. The powder being of a bulky, spongy nature does not favorably lend itself to repercolation. It is better to macerate and press.—Yearbook of Pharmacy, 1906, p. 300.

Taylor, S., thinks that, as a result of the work of Farr and Wright, the Ph. Brit. will direct extracts to be in the powdered form wherever possible. This form secures absolute uniformity of condition; also strength in the standardized extracts. If carefully kept, these products are only slightly hygroscopic, and, with proper care, need cause no trouble. As a diluent he considers that milk sugar is generally successful and much advocated; the addition of some dried efflorescent salt would certainly tend toward keeping the condition of the extract, though the addition of active bodies is to be deprecated.—Pharm. J. Lond., 1906, v. 23, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy recommends that the assay process for liquid extract of belladonna be amended; it also believes that an assay process for belladonna plaster is desirable; it suggests a revision of the wording of the monograph on alcoholic extract of belladonna, and the requirement that the product be in dry powder; and recommends adding an assay process for liniment of belladonna.—Chem. & Drug., Lond., 1906, v. 69, pp. 863–864.

The Annual Report of Philipp Röder, Wien, asserts that the ash content of extract of belladonna root is two or three times that of the extract of belladonna leaf, and suggests that this might serve to differentiate the two.—Pharm. Zentralh., 1906, v. 47, p. 481.

Caesar and Loretz report that the alkaloid content of belladonna root varies considerably, different samples within a single year varying from 0.07 to 0.94 per cent of alkaloid. They outline a method of assay for belladonna root and also suggest the estimation of the moisture content.—Geschäfts-Ber. v. Caesar and Loretz, 1906, pp. 45–46, 108–109.

Evans Sons Lescher and Webb point out that the assay process of the Ph. Brit. IV for the liquid extract of belladonna can be satisfactorily worked by first shaking out the emulsifying bodies with chloroform from an acidulated solution.—Analytical Notes for 1906, 1907, p. 8.

Perry, M. J., suggests a method for the assay of fluid extract of belladonna by the use of Wagner's reagent, which he says is easier and quicker than either the Ph. Brit. or the U. S. P. method.—Chem. & Drug., Lond., 1906, v. 69, p. 839.

Graham, Willard, reports that of 7 samples of belladonna root examined two were below the required standard of 0.50 per cent of mydriatic alkaloids.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Vanderkleed, Charles E., reports the assay of 8 lots of belladonna root which averaged 0.545 per cent of mydriatic alkaloids. Three samples assayed below the required 0.5 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Francis, John M., asserts that several bales of poke root were sold as belladonna root.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

BENZALDEHYDUM.

A paper on the new pharmacopœia, read before the Detroit Academy of Medicine by A. B. Lyons, is quoted to the effect that benzaldehyde ("synthetic" oil of bitter almonds) is, of course, not medicinally the equivalent of the volatile oil of bitter almonds, since the latter contains prussic acid.—Bull. Pharm., Detroit, 1906, v. 20, p. 38.

Schimmel & Co. assert that following the method for the determination of benzaldehyde, as indicated by the U. S. P. VIII, they found it impossible to obtain even approximately satisfactory results, and therefore doubt the usefulness of the official method. They point out that benzaldehyde, described in commerce as "free from chlorine," does not always deserve this designation, and recommend that purchasers pay special attention to this point, as the removal of the last traces of chlorine is not such a simple matter, but is necessary if the product is to be described as absolutely free from chlorine.—Semi-Ann. Rep., 1906, Apr.–May, pp. 70, 86.

Ohliger, Willard, reports artificial oil of bitter almonds with excess of chlorinated compounds.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Hérissey outlines a method of determining small quantities of benzaldehyde, such as are produced by the hydrolysis of some glucosides.—J. de pharm. et de chim. Par., 1906, v. 23, pp. 60–65.

Betti, Mario (Gazzetta, 1906, v. 36, ii, 427–433), discusses spontaneous oxidation in the presence of benzaldehyde: whether the function of the latter is merely to form hydrogen peroxide or some other peroxide, or whether it takes part in a cycle of changes, at the end of which it is regenerated, is as yet undecided.—Abstr. in J. Chem. Soc., Lond., 1906, v. 90, part 1, p. 985.

BENZINUM PURIFICATUM.

Hankey, William T., points out that the U. S. P. VIII requirement for the boiling point of petroleum benzin is rather ambiguous. He thinks it would be more definite to state how it should distil when subjected to fractional distillation under prescribed conditions.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Fernan, Albert, found the boiling point of 3 samples of benzin to vary from 35° to 90° C., 35° to 95° C., and 30° to 98° C. None of the samples complied with the requirement that benzin should distil at or below 60° C. He concludes that samples complying with the Ph. Germ. IV are not available.—Ztschr. d. allg. oesterr. Apoth.-Ver., 1906, v. 44, p. 79.

The Helfenberger Annalen, (1905, p. 53), report on 38 barrels of petroleum benzin, the specific gravity of which varied from 0.719–0.725, at 15° C., and also varied from the official requirement so far as boiling point was concerned. Otherwise the product was acceptable, while samples of Motor-benzin, with a specific gravity varying from 0.679–0.681 at 15° C., were colored yellow with bromine vapor.—Pharm. Zentralh., 1906, v. 47, p. 832.

A news item reproducing additional regulations for the production of denatured alcohol has the following definition for the "Benzin" that is to be used:

> The benzin submitted for approval must be a hydrocarbon product derived either from petroleum or coal tar. If derived from petroleum it must have a specific gravity of not less than 0.800. If derived from coal tar it must have a boiling point of not less than 150° or more than 200° C. It must be of such character as to impart a decided odor to ethyl alcohol when mixed with it in the proportion of one-half of 1 per cent by volume.—Oil, Paint and Drug Rep., 1906, v. 70, Nov. 12, p. 10.

An editorial records the importation of upward of 2,000,000 gallons of petroleum benzin from the Far East and offers some comments on the economic conditions prevailing.—*Ibid.*, Jan. 8, p. 7.

Burge, G., (Korrespondenzbl. f. Schweiz. Aerzte, v. 36, pp. 350–352) reports a fatal case of poisoning by benzin.—Jahresber. u. Tier. Chem. for 1906, 1907, v. 36, p. 793.

Zorulaid, A., (München Med. Wochnschr., v. 53, p. 412–414), discusses poisoning by benzin.—*Ibid.*, 793.

Crouzel, Ed., recommends petroleum benzin as an efficient antiseptic particularly useful for cleaning and promoting the healing of wounds. The volatile nature of this substance causes a local reduction of temperature that tends to harden the tissues and prevent further secretion. A number of antiseptics are soluble in petroleum benzin and may be applied as washes or in the form of spray. It is also pointed out that a solution of petrolatum in benzin will be found useful for rinsing surgical instruments to avoid rust. (Répert. de Pharm.)—Pharm. Ztg. Berl., 1906, v. 51, p. 300.

BENZOINUM.

The Annual Report of Philipp Röder, Wien, outlines a test to determine the origin of benzoin. Sumatra benzoin when heated with potassium permanganate solution produces the odor of benzaldehyde. Siam benzoin, which is free from cinnamic acid, does not produce this odor.—Pharm. Zentralh., 1906, v. 47, p. 523.

The Ph. Brit. Committee of Reference in Pharmacy report on benzoin says: For Sumatra benzoin, 10 per cent insoluble in alcohol and 5 per cent of ash seem fair limits. The two varieties should be described separately, but it is a question whether Siam benzoin should be retained. The Palembang variety contains the highest proportion of benzoic acid and might be introduced.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Holmes, E. M., (Pharm. Journ., Feb. 9, 1907, 127) presents tables showing the insoluble matter, ash, and acid content in a large number of commercial samples of benzoin.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 782–784.

Philipp Röder, Wien, reports that two samples of benzoin contained, respectively, 1.94 and 1.38 per cent of ash.—Pharm. Post, Wien, 1906, v. 39, p. 233.

Hankey, William T., points out that a good grade of Sumatra benzoin usually runs from 70 to 80 per cent soluble in alcohol. The ash, usually between 2 and 2.5 per cent, will at times be as high as 3 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 360.

Vanderkleed, Charles E., reports finding a sample of benzoin which tested but 53 per cent of alcohol soluble matter. Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Evans Sons Lescher and Webb found an interesting sample of benzoin in coarse powder, composed of white and brownish pieces which had the odor of the Siam variety; 8 per cent was insoluble in 90 per cent alcohol, and contained 4.8 per cent of free benzoic acid and 21.78 per cent of combined benzoic acid.—Analytical Notes for 1906, 1907, p. 9.

An abstract points out that Sumatra benzoin may be detected in tincture of benzoin by evaporating the tincture at from 60° to 70° C. and heating the residue previously mixed with a solution of potassium permanganate. Sumatra benzoin develops an odor of oil of almonds. Siam benzoin, which is free from cinnamic acid, does not develop this odor.—Pharm. Ztg., Berl., 1906, v. 51, p. 322.

Liverseege, L. F., suggests that 16 w/v might be taken as the minimum requirement of solid extract in compound tincture of benzoin. The samples examined varied from 16.7 to 22.6 w/v with an average of 18.5 w/v. The specific gravity varied from 0.894 to 0.911.—Yearbook of Pharmacy, 1906, p. 272.

BENZOSULPHINIDUM.

Fernan, Albert, reports finding a sample of commercial saccharin with a melting point of 218° C., and an ash content of 2.18 per cent largely potassium sulphate. He concludes that the sample was probably contaminated with potassium *o*-sulphobenzoate.—Ztschr. d. allg. öesterr. Apoth.-Ver., 1906, v. 44, p. 80.

Glücksmann, C., discusses the testing and valuation of saccharin, reports the findings in several examinations, and points out that saccharin can readily be produced of a much higher per cent of purity than that now commercially available.—Pharm. Prax., 1906, v. 5, pp. 393–403.

Fernan, Albert, points out that the method proposed by Glücksmann is faulty and prefers that by Hefelmann.—Pharm. Post., 1906, v. 39, pp. 212–213.

Bigelow, W. D., outlines the provisional methods for determining saccharin, both qualitatively as well as quantitatively, as adopted by the Association of Official Agricultural Chemists.—Circ. Bur. Chem., U. S. Dept. Agric., 1906, No. 28, pp. 6–7.

Duyk describes and figures an apparatus by which he seeks to obviate the employment of excessive amounts of menstrua, the formation of rebellious emulsions, and the inevitable loss of liquid through the multiplicity of operations in the estimation of saccharin.—Ann. de chim. analyt., Par., 1906, v. 11, pp. 82–84.

BERBERIS.

Henkel, Alice, mentions *Berberis aquifolium* Pursh., also known as berberis, Oregon grape, holly-leaved barberry, and Rocky Mountain grape, as a native in woods from Colorado to the Pacific Ocean;

especially abundant in Oregon and northern California.—Bul. Bur. Plant Ind., U. S. Dept. Agric. No. 89, 1906, p. 15.

Schneider, Albert, discusses the preparations the California and Oregon Indians make from *Berberis aquifolium* Pursh., the parts of the plant used, and the diseases for which taken.—Merck's Report, 1906, v. 15, p. 65.

Francis, John M., questions the statement by some authorities that berberine is the principal constituent of *Berberis aquifolium;* experiments seem to show that the yellow substance found in this drug does not answer to the tests for berberine. An interesting topic for a pharmaceutical research thesis.—Bull. Pharm., Detroit, 1906, v. 20, p. 55.

Reichard, C., (Chem. Ztg. 30, 1906, No. 65, pp. 790–791) briefly describes the color reaction of berberine on nitric acid and explains its application.—Exper. Sta. Rec., 1906, v. 18, p. 208.

Webster, Hebert T., extols the virtues of *Berberis aquifolium* in syphilis, scrofula, and skin diseases, chronic ulcers, proriasis, senile bronchitis, and adds:

> Its action is slow, but if persisted in for months it will cure almost anything curable by medicine when it is a question of chronic inflammation of local character with tendency to relaxation and breaking down of mucous membrane. * * * We have much yet to learn about *Berberis aquifolium.*—Eclectic Med. J., Cincin., 1906, v. 66, pp. 430–435.

Fyfe, John William, says that *Berberis vulgaris* was frequently called for in jaundice, malignant fevers, dysentery, and bilious diarrhœa.—*Ibid.*, v. 66, p. 321.

BETANAPHTHOL.

Riedel's Berichte points out that the melting point of betanaphthol is 121.5° C., and in an air bath 123° C.—Riedel's Berichte, 1906, p. 23.

Ohliger, Willard, reports betanaphthol less soluble than it should be.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Schneider, H., (Zeitschr. f. Hyg., 1906) discusses the use of betanaphthol as a disinfectant and proposes the use of a solution made by the addition of soda to betanaphthol. One-half to 1 per cent solutions are said to be more reliable than similar solutions of lysol.—Jahresber. d. Pharm., for 1906, Götting., 1907, p. 267.

The Anæmia Commission reports the use of betanaphthol in anæmia with excellent results.—J. Am. M. Ass., 1906, v. 46, p. 1231.

BISMUTHI ET AMMONII CITRAS.

The Ph. Brit. Committee of Reference in Pharmacy asserts that the formula for solution of bismuth and ammonium citrate requires alteration.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

BISMUTHI OXIDUM HYDRATUM N. F.

Caldwell, Paul, asserts that hydrated bismuth is more easily made than the directions would seem to indicate.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

BISMUTHI SUBCARBONAS.

Caspari, Charles E., reports on 3 samples of bismuth subcarbonate examined—2 U. S. P.; 1 contained excess of chloride.—Proc. Missouri Pharm. Ass., 1906, p. 102.

The Ph. Brit. Committee of Reference in Pharmacy advises the determination of bismuth in official salts as oxide. Bi_2O_3=89–91 per cent.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Alcock, F. H., criticises the indefiniteness of the Ph. Brit. requirements and the lack of quantitative test. He suggests a method for determining whether much or little nitrates be present in commercial samples.—Pharm. J., Lond., 1906, v. 23, p. 319.

Bennett, C. T., thinks that the indigo method is easily applicable, gives good comparative results, and has the advantage of being more rapid than the process suggested by Alcock. He describes his method.—*Ibid.*, p. 364.

BISMUTHI SUBGALLAS.

In connection with the title bismuthum subgallicum, the Ph. Austr. VIII, in a footnote, gives the information that this substance also occurs in trade as "Dermatol."

Lefeldt, Max, outlines a method for the preparation of bismuth subgallate and suggests such a method for preparing be included in the Ph. Germ.—Ber. d. pharm. Gessellsch., Berl., 1906, v. 16, p. 332.

Caspari, Chas. E., reports 4 samples examined—3 U. S. P., 1 contained chloride and nitrate.—Proc. Missouri Pharm. Ass., 1906, p. 100.

BISMUTHI SUBNITRAS.

The Ph. Brit. Committee of Reference in Pharmacy report on bismuth subnitrate says the per cent of bismuth should be raised.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Caspari, Chas. E., reports 26 samples examined—1 U. S. P., 23 contained chloride, 1 chloride and ammonium salts, and 1 chloride and carbonate.—Proc. Missouri Pharm. Ass., 1906, p. 98.

Lambert, Alexander, outlines the Fleiner method of treating gastric ulcer with bismuth subnitrate.—J. Am. M. Ass., 1906, v. 47, p. 847.

BISMUTHI SUBSALICYLAS.

The Ph. Brit. Committee of Reference in Pharmacy report on bismuth salicylate says the U. S. P. test for the free salicylic acid is better. Five grammes treated with 30 cc. purified ether should yield not more than 3 mgms. of salicylic acid.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

BISMUTHUM.

A news item asserts that an increase of nearly 400 per cent in the production of bismuth ore in 1905 is recorded in the Annual Report of the U. S. Geological Survey, prepared by G. C. Schnatterbeck.—Oil, Paint and Drug Rep., 1906, v. 70, Sept. 10, p. 54.

Aloy and Frébault present the results of their researches relative to the halogen salts and the oxides of bismuth.—Bull. Soc. de chim., Par., 1906, v. 35, pp. 396–400.

Hollard and Bertiaux (Pharm. J., July 8, 1905, 33; from Ann. de chim. anal., 1905, 10, 11) outline an electrolytic process for the determination of bismuth.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 851.

BOROGLYCERINUM N. F.

Caldwell, Paul, asserts that it is not possible for the pharmacist to make boroglyceride, N. F. III, unless he possesses a vacuum pan; otherwise the heat can not be regulated so as to keep the finished product from assuming a dark brown color.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

BROMOFORMUM.

Schoorl and van den Berg report observations on the effect of incandescent gas light on bromoform. In brown vials bromoform remained unchanged; in white glass it liberated free bromine and gave an acid reaction due to the formation of hydrobromic acid (from Pharm. Weekbld., 1906, v. 43).—Chem. Centralbl., Berl., 1906, v. 77, p. 696.

Caspari, Chas. E., reports 2 samples examined.—1 acid, 1 contained bromide.—Proc. Missouri Pharm. Ass., 1906, p. 102.

BROMUM.

Coblentz, Virgil, says that various samples of German bromine assayed 99 per cent, while that of Michigan origin was 98.5 per cent. Bromine from Western Pennsylvania and Ohio contained from 6 to 12 per cent of chlorine. Considering the quality of American bromine, it was deemed advisable not to raise the standard of the bromides, and this was made uniformly 97 per cent.—Am. J. Pharm., Phila., 1906, v. 78, pp. 394, 395.

With reference to the test for iodides, he notes that the chloroform test is much more reliable than the starch test, especially in inexperienced hands.—*Ibid.*, p. 395.

An abstract (from Südd. Apoth. Ztg., 1906, p. 44) outlines the methods employed in Michigan, West Virginia, Ohio, and Pennsylvania in the production of bromine. The bromine production of the United States in 1905 was approximately 897,000 pounds, and that of Germany 300,000 kilos.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 80.

An abstract points out that despite the supply of bromine from the Stassfurt and Leopoldshall deposits of haloid salts, in Germany, the producers of American bromine have secured a foothold for their product in Europe. The total output of American bromine in twenty-five years has been 10,499,625 pounds, valued approximately at $2,887,917. During 1904 the total output amounted to 897,100 pounds, valued at $269,130.—J. Franklin Inst., Phila., 1906, v. 161, p. 70.

Baxter, Gregory Paul, reports on the determination of the atomic weight of bromine, the methods employed, and the results. He points out that from the results obtained the number 79.953 seems to be the most probable value for the atomic weight of bromine if the atomic weight of silver is assumed to be 107.930.—J. Am. Chem. Soc., 1906, v. 28, pp. 1322–1335.

v. Wyss, H., discusses the behavior of the bromine salts in the human and animal organism and reports some observations on the elimination of the bromides by healthy persons and by epileptics, the antagonism between bromides and chlorides, and the cumulation of bromides in the organism. (Arch. f. exp. Path., 1906, v. 55, p. 263.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 698.

Bowen, J. T., (J. Cutan. Dis. incl. Syph., N. Y., 1906, v. 24, p. 26) reports a case of bromide eruption.—Reference from Ind. Med., 1906, p. 174.

BUCHU.

Blome, W. H., found one sample of short buchu leaves which contained 7.85 per cent and one of long buchu 20.33 per cent of stems, wood, bark, and pebbles.—Proc. Michigan Pharm. Ass., 1906, p. 106.

Lyons, A. B., thinks the present U. S. P. menstruum for buchu preferable. The weaker menstruum extracts all of the active principles of the drug and holds them well in solution.

Vanderkleed, Chas. E., does not believe the drug is well exhausted by the new menstruum. The appearance of the new product is inferior to the old.

Other answers are equally divergent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 443.

CAFFEINA.

Puckner, W. A., points out that from the U. S. P. VIII description of caffeine one would be led to believe that the Committee of Revision had adopted the more modern definition for "alkaloids" restricting the names to pyridine bases. It is described to be a feebly basic substance, and one of the tests for purity calls for "absence of alkaloids." In connection with the assays of some of the caffeine containing drugs, however, caffeine is designated as being an alkaloid.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 229.

The Ph. Brit. Committee of Reference in Pharmacy asserts that caffeine loses water by keeping, and samples from stock do not show the loss at 100° C. stated in the Ph. Brit.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Brandel, I. W., reviews some of the recent literature relating to caffeine.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 179–180.

Ammann, Paul, (Agric. prat. des pays chaud, April) discusses the sources of caffeine and gives some interesting analytical results.—J. d'Agric. trop., Par., 1906, v. 6, p. 175.

Weigel, G., asserts that the Ph. Ndl. requirement for the melting point of caffeine, 234° to 235°, is correct and that the Ph. Germ. IV, figures, 230.5°, are too low.—Pharm. Zentralh., 1906, v. 47, p. 400.

Riedel's Berichte reports that air dry caffeine was found to melt at 229.5°. When dried for the same time at 100° C., or over sulphuric acid, it requires 234° C., and in an air bath 236.5° C.—Riedel's Berichte, Berl., 1906, p. 24.

Hanus and Chocensky (Ztschr. f. Untersuch. Nahr. U. Genussmtl., v. 11, 1906, pp. 313–320) discuss the use of the immersion refractometer in food analysis, and show that this instrument may be used to determine the amount of caffeine present in aqueous solution quickly and accurately.—Exper. Sta. Rec., v. 17, No. 11, p. 1039.

Wolff, Carl, outlines a method for determining caffeine in green coffee by extracting with chloroform, and estimating the nitrogen content of the extractive.—Ztschr. f. öffentl. Chem., 1906, v. 12, pp. 186–189.

Brissemoret (Bull. Soc. Chim., Par., 1906, v. 35, pp. 316–321) describes several new derivatives of caffeine and discusses their composition and reactions.—Biochem. Centralbl., Leipz., 1906–07, v. 5, p. 882.

Fischer and Ach discuss the conversion of caffeine into paraxanthin, theophyllin, and xanthin.—Jahresb. ü. Tier. Chem. for 1906, Wiesb., 1907, v. 36, p. 113.

Brissemoret, A., in the course of his researches on the combinations of caffeine with the tannoids, has established the existence of new derivatives obtained by reacting on this substance with many of the acid phenols through which the tannoid molecule is destroyed—protocatechuic acid, gallic, and by extension the more simple of the series, salicylic acid.—Bull. des. sc. pharmacol., Par., 1906, v. 13, pp. 613–616.

Mirano, G. C., (Rif. med., 1906, v. 21, No. 38) finds that caffeine noticeably diminishes blood pressure (10 to 50 mm. Hg on the brachial), the cases of marked arteriosclerosis excepted. According to the author, it depends upon a diminution of peripheral resistance consequent upon vaso-dilation, in opposition to current opinion, and in circulatory disturbances caffeine acts favorably by increasing the power of the heart action.—Abstr. in. Biochem. Centrbl., Leipz., 1906–7, v. 5, p. 205.

Frey, Ernst, (Pflügers Arch., v. 112, pp. 71–127) discusses the mechanism of caffeine diuresis.—Jahresb. u. Tier Chem. for 1906, Wiesb., 1907, v. 36, p. 326.

Fraenkel, Albert, discusses the use of caffeine in the treatment of pneumonia, and points out some of the advantages that it possesses over digitalis.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 1–6.

Gmeiner (Berl. tierärtz. Wchnschr., 1906, No. 22, p. 409) commends the value of caffeine in pneumonia in veterinary practice.—Abstr. in Merck's Ann. Rep. Darmstadt, 1906, v. 20, p. 68.

Wells, G. Harlan, thinks caffeine ranks next to digitalis in importance as a cardiac tonic. He gives from 1 to 5 grains every three hours, by mouth, the maximum not to exceed 30 in twenty-four hours. He prefers the alkaloid to the so-called "citrate."—Hahneman. Month., Phila., 1906, v. 41, p. 260.

CAFFEINA CITRATA.

Taylor, S., says this substance is stated to be equally successful if prepared with less water or even with no added water at all, the water in the citric acid being sufficient to effect combination.—Pharm. J., Lond., 1906, v. 23, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy report on caffeine citrate says the formula and test require revision.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

CAFFEINÆ SODIO-BENZOAS N. F.

Cambe, J., discusses the coloration that is evidenced in concentrated solutions of sodium benzoate with caffeine. He finds that the yellowish-green color only occurs in solutions containing impure caffeine or alkaline sodium benzoate.—Bull. pharm. du Sud-Est., 1906, v. 11, pp. 201–202.

CALAMUS.

Henkel, Alice, mentions *Acorus calamus* L., also known as calamus, and sweet flag, as found in wet and muddy places and along streams from Nova Scotia to Minnesota, southward to Florida and Texas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., No. 89, 1906, p. 8.

Hankey, William T., points out that the consumer, as a rule, prefers the peeled calamus and that this is most widely used and sold.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

CALCII CARBONAS PRÆCIPITATUS.

Kebler, Lyman F., reports a sample of calcium carbonate C. P. as being a heavy, coarse powder containing sulphates, chlorides, and a compound of sodium.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Ohliger, Willard, reports precipitated calcium carbonate which contained traces of iron, aluminum, phosphates, sulphates, and insoluble impurities.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Foote and Menge report on the relative solubility of some difficultly soluble calcium and barium salts.—Am. Chem. J., 1906, v. 35, pp. 432–445.

Lambert, Alexander, states that Ewald has suggested the use of carbonate of lime instead of bismuth in the treatment of gastric ulcer.—J. Am. M. Ass., 1906, v. 47, p. 847.

Webster, Herbert T., discourses on the differences between calcium carbonate, calcarea carbonica, and calcarea ostrearum. The latter possesses the specific affinity for mucous membranes, most applicable in strumous subjects, but also to "any subject presenting indications for it, whether strumous or not * * * Like many another remedy which possesses no powerful toxic or chemical action, it is a giant when it comes to therapeutic effect, if discriminatingly applied."—Eclectic Med. J., 1906, Cincin., v. 66, pp. 516–520.

CALCII CHLORIDUM.

The Ph. Brit. Committee of Reference in Pharmacy report on calcium chloride says the formula is for a crystalline variety unobtainable under the conditions described. The characters and tests are very vague, but most nearly describe the anhydrous chloride, which might be made official.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Caspari, Chas. E., reports one sample examined contained free lime and metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 102.

Netter, Arnold, reports that the administration of chloride of calcium, 1 gm. per diem (in syrup of mint), on the day of injection of serum and the two following days has rendered eruptions six and a half times less frequent. The chloride may be replaced by other salts, notably the lactate. The dose mentioned is, however, not sufficient to prevent the occurrence of the eruption when the injection exceeds 40 cc., and he purposes giving more than 1 gm. and prolonging the administration of the lime salt.—Compt. rend. Soc. de biol., Par., 1906, v. 60, pp. 279–282.

An editorial calls attention to the use of calcium chloride preliminary to operation after it had been noticed that a needle prick was followed by continued bleeding. There was no excessive hæmorrhage at the operation.—N. York M. J., 1906, v. 83, p. 42.

An editorial calls attention to the advantages of calcium chloride in hæmorrhage by its increasing the coagulability of the blood.—J. Am. M. Ass., 1906, v. 47, p. 41.

Chantemesse, A. (Presse. Med., Par., v. 14, No. 16), recommends the use of calcium chloride for preventing hæmorrhage in typhoid fever.—*Ibid.*, v. 46, p. 1403.

Dixon, W. E., (Lancet, Lond., Mar. 24, 1906) believes that calcium chloride is the best remedy for internal hæmorrhage.—*Ibid.*, v. 46, p. 1242.

Murray, Charles, finds that in regard to fibrinogen the relation of calcium salts to heat-coagulation is very different from their relations to ferment-coagulation.—Biochem. J., Liverpool, 1906, v. 1, pp. 167–174.

Evans, Herbert I., calls attention to the fact that calcium chloride has been recommended of late for a variety of conditions, and states that he has treated a case of pleurisy with it successfully.—Brit. M. J., Lond., 1906, v. 1, p. 1377.

Coe, J. W., discusses the use of calcium chloride in hæmorrhage and reports the successful treatment of hæmophilia and purpuric conditions with calcium lactate. He calls attention to the belief that the continued use of calcium chloride increases the time for coagulation of the blood, and questions whether the action of the lactate differs from that of the chloride.—J. Am. M. Ass., 1906, v. 47, pp. 1090–1093.

Additional references to the use of calcium chloride are to be found in the Index Medicus and the J. Am. M. Ass.

CALCII HYPOPHOSPHIS.

Patch, E. L., reports finding calcium hypophosphite which contained a large excess of sulphate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

Caspari, Chas. E., reports two samples examined: One U. S. P.; one contained soluble phosphates.—Proc. Missouri Pharm. Ass., 1906, p. 101.

CALCII PHOSPHAS PRÆCIPITATUS.

The Ph. Brit. Committee of Reference in Pharmacy report on calcium phosphate says: Description obscure, and allows the use of both $Ca_2 2(PO_4)$ and $CaHPO_4$.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Wiebelitz, H., asserts that the Ph. Germ. requirement that calcium phosphate be almost insoluble in acetic acid should be eliminated.—Pharm. Ztg. Berl., 1906, v. 51, p. 1003.

Evans Sons Lescher and Webb found several impurities in calcium phosphate. The most important were ultramarine, sodium carbonate, and copper.—Analytical Notes, for 1906, 1907, p. 11.

Patch, E. L., examined four lots of precipitated calcium phosphate contaminated with iron and excess of chloride.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Caspari, Chas. E., reports five samples examined: All contained chloride, arsenic, metallic impurities, and were not completely soluble in dilute acids.—Proc. Missouri Pharm. Ass., 1906, p. 101.

CALCII SULPHAS EXSICCATUS.

Cowley, R. C., describes a method for the determination of calcium sulphate in plaster of Paris, and adds that the same method may be used for the determination of Ca in precipitated and prepared chalk, lime, and slaked lime, calx chlorinata, liquor calcis chlorinata, and grey powder.—Pharm. J. Lond., 1906, v. 23, p. 429.

Arth and Crétien discuss the solubility of calcium sulphate in solution of sodium chloride.—Bull. Soc. de chim. Par., 1906, v. 35, pp. 778–781.

Bartlett, C. O. (Chemical Engineer), outlines the process employed in the manufacture of commercial plaster of Paris.—Oil, Paint, and Drug Rep., 1906, v. 70, Aug. 20, p. 39.

CALUMBA.

The Ph. Brit. Committee of Reference in Pharmacy points out that for calumba root, microscopic characters and ash percentage should be given.—Chem. & Drug. Lond., 1906, v. 69, p. 863.

Tunmann discusses the occurrence of calcium oxalate crystals in calumba and points out that the frequently made assertion that calcium oxalate crystals occur only in the stone cells of the bark is erroneous, and that they are distributed throughout the woody portion of the root as well as in the bark. He outlines a method for readily demonstrating their presence.—Pharm. Zentralh., 1906, v. 47, p. 1069.

Günzel, E., discusses some of the work done on the chemistry of the root of *Jateorhiza palmata*, the production of the calumba alkaloids, the iodide of calumbamine, the gold salt and the platinum salt of calumbamine, calumbamine nitrate, the acid sulphate of calumbamine, the reduced base, and the several combinations of this reduced base (Tetrahydrocalumbamine).—Arch. d. Pharm., Berl., 1906, v. 244, pp. 255–269.

Gadamer, J., points out that the work done by himself as well as the work undertaken by Günzel and Feist serves to corroborate the assertion by Gordin that calumba does not contain berberine, but does contain at least several distinct berberine-like alkaloids.—*Ibid.*, v. 244, pp. 255–256.

He discusses the chemical composition of the alkaloids found in calumba and their relations to berberine.—Pharm. Zentralh., 1906, v. 47, pp. 828–831.

Caldwell, Paul, asserts that a clear tincture of calumba may be obtained by using 6 minims of solution of potassium hydroxide to every pint.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

CALX.

Low, Wilson H., outlines a method for determining the causticity of lime which depends on titrating a solution of lime in sugar water with tenth normal hydrochloric acid, using phenolpthalein as an indicator. He criticises a method outlined by Beall, depending on the decomposition of ammonium chloride by heating with finely pulverized lime.—Chem. Eng., Phila., 1906, v. 4, pp. 13–15.

Kebler, Lyman, F., reports that two samples of calcium oxide C. P. examined were very dark in color, contained iron, aluminum, sand, sulphate, and chlorides. Virtually no better than ordinary lime used for building purposes.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

CALX CHLORINATA.

von Tiesenholt, W., discusses the composition of chlorinated lime, the method of its production, and the chemistry of its decomposition.—J. f. prakt. Chem., Leipz., 1906, v. 73, pp. 301–326.

Reusch, K., discusses the changes that have taken place in the production of chlorinated lime and reviews the literature of the year relating to the use of this article.—Chem. Ztg., Cöthen, 1906, v. 30, p. 328.

Lefeldt, Max, suggests that the Ph. Germ. include a maximum as well as a minimum requirement for free chlorine. The minimum requirement is 25 per cent and it is possible to find, in commerce, samples of this article that contain 50 per cent more chlorine than this minimum.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 333.

Blome, W. H., found several pound cans of chlorinated lime which averaged 26 per cent of available chlorine. While not up to the standard he thinks the showing far better than the average.—Proc. Michigan Pharm. Ass., 1906, p. 104.

Baird, J. W., reports that of nine samples examined in 1904 all were found to be adulterated or below standard.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

Smith, Kline & French Co. report on the examination of 25 samples of chlorinated lime averaging 36 per cent of available chlorine. Several samples contained as high as 41 per cent.—Annual Lab. Report, 1906, p. 15.

Binz, C. (Therap. Geg., Berl., v. 47), states that the experience of many years confirms his opinion of the value of chlorinated lime in the treatment of chilblains. It is used in the form of an ointment.—J. Am. M. Ass., 1906, v. 47, p. 467.

CALX SULPHURATA.

The Ph. Brit. Committee of Reference in Pharmacy report on sulphurated lime says in the copper test a definite quantity of acid should be prescribed, to be added in portions, and not all at once.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Francis, John M., reports that of 24 lots examined only 3 were below the 60 per cent standard of the pharmacopœia—the lowest, 38 per cent; the highest, 85 per cent; and the average, 70.5 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

Waugh, W. F. (J. Ass., Mil. Surg. U. S., Carlisle, September), writes on "Calx sulphurata, U. S. P., as a preventive of yellow fever."—Abstr. in J. Am. M. Ass., 1906, v. 47, p. 896.

Smith, R. J. (Denver Med. Times, Dec.), presents a paper on "Calcium sulphide in gonorrhœa."—Abstr. *Ibid.*, v. 48, p. 266.

CAMBOGIA.

The Ph. Brit. Committee of Reference in Pharmacy report on cambogia says if this is retained not more than 30 per cent should be insoluble in alcohol.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Ohliger, Willard, reports powdered cambogia adulterated with starch.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Blome, W. H., reports on three samples of powdered cambogia which yielded, respectively, 2.88, 10.92, 4.89 per cent of ash; 31.5 per cent of the first was insoluble in alcohol.—*Ibid.*, p. 105.

CAMPHORA.

True, Rodney H., gives a description of the work done in connection with the cultivation of camphor trees in Florida and the practical results so far secured.—Oil, Paint and Drug. Rep., 1906, v. 70, Oct. 17, p. 37.

The Bureau of Plant Industry reports that during the past year more than 30 pounds of camphor were prepared in an experimental way. A careful survey of the camphor trees now widely scattered throughout Florida, and the conditions of soil, drainage, etc., in which they occur, has made it seem reasonably clear that camphor will flourish over a large part of the area from which frost has driven the orange industry.—Ann. Rep. U. S. Dept. Agric., 1906, p. 206.

Beill, L., asserts that during the past twenty years the camphor tree has been acclimated in many of the countries whose climate approximates that of Formosa. Among them he mentions India, Madagascar, Egypt, Algeria, Canary Islands, South Africa, and California.—Bull. Soc. de Pharm. de Bordeaux, 1906, v. 46, p. 179.

An abstract from an address by Sir Henry Blake presents some data regarding the economic aspect of the cultivation of camphor in Ceylon.—Bull. Dept. Agric., Jamaica, 1906, v. 4, p. 177.

An abstract from the "Bulletin of the Imperial Institute" for March, 1906, presents some interesting data relating to the production of camphor in Australia.—Chem. & Drug., Australas., 1906, v. 21, p. 116.

An abstract (from J. d'Agric. trop.) asserts that the camphor trees in Formosa appear to be much richer than those in Japan. Also that trees rich in camphor are often found alongside trees with a very low camphor content. The distribution of the camphor in the branches, trunk, and roots is unequal, and frequently more camphor is found in one particular side of the tree than the other.—Semi-Ann. Rep., Schimmel & Co., 1906, Apr.–May, p. 11.

(For. Off. Ann. Series, No. 3713) Formosan camphor, though plentiful, grows to a great extent in places which are still practically inaccessible owing to the savage tribes who occupy the districts. In Japan, on the other hand, where there is no such artificial impediment, the supply is being gradually exhausted. Camphor is now obtained from the leaves of the tree as well as the bark; the former yield about 1.5 per cent. The amount of crude camphor produced in 1905 was:

	Lbs.
Formosa	4,800,000
Japan	1,226,607
Total	6,026,607

Of this, 837,333 lbs. were refined in Kobe and Osaka, and 400,000 lbs. sold to native druggists for use in Japan. The refined drug was nearly all exported.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 1002.

Schimmel & Co. discuss the economic conditions prevailing in regard to camphor and camphor oil. They assert that in regard to the camphor producing districts of other countries it is to be regretted that for the present no relief of the existing scarcity can be expected from that side.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 15–21.

An abstract from a report by Consul Fisher, of Tamsui, reviews the history and present status of camphor in Formosa.—Western Druggist, 1906, v. 28, pp. 29–31.

An unsigned article records some experiments in the production of camphor from material grown in East Africa, and presents reports on the resulting camphor oil from Schimmel & Co., and Haarmann & Reimer.—Der Pflanzer, 1906, pp. 333–335.

Nock, J. K., discusses the cultivation of the camphor tree in the island of Ceylon, and devotes some consideration to (1) the propagation by seeds, (2) the propagation by layers, (3) the propagation by branch cuttings, (4) the propagation by root cuttings, and (5) the propagation by suckers.—Circ. & Agric. J. Roy. Bot. Gard., Ceylon, 1906, v. 4, No. 3, pp. 13–20.

Schmidt, O., discusses the production of synthetic camphor from oil of turpentine, and outlines the chemical changes that take place.—(From Chem. Ind., 1906, v. 29.) Chem. Repert., Cöthen, 1906, v. 30, p. 204.

Lüders, R., reviews the history and the development of synthetic camphor.—*Ibid.*, p. 204.

An abstract from a German patent specification outlines a method for the production of artificial camphor, from (1) pinene hydrochloride, (2) isoborneol dissolved in chloroform and treated with chlorine, (3) isoborneol dissolved in benzol and treated with potassium permanganate, and (4) the oxidation of borneol or isoborneol by means of ozone.—Pharm. Zentralh., 1906, v. 47, p. 524.

Weigel, G., reviews the reports regarding experiments in the cultivation of camphor; also reviews the synthesis and the adulteration of this drug.—*Ibid.*, v. 47, pp. 864, 865.

An editorial discusses the economic questions involved in the present status of the camphor market, estimates the probable shortage for 1906 as approximately 1,500,000 pounds, and presents a table giving the total production of camphor in Formosa and Japan for the five years 1900–1904, inclusive.—Pharm. J., Lond., 1906, v. 22, p. 81.

Bredt, J., presents a further contribution to the study of the composition of camphor and its derivatives.—Ann. d. Chem., Leipz., 1906, v. 348, pp. 199–209.

Lowry, T. M., discusses the stereoisomeric halogen derivatives of camphor obtained by treating chloro-camphor or brom-nitro-camphor.—Pharm. J., Lond., 1906, v. 22, p. 293.

Renouf, Nora, presents the results of an investigation on the composition of camphor and the chemistry of several of its derivatives.

Considerable attention is given to a consideration of the composition of dihydrolaurolene and dihydroisolaurolene, two hydrocarbon derivatives from certain camphor derivatives.—Pharm. J., Lond., 1906, v. 22, pp. 157–161, 252–254.

Riedel's Berichte reports that carefully sublimed camphor melts at from 175° to 176°, and in an air bath at 177° C.—Riedel's Berichte, Berlin, 1906, p. 23.

Weigel, G., points out that the Ph. Ndl. requires that camphor have a melting point of from 175° to 177°, and that a solution 1:10 in alcohol, in a 200 mm. tube have an optical activity of +6.5° to 7°.—Pharm. Zentralh., 1906, v. 47, p. 399.

Evans Sons Lescher and Webb report that three samples of artificial camphor from different sources simulated the appearance of natural camphor very well, but possessed a somewhat terebinthinous or saffrol-like odor. A slight stickiness was also noticed. One sample was found to contain a large proportion of halogen compound (chloride) when heated with lime. This was probably pinene hydrochloride. The other two were apparently free from chlorides.—Analytical Notes for 1906, 1907, p. 11.

Weigel, G., reports finding camphor in cubes adulterated to about 50 per cent with stearic acid. (From Apoth. Ztg.)—D. A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 129.

The Ph. Brit. Committee of Reference in Pharmacy recommends giving a method for determining camphor in liniment of camphor and including a fixed minimum limit.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

In a police court case, in which the public analyst had found camphorated oil deficient in camphor by 33 per cent, the defendant's solicitor contended that no standard for the quantity of camphor which ought to be present is provided by the Ph. Brit.—*Ibid.*, v. 68, p. 92.

Cowie and Dickson outline a method for determining the amount of camphor in camphor liniment, which consists in (1) determining the specific gravity of the liniment at 15.5° C., (2) taking the weight of liniment equal to 8 c. c. and placing in a weighed beaker, and (3) in a similar beaker placing an amount of olive oil equivalent to 8 c. c. The two beakers are placed in a sand bath and heated to 150° C. until constant in weight and then compared. The authors give the results of a number of experimental assays which seem to indicate satisfactory results.—Pharm. J., Lond., 1906, v. 22, pp. 281, 282.

Lothian, John, still holds that the simplest method for determining the amount of camphor in camphor liniment is by heating in a shallow flat-bottomed dish on a water bath. He asserts that in practice the behavior of the oil should be taken into account, as continued heating may lead to an increase in weight. Olive oil itself, heated under similar conditions, did not increase in weight.—*Ibid.*, v. 22, pp. 493, 494.

Bell, J. Carter, points out the need for providing tests for linimentum camphoræ, particularly for the detection and estimation of mineral oils and determining the deficiency in active principle. He outlines a series of tests.—Brit. & Col. Drug., Lond., 1906, v. 49, pp. 548, 549.

Utz (Pharm. Nachr., 1906, v. 1, p. 222) points out that the most satisfactory method for the determination of camphor liniment is by polarization.—Chem. Repert., Cöthen, 1906, v. 30, p. 351.

The Ph. Brit. Committee of Reference in Pharmacy points out that a method for estimating the camphor in spirit of camphor is desirable.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Nestell, Raymond J., proposes a method for the examination of spirit of camphor based upon the fact that the addition of sufficient water to the spirit will separate out nearly all of the camphor and that the increase in volume of an immiscible solvent is practically equal (c. c.–gm.) to the weight of the camphor dissolved.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 5.

Leach, Albert E., reports that a number of samples of spirit of camphor were found to vary considerably from the pharmacopœial standard. The published report indicates that three of these samples varied from 35 to 50 per cent of the required amount.—Rep. Massachusetts Bd. Health, 1906, p. 403.

Linke, R., reports finding a sample of spirit of camphor made with methyl alcohol, and calls attention to the advisability of testing for methyl alcohol.—Apoth. Ztg., Berl., 1906, v. 21, p. 1023.

Arnost, Alois, outlines a method for the estimation of camphor, which depends on the shaking out of the contained camphor by means of petroleum benzin, in a specially designed apparatus.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 532–539.

Beysen, Kurt, suggests that the Ph. Germ. require the following assay in connection with spirit of camphor: On shaking, in a graduated cylinder, 10 gm. of spirit of camphor with 10 gm. of a solution of sodium chloride and 5 c. c. of petroleum ether the resulting petroleum ether layer should measure at least 6 c. c. The camphor remaining after the evaporation of the petroleum benzin should have a melting point of 175° C.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 330.

Barnard, H. E., reports that but 30 of 70 samples of spirit of camphor analyzed contained a sufficient quantity of camphor to comply with the requirements of the U. S. P. VIII. One sample contained but 16 per cent of the required amount.—Rep. Indiana Bd. Health, 1906, pp. 381–383.

Thurston reports that of 202 samples of spirit of camphor tested, two contained wood alcohol, 95 were deficient in camphor with added water, and 87 deficient in camphor only, showing an adulteration of 91 per cent of the samples examined. He cites two methods of determining the amount of camphor in the spirit—Schmatolla's and by polarization; by the latter method the spirit should show over 9 per cent.—Proc. Ohio Pharm. Ass., 1906, p. 68.

Baird, J. W., reports 22 samples examined in 1904, 15 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Gottlieb, R., reviews the opinions of camphor as a cardiac stimulant, reports the results of experiments on dogs, and concludes that camphor does influence the action of the heart when given in doses that are not in any way toxic.—Ztschr. f. exper. Path. u. Therap., 1906, v. 2, pp. 385–390.

Happich, K., reports the death of a patient after the injection of camphor and discusses the limits of the therapeutic dosage.—J. Am. M. Ass., Chicago, 1906, v. 46, p. 471.

Löbl analyzes 6 cases of poisoning from the use of camphor and the same number of cases of belladonna or hyoscyamus poisoning, all terminating in recovery.—*Ibid.*, v. 46, p. 393.

Volland gives his experience with camphor in pulmonary diseases, subcutaneous injections of camphor oil, with excellent results.—Therap. Monatsh., Berl., 1906, v. 20, pp. 57–60, 546–547.

Winterberg, Heinrich, discusses the use of camphor to control the abnormal action of the heart. He reports a number of experiments and concludes that a constant and reliable action of camphor on the heart is not demonstrated.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 182–208.

Gottlieb, R., controverts the conclusions arrived at by Winterberg, reports some additional experiments, and points out that while camphor can not be designated as a reliable cardiac remedy, his experiments would appear to indicate that it has some controlling influences.—*Ibid.*, pp. 588–596.

Fraenkel, A. (Therap. Geg., Berl., v. 47), uses camphor or alcohol to supplement the action of caffeine in some cases of pneumonia with rapid heart.—J. Am. M. Ass., 1906, v. 47, p. 467.

Felter, Harvey Wickes, quotes Volland (Therap. Monatsh.) on the value of subcutaneous injection of camphorated oil in all cases of pulmonary consumption, twenty minims of a 10 per cent solution in olive oil once or twice a day. The U. S. P. preparation is thought to be less available, though stronger.—Eclectic Med. J., Cincin., 1906, v. 66, p. 393.

Douglass, Malcolm E., says camphor is combined with opium and ipecac in the well-known diaphoretic powder in the proportion of one part each of camphor, opium, and ipecac with seven parts of the potassium sulphate. The dose is from 2 to 10 grains.—Hahneman. Month., Phila., 1906, v. 41, p. 43.

Ehrlich, C., (München Med. Wchnschr., v. 53, No. 1) confirms Chlumsky's excellent results with camphor and carbolic acid in 96 cases of suppuration.—J. Am. M. Ass., 1906, v. 46, p. 1808.

CAMPHORA MONOBROMATA.

Douglass, Malcolm E., gives the dose of camphor monobromate as from one-tenth grain to 5 grains.—Hahneman. Month., Phila., 1906, v. 41, p. 47.

CANNABIS INDICA.

Walters, W. J., gives a historical sketch of cannabis indica, its cultivation, preparation for market, etc. He remarks that the only means of standardizing is by the physiological method.—Proc. Indiana Pharm. Ass., 1906, pp. 110–113.

The Ph. Brit. Committee of Reference in Pharmacy report on cannabis indica says:

> If the yield to alcohol is included, it should be not lower than 10 per cent, as the yield is rarely less than 11 per cent.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Taylor, S., pleads for some control of the drug, viz, (*a*) its importation, (*b*) its manufacture into galenicals, and (*c*) the length of time it is kept in stock. This drug and its galenical preparations deteriorate somewhat rapidly on keeping, a fact which leads one to believe that the idiosyncrasy of the patient with regard to the drug is rather one of the drug with regard to the patient. He feels sure that if the freshness of the drug were guaranteed to the pharmacist, he would in turn guarantee the freshness of the galenical.—Pharm. J., Lond., 1906, v. 23, p. 669.

Patch, E. L., reports on 6 samples of cannabis indica which contained 7.26, 12.1, 11.8, 11.87, and 12 per cent of resin, respectively.

Kraemer, Henry, asserts that a drug answering the official description is not on the market.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Philipp Röder, Wien, reports examining a sample of Indian cannabis which contained 13.94 per cent of ash and 16.34 per cent of matter soluble in 90 per cent alcohol.

The Ph. Austr. VIII requires 8 per cent of matter soluble in 90 per cent alcohol and limits the ash content to not exceeding 15 per cent.—Pharm. Post., Wien, 1906, v. 39, p. 264.

Vanderkleed, Charles E., reports meeting with Mexican grown cannabis indica, testing 11.1 per cent of resin. This resin was shown by physiological tests on dogs to be only about one-fourth as active as that from true East Indian cannabis.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the process for extract of Indian cannabis be improved.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Gane, E. H., suggests that a concerted attempt be made to discourage the use of powdered extract of cannabis indica, as it is practically inert.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 331.

Douglass, Malcolm E., discusses the indications for *Cannabis sativa* and its use in urethritis and gonorrhœa, where discharges are less profuse than those requiring argenti nitras.—Hahneman. Month., Phila., 1906, v. 41, pp. 281, 362–366.

de la Carriere, G. C., (Internat. Clinics, Phila., v. 2) "Treatment of migraine, with special reference to the use of cannabis indica."—J. Am. M. Ass., 1906, v. 47, p. 1418.

CANTHARIS.

Hankey, William T., believes that the Chinese cantharides is more efficient than the more expensive Russian variety; also that a reliable assay method would be a desirable addition to the pharmacopœia.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Philipp Röder, Wien, reports that the ash content of 5 samples of cantharides varied from 5.56 to 19.50 per cent. Only 2 of the samples came within the Ph. Austr. VIII limit of 8 per cent of ash.—Pharm. Post, 1906, v. 39, p. 234.

Siegfried, K., discusses the control tests of the Ph. Germ. and of the Ph. Helv. IV and outlines a method of assay for cantharides.—Schweiz. Wchnschr. f. Chem. ü. Pharm., 1906, v. 44, pp. 342–345.

Naylor, W. A. H., in a presidential address, B. P. C., reviews the several methods suggested by Greenish and Wilson and Dieterich for the estimation of cantharidin in cantharides. The several methods appear to give concordant results, and it is proposed that the requirements be fixed at 0.60 per cent. He points out that there is considerable variation in the commercial articles.—Yearbook of Pharmacy, 1906, p. 208. (See also Pharm. J., Lond., 1906, v. 23, p. 74.)

The Ph. Brit. Committee of Reference in Pharmacy recommends that cantharides be assayed to contain 0.5 per cent total cantharidin. Compare process.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

An unsigned critique of the Ph. Ndl. IV notes the requirement of 0.6 to 0.8 per cent of cantharidin.—*Ibid.*, v. 68, p. 828.

Caesar and Loretz outline a method for the determination of the moisture content of cantharides and for the estimation of free and combined cantharidin.—Geschäfts-Ber. v. Caesar & Loretz, 1906, pp. 90, 91.

An abstract (from Rev. de chim. Industr.) says the oriental chemist, Puran Sing. proposes a method for the preparation of cantharidin by treating powdered cantharides with a mixture of 5 parts of nitric acid and 95 parts of water. evaporating the mixture, with the addition of a little gypsum before total desiccation. The resulting mass is exhausted with chloroform. the latter recovered by distillation and the resulting crystals of cantharidin are then washed with a small quantity of ether or alcohol.—Sc. Am. Suppl., 1906, v. 62, p. 25612.

Spindler reports finding a sample of cantharides with 0.47 per cent of cantharidin in place of 0.8 per cent required by the Ph. Germ. IV.—Südd. Apoth. Ztg., 1906, v. 46, p. 90.

The Revisors of Pharmacies in Würtemberg, Germany, report finding cantharides containing but one-half the normal amount of cantharidin. The cause for this deficiency was, probably, that too high a heat had been used in drying the drug.—Pharm. Zentralh., 1906, v. 47, p. 650.

Patch, E. L., reports finding 0.55, 0.8, 0.56, 0.4, 0.45, 0.72, and 0.66 per cent of cantharidin in varying samples of Russian cantharides.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

A report on the drug market presents a table of high and low prices of cantharides for the several months of the years 1901 to 1905, inclusive.—Oil, Paint and Drug. Rep., 1906, Jan. 29, part 2, p. 34.

Haines, Oliver L., has seen numerous cases of pericarditis * * * but only one of extreme character. * * * This case was resolved by the tincture of cantharides assisted by small, repeated cantharidial blisters and the ice bag over the cardiac area.—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. I, p. 434.

CAPSICUM.

The Ph. Brit. Committee of Reference in Pharmacy report on *Capsici fructus* says:

> Restrict the drug as now to *Capsicum minimum*. Standards for ash and oleo-resin should be introduced. Experiment with solvents, so as to extract oleo-resin without fixed oil. Microscopical characters should be introduced.—Chem. & Drug. Lond., 1906, v. 69, p. 863.

Smith, Kline and French Co. report the following results of their examination of cayenne pepper: Ash, 4.1 per cent; ash insoluble in hydrochloric acid, 0.4 per cent; alcohol extractive, 26 per cent; ether extractive (nonvolatile), 15.5 per cent; crude fiber, 24.5 per cent; microscopically, normal.—Lab. Rep. S. K. & F., 1906, pp. 33–34.

The Helfenberger Annalen (for 1905, p. 114) records experiments for determining the extract content of capsicum and the amount of extract yielded to alcohols of varying strength.—Pharm. Zentralh., 1906, v. 47, p. 855.

Patch, E. L., reports finding a sample of powdered capsicum which was adulterated and artificially colored. Yielded but 14 per cent of extractive to alcohol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Baird, J. W., reports that of 55 samples examined in 1904, 4 were found to be adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

Ohliger, Willard, reports powdered capsicum loaded with powdered black pepper.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Blome, W. H., reports two lots of powdered capsicum yielding an excessive amount of ash—13.07 and 16.49 per cent; he adds that some authorities state that it should yield not over 5 per cent.—*Ibid.*, p. 104.

Nestler, A., presents an exhaustive study, illustrated, of *Capsicum annuum.*—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 11, pp. 661–666.

Fyfe, John William, finds that *Capsicum annuum* constituted an important medicament in colic, rheumatism, fever and ague, coldness of the system, and malignant sore throat. It saved some whose state had been thought to be desperate.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

Felter, Harvey Wickes, says Lillian G. Bullock, (J. Therap. and Diet. Nov.) extols a remedy the more extensive use of which we have frequently urged. For low conditions, with lack of buccal and intestinal secretions, capsicum is one of the best agents in materia medica.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, pp. 586–588.

Kopp, Frederick, (Hom. World, N. A. Jour.) regards *Capsicum annuum* as the most beneficial remedy in those obstinate diarrhœas of the aged which resist ordinary remedies. He gives drops of the tincture upon sugar or in sweetened water.—Hahneman. Month., Phila., 1906, v. 41, p. 59.

Rice, Philip, (Pacific Coast J., Homœop.) says when acute and inflammatory conditions tend to suppuration, and the usual inflammatory remedies have little or no effect, give capsicum. Indicated in lazy, phlegmatic individuals in whom medicines have little effect.—*Ibid.*, p. 75.

CARBO.

Takahashi, M., discusses the several charcoals of animal origin that have been used and reports on the examination of a Japanese variety of animal charcoal.—Pharm. Zentralh., 1906, v. 47, pp. 707–709.

Rosenthaler and Türk discuss the absorbing properties of various kinds of charcoal and their comparative value as decolorizing agents.—Arch. d. Pharm., 1906, v. 244, pp. 517–536.

Patch, E. L., found a sample of willow charcoal which was not completely carbonized.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Hedin, S. G., reports on an antitryptic effect of charcoal and a comparison between the action of charcoal and that of tryptic antibody in the serum.—Biochem. J., Liverpool, 1906, v. 1, pp. 484–495.

CARBONEI DISULPHIDUM.

Hankey, William T., has found commercial carbon disulphide to contain varying amounts of dissolved sulphur.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Aitoff, Vladimir, presents contributions to the study of the effects of carbon disulphide.—Thesis, Paris, 1905, No. 479, 60 pp. Referred to in Biochem. Centralb., Leipz., 1906–07, v. 5, p. 292.

Douglass, Malcolm E., considers carbon bisulphide an important remedy in headaches, facial neuralgia, toothache, severe intestinal irritation, rheumatism, sciatica—of both the left and right thigh—itch, tetter, impetigo, herpes, and other cutaneous eruptions.—Hahneman. Month., Phila., 1906, v. 41, p. 50.

CARDAMOMUM.

Loefler, Paul, (Feuille de renseignement de l'Office colloniale, No. 67, 1905) discusses the cultivation of cardamom in Indo-China and gives a tabulated statement of the production in the Province of Pursat, 1900–1904.—Extract in Bull. des sc. pharmacol., Par., 1906, v. 13, pp. 114–117.

Dupont, R., (Agr. pr. pays chauds, Paris, 1906, VI, No. 40, pp. 72–78) discusses the conditions of culture, production, and preparation of cardamom in Seychelles; after repeated washings and exposure to the sun, they are finally dried and treated with sulphur vapor to bleach them, the pale varieties being most esteemed.—*Ibid.*, v. 13, p. 584.

Gehe & Co. discuss the economic conditions prevailing in connection with cardamom, the harm caused in the plantations by drought, and the decreased importation to both the London and Hamburg markets.—Handels-Ber., Gehe & Co., 1906, p. 29.

The Ph. Brit. Committee of Reference in Pharmacy report on cardamom says: Ash should be raised to 6 per cent as a maximum. Microscopical characters of the powder should be given.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Utz suggests that for cardamom the permissible ash should not exceed 14 per cent, and the drug should yield at least 3 per cent of volatile oil.—Apoth. Ztg. Berl., 1906, v. 21, p. 930.

Thamm, R., reports that the ash content of cardamom, particularly of cardamom hulls, is abnormal and can not be relied on as an indication of contamination. The total ash content of the sand free, dry cardamom varied from 3.33 to 13.22 per cent.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 168.

Francis, John M., notes that the *hulled* seeds of cardamom are available on the market, and some manufacturers use these altogether, as they yield a finer flavored and stronger fluid or tincture. In only one instance, viz, compound aromatic powder, does the pharmacist prescribe hulled fruit. The compound tincture, this author thinks, has been greatly improved by an increase of the aromatics.—Bull. Pharm., Detroit, 1906, v. 20, p. 231.

Dunning mentions the possibility of the tannin in compound tincture of cardamom causing precipitation of alkaloid strychnine.—Proc. Maryland Pharm. Ass., 1906, p. 63.

McCutcheon, Alexander, discusses the incompatibility of compound tincture of cardamom with alkaloidal salts, with bismuth mixtures, and with sodium bromide.—Pharm. J., Lond., 1906, v. 22, p. 218–220.

The Ph. Brit. Committee of Reference in Pharmacy report on tincture of cardamom compound says: The substitution of glycerin for raisins and oil of cinnamon for cinnamon bark should be considered.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Heinrich Haensel discusses the economic conditions prevailing in connection with cardamom oil and describes a terpeneless oil of cardamom which he believes possesses many advantages on account of its strength and ready solubility.—Half-Yearly Reports, April, 1906, p. 9.

CARUM.

An abstract (from Nederlandsch Landbouw Weekblad, 1906) presents some figures relating to the cultivation and the yield of caraway in Holland.—Semi-Ann. Rep., Schimmel & Co., 1906, Apr.–May, p. 14.

CARYOPHYLLUS.

Schimmel & Co. present an abstract from a report made by the German consul at Zanzibar relating to the production and export of cloves.—Semi-Ann. Rep., Schimmel & Co., 1906, Apr.–May, pp. 20, 21,

Gehe & Co. discuss the economic conditions prevailing in connection with cloves and present a table showing the production of this drug in Zanzibar and Pemba during the past twelve years and the amount exported to the several countries of the world.—Handels-Ber., Gehe & Co., 1906, p. 19.

The Ph. Brit. Committee of Reference on Pharmacy report on *Caryophyllum* says:

> Include limit of ether extract and ash percentage.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Smith, Kline & French Company point out that the most common adulterant of cloves is clove stems. They report the following data for Zanzibar cloves: Ash, 5.36 per cent; ash insoluble in hydrochloric acid, 0.12 per cent; crude fiber, 7.5 per cent.—Lab. Rep. S. K. & F., 1906, p. 34.

Utz suggests that for cloves the ash content should not exceed 10 per cent, and the drug should contain at least 10 per cent of volatile oil.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Sprinkmeyer and Fürstenberg found the sand free ash in cloves to vary from 0.52 to 7.02 per cent.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 657.

Thamm, R., found the sand free ash in cloves to vary from 6.29 to 6.82 per cent; also discusses the composition of the ash, its solubility in water and its alkalinity.—*Ibid.*, v. 12, p. 168.

Rusby, H. H., asserts that clove stems are sold for cloves.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Fernan, Albert, reports finding a sample of partially extracted cloves containing but 1.5 per cent of eugenol.—Ztschr. d. allg. österr. Apoth.-Ver., 1906, v. 44, p. 79.

The fifth report of the Illinois Food Commission says that of 84 samples of cloves examined, 4 were inferior, 23 contaminated, and 24 adulterated with clove stems, cassia, ginger, sand, flour, pepper, shell, or allspice.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

CATAPLASMA KAOLINI.

Cook, E. Fullerton, reports that Herbert L. Flack, as a result of his experiments and investigations, recommends the addition of about 5 per cent more of glycerin to the U. S. P. formula, and heating with occasional stirring during at least four hours, otherwise a slow effervescence occurs in many samples which renders the product unfit to dispense in tight cans.—Am. J. Pharm., Phila., 1906, v. 78, p. 419.

Hemm, Francis, exhibited two samples, one like a fluid and the other satisfactory. In the one case the clay used had lost 1 gramme in 5 on heating, 400 grammes mixed with the full amount of glycerin intended for 500 made it too soft. Hemm heats the clay for two hours, instead of one, as directed by the U. S. P.—Proc. Missouri Pharm. Ass., 1906, p. 46.

Schultze thinks that from 2 to 3 per cent more glycerin should be added to the formula.—Proc. Maryland Pharm. Ass., 1906, p. 94.

Dunning concurs; thinks the difficulty due to the great difference in the kaolins on the market.—*Ibid.*, p. 97.

Stevens, A. B. (Bull. Pharm., Aug., 1906, 346), asserts that the U. S. P. formula for making cataplasm of kaolin is all right, and that when difficulty is encountered it is due to the manipulation. He describes the method which he uses.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 648, 649.

Sayre, Edward A., thinks cataplasma kaolini might well have been omitted from the pharmacopœia. The doctors will write as they have been doing. Why multiply the articles which we must have in stock unnecessarily?—Proc. New Jersey Pharm. Ass., 1906, p. 100.

Herzfeld, A., considers the inclusion of cataplasma kaolini, in the U. S. P. VIII as a decidedly retrograde step. He points out that the external use of glycerin may lead to marked irritation of the skin.—D.-A. Apoth. Ztg., N. Y., 1906, v. 27, pp. 113, 114.

See also Proc. New York Pharm. Ass., 1906, p. 180, where Herzfeld discusses the question of cataplasmata at some length.

Ritter, John, calls attention to the fact that the official cataplasma kaolini is a suitable substitute for the numerous earth preparations for antiphlogistic use sold under fanciful names.—J. Am. M. Ass., 1906, v. 47, p. 683.

CERA.

The Ph. Brit. Committee of Reference in Pharmacy report on waxes says:

> Include separate monographs for white and yellow waxes. For yellow the present test for paraffin should be revised and the solubility test made more definite. The monograph for white wax should be for the chemically bleached variety.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Weigel, G., calls attention to the fact that in addition to white and yellow wax the Ph. Ndl. also includes a monograph for "Cera Foliorum," the wax-like secretion of the leaves of *Copernicia cerifera*, the so-called Carnauba wax. For this product it is required that it melt at from 75° to 85° C., that not more than 5 per cent of its weight be soluble in alcohol, and that not less than 95 per cent be soluble in carbon disulphide. The acid number should not exceed 5 and the saponification number from 85 to 110.—Pharm. Zentralh., 1906, v. 47, p. 398.

Bellier, J., (Ann. chim. anal., 1906, v. 11, p. 366–368) reports that a sample of beeswax received from Annam gave results, on analysis, which differed considerably from those yielded by ordinary European beeswax. The figures obtained were: Sp. gr., 0.964; m. p., 61°; acid number, 7.8; ester number, 86.6; iodine number, 6; unsaponifiable matter, 10.5 per cent.—Abstr. in J. Chem., Soc., Lond., 1906, v. 90, pt. 1, p. 924.

Bohrisch, P., discusses the desirable changes that should be incorporated in the Ph. Germ.—Pharm. Zentralh., 1906, v. 47, pp. 1064–1068.

Lefeldt, Max, discusses the determination of the ester number of wax, and asserts that the determination as directed by the Ph. Germ. IV, gives false, invariably low results. He outlines a method for determining the acid, ester, and saponification number of wax.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 334.

Bohrisch and Richter discuss the physical and chemical properties of yellow wax and record analytical data.—Pharm. Zentralh., 1906, v. 47, pp. 201–213, 227–233, 270–278, 299–304, 311–313.

G. Hell & Co., in Troppau, consider the determination of the acid, saponification, and ester numbers as being of prime importance. They do not recommend the cold method, as the resulting figures are frequently low. Of 9 samples submitted 4 were refused as being unsatisfactory. Two of the samples refused contained stearic acid, 1 contained paraffin and ceresin, and 1 contained rosin and tallow.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Bedall, C., asserts that wax can not be saponified by the method directed by the Ph. Germ. IV in one-half hour and suggests that the boiling be directed for at least one hour in connection with a reflux condenser.—Apoth. Ztg., Berl., 1906, v. 21, p. 852.

Lackey, R. H., quotes a correspondent who asserts that yellow beeswax is one of the articles nearly always adulterated. He has little hesitation in stating that every manufacturer of yellow beeswax, on an order for pure yellow beeswax, will supply an article that is not pure, and the strictly pure can only be obtained if the lots as delivered are carefully tested.—Proc. Pennsylvania Pharm. Ass., 1906, p. 117.

Fernan, Albert, reports 2 samples of wax, out of 14, adulterated with stearin and paraffin. Recommends that the Weinwurm test for paraffin be included in the pharmacopœia.—Ztschr. d. allgen. österr. Apoth.-Ver., 1906, v. 44, p. 79.

Mansfeld, M., reports a sample of wax which was found to contain from 8 to 10 per cent stearic acid. Another sample of " guaranteed genuine beeswax " consisted of 30 per cent of wax and 70 per cent of ceresin or paraffin artificially colored.—*Ibid.*, v. 44, p. 617.

Dieterich, Karl, reports on a total of 60 samples of yellow wax and 3 samples of white wax. The specific gravity of the several samples varied from 0.9180 to 0.9670, and the melting point from 57.0° to 65.0° C. The acid number of the samples of yellow wax, varied from 1.86 to 20.53 and the white wax from 21.46 to 23.40. Of the total number of samples, 51 did not comply fully with all the requirements.—Helfenberger Annalen, 1905, 1906, v. 18, pp. 134–136.

Barnard, H. E., reports that of 87 samples of yellow or natural beeswax examined, 60 contained paraffin in quantities ranging from 10 to 100 per cent, while but 2 out of 70 samples of white wax were free from paraffin. He also discusses the use of the butyro refractometer of Zeiss in determining the purity of beeswax, the refractive index being very different from that of paraffin, its chief adulterant.—Rep. Indiana Bd. Health, 1906, pp. 376–381.

Sayre, L. E., reports that the melting point of 13 samples of white wax examined varied from 48.3° to 68.7°, while the melting point of 3 samples of yellow wax varied from 49.3° to 63.8° C.—Bull. Kansas Bd. Health, 1906, v. 2, p. 176.

Patch, E. L., reports finding sample of yellow wax which had a saponification number of 94.3, but did not comply with the U. S. P. VIII sulphuric acid test.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

Gane, E. H., asserts that beeswax is frequently adulterated with paraffin. Much of the white wax is mainly paraffin.—*Ibid.*, v. 54, p. 334.

Ohliger, Willard, reports beeswax of low specific gravity.—Proc. Michigan Pharm. Ass., 1906, p. 46.

MacFadden, W. Lester, notes that beeswax, especially when bleached, is very suitable for securing firm consistence in an ointment and that it lends itself to admixture more satisfactorily than would be expected from the high melting point. The natural odor suggests a slight rancidity, but, as the wax is permanent, this property is of little importance. It is assumed that precaution is exercised against adulteration.—Bull. Pharm., Detroit, 1906, v. 20, p. 203.

CERATA.

CERATUM RESINÆ COMPOSITUM.

Eberle, E. G., suggests that compound resin cerate be transferred to the National Formulary.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

CERATUM CAMPHORÆ COMPOSITUM N. F.

Caldwell, Paul, asserts that he has had difficulty with camphor ice containing castor oil, as required by the N. F. III formula, and suggests sesame or lard oil.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

CERII OXALAS.

Baskerville, Chas., points out that the cerium salts were introduced into medicine by the eminent gynæcologist, Simpson, who recommended cerium oxalate as an efficient remedy for *vomitus gravidarium.* Cerium oxalate, as used in medicine, contains besides cerium considerable quantities of other rare elements. Orlow found in a commercial sample 60 per cent of didymium oxalate, and the oxides extracted from the salts examined by Boehm contained lanthanum, neodymium, praseodymium, and just perceptible traces of samarium and yttrium.—Am. Druggist, N. Y., 1906, v. 49, p. 131.

The Ph. Brit. Committee of Reference in Pharmacy report on cerium oxalate says:

> Omit the formula, for although pure cerium oxalate is now obtainable. it is not known to what constituents the medicinal effect is due.—Chem. & Drug., Lond., 1906, v. 69. p. 863.

Orlow, N. A., outlines a method for the production of pure cerium combinations.—Chem. Ztg., Cöthen, 1906, v. 30, p. 733.

Caspari, Chas. E., reports three samples examined; all off color.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Albertoni, Garelli, and Barbieri have investigated the therapeutic action of cerium salts and assert that these combinations produce, in the presence of organic material, a continuous production of oxygen and thus serve to destroy pathogenic bacteria.—Abstr. in Chem. Ztg., Cöthen, 1906, v. 30, p. 467.

CETACEUM.

The Ph. Brit. Committee of Reference in Pharmacy report on *Cetaceum* says:

> Revise the monograph and introduce a saponification number (125 to 130).—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Hankey, William T., finds that the melting point of spermaceti usually ranges from 42.5° to 44.5° C. and rarely requires 45° C. He also believes that the test for stearic acid is misleading unless the conditions are carefully controlled.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Evans Sons Lescher and Webb report on the examination of six samples of spermaceti in which the specific gravity ranged from 0.935 to 0.959, the melting point from 44.5° to 47.4° C., and the saponification value from 122 to 124. They were passed as genuine.—Analytical Notes for 1906, 1907, p. 30.

Patch, E. L., reports three samples of spermaceti which melted at 42.5°, 43.5°, and 44° C., and all three gave distinct precipitates with the U. S. P. VIII test for stearic acid.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

MacFadden, W. Lester, thinks that any prejudice against spermaceti on account of its crystalline appearance is unjust, as this disappears when it is combined with other fats. It performs the same office as white wax, but is inferior, in that it is more likely to become rancid upon exposure, and has a lower melting point. It is preferable in point of color.—Bull. Pharm., Detroit, 1906, v. 20, p. 203.

Pozzi mentions the use of spermaceti in cysts, previous to removal.—J. Am. M. Ass., 1906, v. 46, p. 1232.

CHIMAPHILA.

Henkel, Alice, mentions *Chimaphila umbellata* (L.) Nutt., commonly known as chimaphila, pipsissewa, prince's pine, bitter wintergreen, and rheumatism weed, as a native of dry, shady woods, especially in pine forests, from Nova Scotia to Georgia, west to California.—Bull. Bur. Plant Ind., U. S. Dep't. Agric. No. 89, 1906, p. 21.

The Eclectic Review says:

> Its specific symptomology is glandular lesions with urinary derangement, and, since it seldom disagrees with the stomach, it is one of the most valuable remedies known for these conditions. The drug goes well with saw palmetto, and is a vehicle and adjuvant to hexamethalme-tetramine.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 239.

CHLORALFORMAMIDUM.

Kahn, Joseph, points out that when treated with a solution of sulphurated potassa, a solution of chloralformamide clouds and turns yellow; on heating, the liquid turns a bright chocolate color, and on long standing a grayish precipitate is produced, the supernatant liquid being of a brownish color.—Am. Druggist, N. Y., 1906, v. 49, p. 6.

Brower, D. R., prefers chloralamide to chloral when opium fails to relieve insomnia of insanity.—J. Am. M. Ass., 1906, v. 47, p. 84.

CHLORALUM HYDRATUM.

The Committee of Reference in Pharmacy report on chloral hydrate says:

> Modify the quantitative test and add the isonitrile test. Alter the temperature of solidification.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Riedel's Berichte reports that on slowly heating hydrated chloral melts at 57° C.—Riedel's Berichte, Berl., 1906, p. 23.

Lefeldt, Max, asserts that he found hydrated chloral to melt from 49° to 51° C., and that the Ph. Germ. IV requirement that it melt at 58° C. is too high. He also suggests that the test for alcohol should be replaced by the more reliable nitric acid test.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 335.

Utz asserts that hydrated chloral melts at 57° C.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Kahn, Joseph, discusses the detection of hydrated chloral in the presence of chloroform and outlines a reaction with a solution of sulphurated potash which is said to be quite satisfactory.—Am. Druggist, N. Y., 1906, v. 49, p. 6.

Wallis (Répert de pharm.) outlines a method for the estimation of hydrated chloral by titrating with sodium hydrate, resulting in the formation of sodium chloride, neutralizing the excess with sulphuric acid and finally titrating with tenth normal silver nitrate solution.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 234, 235. (See also Chem. & Drug., Lond., 1906, v. 68, p. 253.)

Schoorl and van den Berg (Pharm. Weekbld., 1906, v. 43) report that continued exposure of hydrated chloral to the rays of incandescent gas light causes partial decomposition of this substance with the formation of distinct traces of hydrochloric acid.—Chem. Centralbl., Berl., 1906, v. 43, p. 696.

Enklaar, Johannes E., (Rec. trav. chim., 1906, v. 25, pp. 297–310) has extended his investigations on the rate of decomposition of chloral hydrate by the action of bases, and tabulates the values of velocity coefficient for mixtures of chloral hydrate and barium hydroxide, with and without the addition of neutral barium nitrate, choride, acetate, propionate, or valerate.—Abstr. in J. Chem. Soc., Lond., 1906, v. 90, pt. 1, p. 929.

Caspari, Chas. E., reports three samples examined: one U. S. P.; two contained chlorides and alcoholate.—Proc. Missouri Pharm. Ass., 1906, p. 102.

Lowe, C. B., points out that chloral is directed to be given in "average doses" of 15 grains, while potassium bromide, a much less dangerous drug, is directed to be given in the same quantities—15 grains.—Proc. Pennsylvania Pharm. Ass., 1906, p. 102, 103.

A contributor to the "Pharmacology" column calls attention to the fact that somnos is merely loosely combined chloral and glycerin, which is unstable and readily yields chloral.—J. Am. M. Ass., 1906, v. 47, p. 696.

The subcommittee's report to the Council on Pharmacy and Chemistry shows that the action of somnos is practically identical with that of a 5 per cent elixir of hydrated chloral.—*Ibid.*, v. 47, pp. 872–875.

An editorial discusses the significance and the value of this report.—*Ibid.*, v. 47, p. 863.

Wood, H. C., jr., calls attention to the dangers of bromidia.—*Ibid.*, v. 46, p. 1220.

Schulz, W. A., (Am. J. Physiol., v. 16, pp. 483–501) discusses the effect of hydrated chloral on the properties of heart muscle.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 699.

Carlson, A. J., presents some observations on the action of hydrated chloral on the heart with reference to the so-called physiological properties of heart muscle.—Am. J. Physiol., Bost., 1906, v. 17, pp. 1–7.

Rohde, Erwin (Arch. f. experim. Pathol. u. Pharmakol., v. 54, pp. 104–21), discusses the effects of hydrated chloral on the characteristic heart action.—Jahresb. u. Tier Chem. for 1906, Wiesb., 1907, v. 36, p. 481.

Nicloux, Maurice, concludes that while chloral may undergo decomposition with the formation of chloroform, the quantity of the latter is insufficient to produce anæsthesia, therefore the action of chloral is specific.—Compt. rend. Soc. de biol. Par., 1906, v. 60, pp. 320–322.

Fonteyne, A., gives a number of historical and pharmacological references in addition to the details of his own researches on the action of hydrated chloral on circulation and respiration.—Arch. internat. de pharmacod. et de thérap. Par., 1906, v. 16, pp. 377–387. (See also "General Conclusions," *Ibid.*, p. 449 ff.)

Brower, D. R., uses chloral only with reluctance in the insomnia of insanity.—J. Am. M. Ass., 1906, v. 47, p. 84.

CHLOROFORMUM.

Trechzinski, R. M. (Protoc. of the Russ. phys.-chem. Ass.), outlines a method for the electrolytic production of chloroform from calcium chloride and alcohol.—Pharm. Ztg., Berl., 1906, v. 51, p. 523.

The Ph. Brit. Committee of Reference in Pharmacy report on chloroform says:

> Test by odor with 10 cc., and revise the sulphuric acid test.—Chem. & Drug. Lond., 1906, v. 69, p. 863.

Maillard and Ranc present a method for the purification of chloroform.—Compt. rend. Soc. de biol., Par., 1906, v. 61, p. 483.

Arzberger (Pharm. Post) points out that in the determination of the boiling point of chloroform it is important that the distillation be continued until the last drops have been vaporized and that a perceptible rise of temperature at this point indicates the presence of water, which tends to aid in the decomposition of chloroform.—Pharm. Ztg., Berl., 1906, v. 51, p. 321.

Weigel, G., points out that the Ph. Ndl. IV requirements for chloroformum ad narcosin are rather stringent. They provide a test for decomposition products with sulphuric acid, Nessler's reagent, and the evaporation test.—Pharm. Zentralh., 1906, v. 47, p. 400.

Schoorl and van den Berg discuss the influence of incandescent gas light on chloroform. On exposure up to four hundred and seventy-eight hours chloroform remained unchanged.—From Pharm. Weekbl., 1906, v. 43; Chem. Centralbl., Berl., 1906, v. 77, p. 696.

Nicloux, Maurice, outlines a method for the quantitative determination of minute quantities of alcohol in chloroform.—Bull. Soc. de Chim., Par., 1906, v. 35, pp. 330–335.

In the Department of Pharmacy attention is called to the instability of chloroform, its liability to become resolved into simpler derivative bodies, the most objectionable of which are substances containing chlorine and hydrochloric acid. The pharmacist or the physician should assure himself that the chloroform used for anæthesia is reasonably fresh, put up in well filled, tightly stoppered bottles, and that it has been protected from bright light and excessive heat.—Bull Pharm., Detroit, 1906, v. 20, p. 215.

Price, T. Slater, quotes Wade and Finnemore (J. Chem. Soc., 1904, v. 85, 938) to the effect that chloroform made from acetone is not nearly so good an anæsthetic as chloroform made from ordinary alcohol by reason of the presence in the latter of a very small proportion of ethyl chloride.—Pharm. J., Lond., 1906, v. 23, pp. 89–91.

Kahn, Joseph I., notes that the U. S. P. VIII fails to give any chemical tests whatever for the identification of chloroform, probably for the reason that chloral gives the same reaction as chloroform. He gives a test with sulphurated potassa (U. S. P., 1890).—Proc. New York Pharm. Ass., 1906, p. 207.

Rosenthaler, L., points out that the mixing of chloroform and ether is accompanied by a perceptible rise in temperature of the combined liquids. This rise he believes to be due to a chemical change and a rearrangement of the ether molecule.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 65, 66.

Caspari, Chas. E., reports seven samples examined: Five U. S. P.; two contained chlorinated decomposition products.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Baird, J. W., reports six samples examined in 1904, one adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Ohliger, Willard, reports chloroform with chlorinated compounds and carbonizable impurities present.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Scoville, Wilbur L., suggests the use of chloroform as a sweetener for alkaline mixtures.—Am. Druggist, N. Y., 1906, v. 48, p. 158.

Nicloux, Maurice, presents a method of determination of chloroform in the air, in the blood, or in an aqueous liquid by the employment of a technique which is simple, rapid, and very exact, and which he commends to the attention of the physiologist and the medico-legal expert.—Compt. rend. Acad. des Sc., Par., 1906, v. 142, pp. 163–165, (See also *Ibid.*, pp. 258, 303–305, and Bull. Soc. de chim., Par., 1906, v. 35.)

Feigel and Meier report a series of biologic chemical observations on the influence of chloroform on the animal organism. They conclude that narcotic doses of chemically pure chloroform have little or no action on blood pressure, the heart, or the circulatory system generally, and that these effects, when observed, are usually due to the accompanying impurities in commercial alcohol.—Biochem. Ztschr. Berl., 1906, v. 1, pp. 316–331.

Gwathmey, Jas. T., discusses the scientific methods of administering anæsthetics and calls attention to the fact that surgeons frequently do not understand the principles of anæsthesia. He particularly criticises the exhaustive article of Bevan and Favill as showing a lack of appreciation of the subject of anæsthesia.—J. Am. M. Ass., 1906, v. 47, pp. 1361–1365.

Brodie and Widdows, in a report of the special chloroform committee, make a preliminary report upon the rate of absorption of chloroform during the induction of anæsthesia, with protocols of experiments.

Harcourt, Vernon, reports on the administration of chloroform and on the proportions of the chloroform administered which is retained by the patient.

Sherrington and Sowton report on the effect of chloroform in conjunction with carbonic dioxide on cardiac and other muscles.—Brit. Med. J., 1906, v. 2, pp. 78–87.

Lawrie, Edward, protests against the conclusion of the committee.—*Ibid.*, p. 394.

Filehne and Biberfeld present a contribution to our knowledge of the action of chloroform as an anæsthetic. They discuss the action of aqueous solutions of chloroform on the peripheral arteries and the advisability of adding volatile analeptics to chloroform to prevent the reduction of blood pressure. Their experiments with the latter were negative.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 171–181.

An editorial calls attention to a paper read by Moore and Roaf in which they give evidence to show that the anæsthetics form unstable compounds or aggregates with tissue proteids, and that anæsthesia is due to a paralysis of the chemical activities of the protoplasm as the result. The solubility of chloroform and various other anæsthetics is considered, all being found more soluble in serum than in water.—Brit. M. J., Lond., 1906, v. 1, p. 101.

Tedford and Falconer (Lancet, Lond., Nov. 17) observed delayed chloroform poisoning in several patients and were led to study the postanæsthetic conditions in 143 cases. It appears that chloroform, ether, and ethyl chloride may induce temporary aciduria, but there is no relation between the duration of the aciduria and the length of time during which the anæsthetic was administered.—J. Am. M. Ass., 1906, v. 47, p. 2040.

Beesley, Lewis, discusses the postanæsthetic acetonuria and the significance of delayed chloroform poisoning with the advantages of ether over chloroform in acute infective conditions. He states that ether and chloroform invariably induce an acute temporary acetonuria which may be very detrimental even to an apparently healthy organism.—Brit. M. J., Lond., 1906, v. 1, pp. 1142–1148.

Nicloux, Maurice, finds in general that there is a larger quantity of chloroform in the liver of the fœtus than in that of the mother, He compares the passage, as to rapidity, to that of very soluble, rapidly diffusible substances and, as to mechanism, to that of substances which have an elective affinity for the blood globule.—J. de pharm. et de chim., Par., 1906, v. 23, p. 360.

An editorial comments on the work of Tuffier, Mauté, and Auburtin (Presse méd., May 16) on the tardy accidents of chloroform anæsthesia. The symptoms usually appear after twenty-four hours; the lesions are in the vital organs, particularly the liver, kidney, and heart.—N. York M. J., 1906, v. 84, p. 291.

Cushing, H. E., describes a case of acute yellow atrophy following chloroform anæsthesia. Death occurred one hundred hours from the beginning of the anæsthesia.—J. Am. M. Ass., 1906, v. 47, p. 1191.

For additional references on the use and effects of chloroform, see Index Medicus and J. Am. M. Ass.

CHROMII TRIOXIDUM.

Manchot, W., discusses the constitution of chromic acid and its behavior with various reagents.—Ber. d. deut. chem. Gesellsch., Berl., 1906, v. 39, pp. 1352–1356.

Wiebelitz, H., believes that it would be desirable to mention in the pharmacopœia that chromium trioxide is strongly hygroscopic.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Horn, D. W., finds that the sensitiveness in the colorimetry of chromium is beyond a doubt variable and that the ease of determination varies also with the concentration. * * * The general relation between sensitiveness and concentration is not a simple one, nor such as would be likely to be predicted. * * * It was easier by far to tell the difference between two colored liquids than between a colored and a colorless one.—Am. Chem. J., 1906, v. 35, pp. 253–258.

See also a paper by Horn and Blake on "Variable sensitiveness in colorimetry," *Ibid.*, v. 36, pp. 195–208, 516–521.

Patch, E. L., reports finding chromium trioxide which contained sulphuric acid and was not wholly soluble.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 33.

Caspari, Charles E., reports two samples examined; both contained sulphuric acid.—Proc. Missouri Pharm. Ass., 1906, p. 102.

Seubert and Carstens make a contribution to the knowledge of the action of chromium trioxide as an oxidizing agent.—Ztschr. f. anorg. Chem., Hamburg, 1906, v. 50, pp. 53–66.

CHRYSAROBINUM.

Weigel, G., points out that the Ph. Ndl. provides for a test for free chrysophanic acid in chrysarobin, but directs that the latter be dispensed when chrysophanic acid is directed for external application.—Pharm. Zentralh., 1906, v. 47, p. 400.

Krause (Zeitschr. f. Aughkde., 1906, v. 15, H. 3) reports that three patients with psoriasis developed, the one four weeks, both the other two five days after the beginning of chrysarobin therapy, a subepithelial corneal opacity with hyperæmia of the iris and violent irritation and conjunctivitis. The phenomena disappeared on withdrawing the drug, to return promptly on renewal. Outcome finally favorable.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 206.

Bulkley, L. Duncan, mentions the fact that psoriasis of long standing may be removed by the use of chrysarobin, but the well-known disadvantages often preclude its use.—J. Am. M. Ass., 1906, v. 47, p. 1635.

Nicolas and Favre (Lyon med., 1905, No. 46) think there is no need to avoid the occurrence of erythema in treating psoriasis by chrysarobin; it is only necessary to regulate its extent and its severity.—Abstr. in Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, p. 79.

CIMICIFUGA.

Henkel, Alice, mentions *Cimicifuga racemosa* (L.) Nutt., also known as *Actæa racemosa* L., commonly known as cimicifuga, black snakeroot, squawroot, and rattle-root, as being found in rich soil in shady woods, Maine to Georgia, west to Wisconsin and Missouri. Most abundant in the Ohio Valley.—Bul. Bur. Plant Ind., U. S. Dept. Agric. No. 89, 1906, p. 21.

The Ph. Brit. Committee of Reference in Pharmacy is not in favor of an alcoholic extract assay for cimicifuga rhizoma. The section of the rhizome should be described and the ferric chloride test made with an infusion.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Hommell, P. E., says one of the queries at present is, should not the present official tincture be discarded from the U. S. P. on account of the therapeutic antagonism of the alcohol and the drug content. He explains that this tincture is employed more as an antispasmodic diaphoretic, diuretic, and expectorant than a sedative.—Proc. New Jersey Pharm. Ass., 1906, p. 109.

Shoemaker, John V., commends cimicifuga in chorea and quotes Hiram Corson's claim that he had used it for fifty years without a failure.—Merck's Archives, 1906, v. 8, p. 174.

Wells, G. Harlan, finds cimicifuga often of service in functional and organic heart diseases associated with nervous and rheumatic conditions. The indications for its use are irritability of the pulse, pain in the left mammary region, frontal headache, and, in women, uterine or ovarian disturbances.—Hahneman Month., Phila., 1906, v. 41, p. 264.

Mittelbach, Wm., raises the question as to whether there ought to be two barks recognized.

Whelpley, H. M., explains that these two specific plants are mentioned because they are the two reliable barks most frequently found in commerce.

Brandenberger, A., maintains that the official bark should be either the " red " or the " pale."

Hemm, Francis, agrees with Mittelbach and thinks the color does not cut any figure. He suggests a recommendation to the Committee of Revision that there be but one, which should contain approximately 5 per cent of alkaloids.—Proc. Missouri Pharm. Ass., 1906, p. 35.

An unsigned critique of the Ph. Ndl. IV notes the requirement of not less than 0.6 per cent of alkaloids.—Chem. & Drug., Lond., 1906, v. 68, p. 828.

Gehe & Co. discuss the economic conditions prevailing in the cinchona market. They give the amount of bark exported from Java during the years 1902 to 1905, inclusive, and point out that the average content of quinine during this period has been well above 5 per cent; 5.49 per cent in 1905. They also point out that American barks have practically lost interest and that, apart from a few of the South European countries, there is practically no demand, though the true flat Calisaya, as well as the Guajaquil, Huanoco, and Loxa barks are to be found in regular supplies.—Handels-Ber., Gehe & Co., 1906, pp. 23–25.

An editorial calls attention to the fact that the supplies of bark offered at auction (Amsterdam and London) during 1905 were about 3,100,000 pounds more than the average of the preceding three years.—Brit. & Col. Druggist, Lond., 1906, v. 49, p. 90.

Gerock, J. E., discusses the market conditions and the production of cinchona. He does not believe that there has been any marked decrease in the amount of cinchona and quinine consumed, despite the evident reduction in the amount imported into the United States.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, pp. 38–41.

England, J. W., exhibited a sample of powdered Java cinchona containing 10 to 12 per cent of alkaloid estimated as quinine sulphate. He said that fully 95 per cent of the cinchona bark on the market is derived from the cultivated cinchona trees in Java and that the cinchona market of the world has changed from London to Amsterdam. * * * It is not unusual for the alkaloid yield to be equivalent to 12 or 13 per cent of quinine sulphate.—Am. J. Pharm., Phila., 1906, v. 78, p. 99.

Goris and Reimers (Trav. Lab. Mat. méd. Ecol. super. Pharm., Par.) point out that *Cinchona robusta* Trimen is a collective name proposed for all the hybrids of *C. officinalis* L. and *C. succirubra* Pav. cultivated in Ceylon, India, and Java. The structure of the bark, which is said to approximate that of *C. succirubra*, is described.—Bot. Centralbl. Cassel, 1906, v. 101, p. 462.

An abstract from a report by Consul-General William H. Michael, Calcutta, points out that the Madras government, in India, is operating cinchona plantations, the product of which is converted into quinine in government factories. The report also includes a number of figures showing the amount of bark grown and the value.—Oil, Paint, and Drug Rep., 1906, v. 70, Oct. 17, p. 42.

Howard, David, presents a comprehensive survey of cinchona barks and their cultivation at a meeting of the London Section of the Society of Chemical Industry.—Brit. & Col. Druggist, Lond., 1906, v. 49, p. 29. (See also J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 97–99.)

An editorial notes that David Howard's fascinating lecture before the Society of Chemical Industry, on the history of cinchona and its cultivation in the East Indies and elsewhere, was one of those rare expositions which can not be adequately reproduced in printing ink. A table is given showing the exports of Java bark from 1892 to 1905, inclusive, with percentages of quinine sulphate, etc.—Chem. & Drug., Lond., 1906, v. 68, p. 53. (For further notes and discussion see *Ibid.*, p. 69.)

Winkler, Hans, describes the cultivation of cinchona in Java, the methods employed both in the cultivation as well as in the collecting and preparing for market.—Der Tropenflanzer, 1906, v. 10, pp. 222–238.

Busse, Walter, records his observations on the cinchona plantations of Java and discusses their application to the proposed cultivation of this drug in Kamerun and German East Africa. (From Tropenpflanzer, 1906.)—Apoth. Ztg., Berl., 1906, v. 21, p. 93.

An editorial reviews the prospects of economic success in the cultivation of cinchona in Kamerun and German East Africa and discusses the climatic conditions that are necessary for the successful cultivation of this plant.—Pharm. Ztg., Berl., 1906, v. 51, p. 362.

Schneider, Albert, reviews the history of cinchona cultivation and the possible cultivation of the drug in California. (Paper read at Lewis and Clark Pharm. Congress.)—Western Druggist, 1906, v. 28, pp. 136–143.

Planchon, L., points out that the true calisaya bark is but seldom seen in the European market and that in place of it a drug known as Quinquina de Carthagène fibreaux or Q. de Colombie or Q. fibrosa is frequently mistaken for the flat calisaya, " Calisaya plat." He enumerates the characteristics of the two barks. (From Bull. de pharm. du Sud-Est., 1906, p. 509.)—Apoth. Ztg., Berl., 1906, v. 21, p. 1076.

Caesar and Loretz suggest that for cinchona it is advisable to determine the moisture and the alkaloid content. For the latter they outline a method which includes a preliminary treatment with acidulated water, on a water bath; this aqueous solution is subsequently extracted with a mixture of ether and chloroform.—Geschäfts-Ber., v. Caesar & Loretz, in Halle, a. S., 1906, pp. 92–95.

Reichard, C., discusses the characteristic reactions of quinoidine and enumerates a number of reactions that he believes can be used for determining the identity of this mixture of alkaloidal substances.—Pharm. Ztg., Berl., 1906, v. 51, p. 532.

Spiegel, L., refers briefly to the work of Berthelot and Gaudechon, Skraup and Egerer, Pecsics, Christensen, Zwerger, and Koenigs on the cinchona alkaloids.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 102.

Rabe, Paul, presents a contribution to our knowledge of the cinchona alkaloids, dealing more particularly with the composition and properties of isonitrosocinchotoxine.—Ann. d. Chem., Leipz., 1906, v. 350, pp. 180–203.

Herder, M., discusses the relation of pure quinine and cinchonine with various reagents and the demonstration of these alkaloids in situ in various parts of the plant.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 130, 131.

Königs (Ber. d. deut. chem. Gesellsch.) discusses the constitution of the cinchona alkaloids in the relation of a piperidin base, which he terms chinuclidin with cincholoipon, a derivative of the cinchona alkaloids.—Pharm. Zentralh., 1906, v. 47, pp. 192, 193.

An abstract (from Vidensk Selsk Skrift, 1906, p. 265, v. 7) discusses the behavior of the cinchona alkaloids with chlorine and points out that cinchonine, cinchonidine, and quinine produce additional products with chlorine similar in nature to those produced with bromine.—Chem. Repert., Cöthen, 1906, v. 30, p. 231.

Skey has pointed out that many alkaloids give precipitates with ammonium thiocyanate in the presence of a zinc or mercury salt. According to P. W. Robertson (Proc. Chem. Soc.) the alkaloids most sensitive to this reaction are quinine and the other cinchona alkaloids.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 47.

The Ph. Brit. Committee of Reference in Pharmacy concludes that the assay process for tincture of cinchona requires revision, as does the assay process for liquid extract of cinchona.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Puckner, W. A., reviews some of the recent literature relating to the assay of cinchona.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 234–236.

Francis, John M., believes that the U. S. P. VIII method for the assay of cinchona is possessed of no advantage over the one previously official. The conditions demanded in properly executing the cinchona assay are so exacting as to render it unfit for the use of the chemist or pharmacist who is lacking in very considerable skill, and more particularly a great deal of experience.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 453.

Lyons, A. B., reports that 9 of the 12 replies received were in favor of the U. S. P. standard of 4.0 gm. of anhydrous ether soluble alkaloids in 100 cc. of fluid extract of cinchona. He calls attention to several changes he would like to see incorporated in the assay for ether soluble alkaloids in cinchona. He thinks the directions should direct reducing the temperature of the fluids to 15° C. and maintaining this temperature during the shaking process.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 437–440.

Gordin, H. M., asserts that the use of aliquot parts in alkaloidal assaying is objectionable and outlines a method for the assay of cinchona, in which he extracts the alkalized fluid extract with a mixture of ether and chloroform, shakes out the resulting solution with dilute sulphuric acid, and extracts the alkaloids from this solution with chloroform.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 380, 381. (See also Am. J. Pharm., Phila., 1906, v. 78, pp. 455–462.)

Kebler, L. F., reports the results obtained in a cooperative investigation of the assay of cinchona. The results obtained by seven analysts, with three methods given in detail, are reported in a table for ready reference and are commented on at some length by the referee. The variation in the total alkaloids found was from 3 to 3.93 per cent and the variation of ether soluble alkaloids by the U. S. P. VIII was from 2.16 to 3.14 per cent.—Proc. Ass. Off. Agric. Chem. 23d Ann. Conv., pp. 134–136. (Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 105.)

Dohme, A. R. L., believes that in the assay of high-grade cinchona bark the amount of solvent should be increased to extract all the alkaloids. He reports a variation of from 3.51 to 4.28 per cent in the amount of alkaloid found in the same sample of F. E. cinchona, by the same process, by seven analysts.—Am. Druggist, N. Y., 1906, v. 49, pp. 267, 268.

Panchaud, A., discusses the assay of cinchona and the relative value of titrimetric and gravimetric estimations. He points out that in using a mixture of ether and chloroform it is important to avoid decomposition of the chloroform and the partial or even complete neutralization of the alkaloids by the resulting hydrochloric acid.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 580–582.

Matolcsy, N. (Pharm. Post. 1906, v. 39, pp. 345–347), presents a method of quantitative analysis of the alkaloids in the bark, extract, and tincture of cinchona by means of amyl alcohol.—J. de pharm. et de chim. Par., 1906, v. 24, p. 316.

Florence discusses the assay of cinchona and outlines several methods: (1) A simple and rapid method (*a*) for total alkaloids and (*b*) for quinine. (2) An exact method for total alkaloids and quinine.—Bull. des. sc. pharmacol., Par., 1906, v. 13, pp. 365–368.

Evans Sons Lescher and Webb assert that they now use the "sand" method for the assay of cinchona liquid extract, extracting afterwards with chloroform and ammonia. They also assert that this method gives good results and that the alkaloidal residue is very clean.—Analytical Notes for 1906, 1907, p. 12.

Panchaud, A., points out that cinchona alkaloids in the presence of chloroform may be neutralized and even form acid solutions due to the decomposition of the chloroform into phosgen and hydrochloric acid. It is important that when chloroform or mixtures of chloroform and ether are used for the separation of alkaloids the solvent be distilled off so as to avoid the possible error due to the decomposition of the solvent. (From Schweiz. Wchnschr. f. Chem. u. Pharm.)—D.-A. Apoth. Ztg., N. Y., 1906–1907, v. 27, p. 108.

Beuttner, E., criticises the Ph. Austr. VIII method of assay for cinchona, and points out that there is a material loss of alkaloid in addition to the impracticable amount of time that is directed. (From Schweiz. Wchnschr. f. Chem. u. Pharm.)—Pharm. Post, Wien, 1906, v. 39, p. 533.

Caesar and Loretz assert that the assay process for cinchona, of the Ph. Austr. VIII, gives results that are from 1 to 2½ per cent lower than those given by the process they use.—Geschäfts.-Ber. v. Caesar & Loretz, in Halle a. S., 1906, p. 14.

Philipp Röder, Wien, outlines a modified method for the assay of cinchona, and suggests that the amount of total alkaloid in the water free substance should be at least 4 per cent, and the extractive 13 per cent. A total of 35 samples varied from 1.98 to 15.43 per cent ash in the air dry drug, while the alkaloid content, in the water free drug, varied from 0.96 to 8.80 per cent. The Ph. Austr. VIII requires that the ash content shall not exceed 6 per cent, the extractive be at least 15 per cent, and the total alkaloids, for water free drug, be at least 6 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 248.

Vanderkleed, Charles E., reports the assay of 20 lots of cinchona bark which averaged 6.8 per cent of total alkaloids. Three samples assayed below the required 5 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Sayre, L. E., reports that four samples of cinchona bark examined varied from 4.58 to 2.3 per cent of total alkaloids and from 3.2 to 1.8 per cent of ether soluble alkaloids.—Bull. Kansas Bd. Health, 1906, v. 2, p. 174.

Dieterich, Karl, reports that of seven samples of cinchona offered but one contained the required amount of total alkaloids, the remaining six varied from 3.76 to 4.86 per cent. Two samples of cinchona from Kamerun also fell below the required 5 per cent of total alkaloids.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, pp. 117–120.

Spindler reports finding four samples of cinchona with from 3.05 to 4.7 per cent of alkaloids in place of the 5 per cent required.—Südd. Apoth. Ztg., 1906, v. 46, p. 90.

Evans Sons Lescher and Webb found a sample of cinchona bark which yielded 10.9 per cent of total alkaloids.—Analytical Notes for 1906, 1907, p. 12.

Weisz, Ernst, discusses the value of extract of cinchona of the Ph. Austr. VIII, and records a comparative study of some available commercial samples. He concludes that these samples are not particularly creditable, and suggests that the pharmacist should prepare the extract himself. (From Ztschr. d. allg. österr. A. V., 1906.)—Apoth. Ztg., Berl., 1906, v. 21, pp. 439, 440.

Desmaisons suggests a formula for fluid extract of cinchona including dilute hydrochloric acid in the menstruum. The finished product has a specific gravity of 1.116 at 15° C., leaves a residue of 38.88 per cent at 100°, 18.88 per cent extractive, and 4.565 per cent alkaloids.—Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 201.

Drelière, Walter, outlines a method for preparing fluid extract of cinchona, discusses the content of alkaloids, and suggests a method of assay which is described.—J. de pharm. d'Anvers, 1906, v. 62, pp. 934–937.

van der Wielen, P., points out that the formula for extract of cinchona as proposed by Th. (in the Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 56, 57) does not produce a satisfactory preparation. He also points out that the preparation was originally proposed by de Vriji in 1891, and that an improved formula suggested by van der Wielen (Pharm. Weekblad) in 1903 was subsequently preferred to the formula by de Vriji which had been embodied in the Supplement to the Netherlands Pharmacopœia.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 244–246.

Dott, D. B., asserts that cinchona is much more readily extracted by 60 per cent spirit than by the official menstruum. In this case it is well to add 1 per cent hydrochloric acid with the first maceration, distill off the spirit and make up to the volume indicated by the alkaloidal assay, using one-tenth volume of glycerin and one-fifth volume of alcohol.—Yearbook of Pharmacy, 1906, p. 300.

The Ph. Brit. Committee of Reference in Pharmacy report on liquid extract of cinchona says: " Amend the assay process."—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Weisz, Ernst, presents some observations on the several pharmaceutical preparations of cinchona and outlines a method for determining the glycerin content of fluid extract of cinchona.—Ztschr. d. allg. österr. Aptoh.- Ver., Wien, 1906, v. 44, pp. 267–270.

Moerk, Frank X., points out that the tincture of cinchona represents but 18.75 per cent of the alkaloids of cinchona instead of representing 20 per cent of the drug as is generally supposed.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Douglass, Malcolm E., discusses the physiologic action and uses of cinchona and its alkaloids.—Hahneman. Month., Phila., 1906, v. 41, pp. 283–292, 354–360.

CINCHONIDINÆ SULPHAS.

Reichard, C., (Pharm. Ztg.) has investigated the reactions of quinidine and cinchonidine with various metallic salts, iodic acid, potassium ferrocyanide, ammonium persulphate, molybdic, chromic, and vanadic acids, etc. He believes that the two bases may be distinguished from each other by their reaction with sodium iodate. A description of the reactions is given.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 933, 934.

CINCHONINÆ SULPHAS.

Gordin, H. M., reviews the progress in the chemistry of cinchonine and the cinchona alkaloids during the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 181–184.

Legradi, Th., discusses the chemistry and the probable constitution of cinchonine.—Ztschr. d. all. österr. Apoth.- Ver., Wien, 1906, v. 44, pp. 187, 188, 203, 204, 215–217.

Herder, M., (Arch. d. Pharm., 244, No. 2, 1906, 120) in discussing the use of calcium- and barium-mercuric iodides, asserts that when cinchonine is treated with the calcium salt in solutions of 1:10,000, and the barium salt in solutions of 1:12,000, a precipitate is formed similar to that produced when quinine is treated in the same way.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 921.

CINNALDEHYDUM.

Schimmel & Co. point out that cinnamic aldehyde is not colorless but bright yellow; they also assert that the statement of the specific gravity is not correct—it should read "1.048–1.052 at 25° C." They also call attention to the fact that commercial cinnamic aldehyde is usually produced synthetically, as the production from oil of cinnamon or from oil of cassia would be too expensive.—Semi-Ann. Rep., 1906, Apr.–May, pp. 73, 78.

They give the following as being characteristic of cinnamic aldehyde: Color, bright yellow; specific gravity at 15° C., 1.054 to 1.058; optically, inactive; boiling point, 252° C. with partial decomposition;

solidifies when much reduced in temperature, and melts again at —7.5° C. Soluble in about 2 volumes of 70 per cent alcohol; must be free from compounds containing chlorine.—*Ibid.*, Oct.–Nov., p. 90.

Barbier and Leser (Bull. Soc. Chim., 38, p. 858) discuss the conversion of cinnamic aldehyde into styrone (cinnamic alcohol) by the reduction of its diacetyl.—Pharm. J., Lond., 1906, v. 22, p. 12.

CINNAMOMUM SAIGONICUM.

Francis, John M., referring to the displacement of Ceylon by Saigon cinnamon in practically all the formulas of the pharmacopœia, thinks that the former is fully equal in every way to the latter and that few people will be able to distinguish one from the other.—Bull. Pharm., Detroit, 1906, v. 20, p. 231.

Mittelbach, Wm., suggests that the two cinnamon barks so entirely different in flavor should, if possible, be more distinct in name, so as to leave no room for substituting one for the other. He considers Saigon cinnamon the more desirable by reason of its finer aromatic quality, and asks why, then, should Ceylon cinnamon be recognized.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 449.

Hess, Paul, thinks Ceylon has a better flavor, while Saigon contains more oil.

Murray, J. V., handles both, selling Saigon at a higher price than Ceylon.

Geiwitz, J. G., asks whether what the pharmacopœia specifies can be procured. He has been able to get better cinnamon from the spice houses.

Petit, H. M., says that in his experience the spice houses adulterate.—Proc. Missouri Pharm. Ass., 1906, p. 37.

Vilbouchevitch, J., notes that the exportation of cinnamon, largely from *Cinnamomum loureirii* Nees, from Annam fell from 500,000 kg. in 1886 to 300,000 kg. in 1904. The species most desired in the European market is *Cassia lignea.* France consumes not more than 50 tons (50 tonnes) in the year.—J. d'Agric. trop., Par., 1906, v. 6, p. 299.

Hanus and Bein (Ztschr. Untersuch. Nahr. u. Genussmtl., 12, 1906, No. 7, pp. 395–407) point out that the pentosan content of spices is fairly constant and depends upon the portion of the plant from which the spice is obtained, and that white cinnamon contains a larger amount of pentosan than spices obtained from the whole plant or from leaves.—Exper. Sta. Rec., 1906, v. 18, p. 859.

Philipp Röder, Wien, reports examining 2 samples of Chinese cinnamon which were found to contain 5.59 and 3.45 per cent of ash respectively, and two samples of Ceylon cinnamon which contained 7.14 and 4.27 per cent of ash respectively.—Pharm. Post, Wien, 1906, v. 39, pp. 247, 248.

Smith, Kline & French Co. report the following data for ground Saigon cinnamon: Ash, 3.5 per cent; ash soluble in water, 2.1 per cent; ash insoluble in hydrochloric acid, 0.1 per cent; ether extractive (nonvolatile), 1.5 per cent; alcohol extract, 11.9 per cent.—Lab. Rep. S. K. & F., 1906, p. 36.

Lührig and Thamm report examining 8 samples of Ceylon and 2 samples of cassia cinnamon, and present the results of their examination in the form of a table. The ash content of the Ceylon cinnamon varied from 3.85 to 5.32 per cent, while the cassia cinnamon was found to contain 2.05 and 2.12 per cent of ash.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 11, pp. 132–134.

Kraemer, Henry, asserts that the official cinnamon is substituted by fagot or Batavia cinnamon.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Rusby, H. H., asserts that powdered cassia has been offered from which the oil has been distilled.—*Ibid.*, p. 335.

The 5th report of the Illinois Food Commission reports examining 85 samples of powdered cinnamon; 3 were contaminated, 5 adulterated with oil stone, flour, wheat starch, sand, and bean meal.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

At Darlington police court a dealer was fined £1 and costs for selling cassia which contained 10.30 per cent mineral matter, of which 7.30 per cent was sand. The analyst (W. F. Keating Stoak) certified that the ash of pure cassia did not exceed 2.40 per cent, and the largest proportion of sand he found in commercial samples of fair quality was 3 per cent.—Brit. Food J., Lond., 1906, v. 8, p. 48.

Keimatsu, K., has examined the etheral oils obtained from the leaves, stems, and roots of the cinnamon tree, *Cinnamomum loureirii* Nees. He finds that the oil obtained from the leaves contains citrol as its chief component. The oils obtained from the stems and roots both contain cinnamic aldehyde as their chief constituent.—J. Pharm. Soc., Japan, 1906, p. 105.

Keimatsu and Asahina report an examination of the volatile oil of *Cinnamomum pedunculatum* Nees.—*Ibid.*, 1906, p. 1095.

CINNAMOMUM ZEYLANICUM.

Sprinkmeyer and Furstenberg found Ceylon cinnamon to vary from 4.61 to 6.98 per cent of sand-free ash, while cassia cinnamon was found to have from 1.77 to 3.38 per cent sand-free ash. Other factors relating to the properties of the ash are also mentioned.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 657.

Smith, Kline & French Co. report the following data for ground Ceylon cinnamon bark: Ash, 5.2 per cent; ash soluble in water, 2.01 per cent; ash insoluble in hydrochloric acid, 0.25 per cent; ether extractive (nonvolatile), 1.53 per cent; alcohol extractive, 12.8 per cent.—Lab. Rep., S. K. & F., 1906, pp. 35, 36.

Weigel points out that the Ph. Ndl. requirement for *Cinnamomum zeylanicum* is that the ash content may vary from 4 to 8 per cent.—Pharm. Zentralh., 1906, v. 47, p. 400.

COCA.

Levy, N. (Südd. Apoth. Ztg.), discusses the cultivation of *Erythroxylon coca* in the mountainous regions of Peru and presents some information on the distribution and uses of the drug.—J. de pharm. d'Anvers, 1906, v. 62, pp. 106, 107.

Winkler, Hans, describes the cultivation of *Erythroxylon coca* Lam. in Java and gives an outline of the history of the plant and its cultivation and use by the Incas of Peru.—Der Tropenpflanzer, 1906, v. 10, pp. 69–81.

Francis, John M., asserts that Huanuco coca has the best aroma and contains more cocaïne and less isotropyl-cocaine. The assay of 15 lots varied from 0.32 to 0.83 per cent, the average being 0.69 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

The Ph. Brit. Committee of Reference in Pharmacy report on coca leaves says: Restrict to the Bolivian variety of South American or Ceylon growth. For galenical preparations use leaves with 0.5 per cent of total alkaloids.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Herting, Otto, discusses the official requirements for the leaves of *Erythroxylon coca* and suggests, in place of the official assay process, a gravimetric method based on the deJong modification of Keller's method.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 1.

deJong, A. W. K., (Rec. trav. chim. Pays-Bas, v. 25, pp. 233–237) discusses the behavior of the alkaloids in coca leaves and points out that with the dying of the leaf the alkaloids disappear slowly, though not entirely. He also discusses the change from cinnamyl-cocaine to benzoyl-cocaine with the growth of the leaves; discusses the extraction of the leaves of coca; and outlines a method that he believes to be economical and satisfactory.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 909.

Puckner, W. A., reviews some of the recent literature relating to the assay of coca, and points out that the use of ether instead of chloroform in the final extraction of the U. S. P. VIII process, is done for the purpose of rejecting alkaloids other than cocaine.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 236.

Puckner, W. A., reviews some of the recent literature relating to the assay of coca, and points out that the use of ether instead of tube percolator used, to avoid transfer of the ethereal liquid from vessel to vessel.—Am. J. Pharm., Phila., 1906, v. 78, p. 455.

Lyons, A. B., reports that 8 of the 12 replies received were in favor of the U. S. P. VIII standard for fluid extract of coca.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

The annual report of Philipp Röder, Wien, outlines an assay process for the fluid extract of cola in which the preparation, made alkaline with ammonia, is directed to be washed out with petroleum ether. This solution is, in turn, washed out with 0.5 per cent of hydrochloric acid. The acid solution, after being made alkaline with ammonia, is washed out with ether, the latter evaporated, and the residual alkaloids weighed.—Pharm. Zentralh., 1906, v. 47, p. 482.

Sack, J. (Inspectie van den Landbouw in West Indie. Bulletin 3), reports examining coca leaves from the garden at Paramaribo, Surinam. The freshly picked leaves contained 0.51 per cent of cocaine, with 68.9 per cent of water.—Bot. Centralbl., Cassel, 1906, v. 101, p. 560.

Evans Sons Lescher & Webb found a sample of Bolivian coca leaves which, when extracted with ether, contained 0.3 per cent of alkaloid. A sample of Peruvian coca leaves was found to contain 0.5 per cent of alkaloid.—Analytical Notes, for 1906, 1907, p. 14.

Philipp Röder, Wien, reports examining 6 samples of coca which varied from 5.07 to 9.90 per cent of ash and from 0.700 to 1.050 per cent of alkaloid.—Pharm. Post, Wien, 1906, v. 39, p. 264.

The Ph. Brit. Committee of Reference in Pharmacy report on liquid extract of coca recommends standardization and investigation of published processes.—Chem. & Drug., 1906, v. 69, p. 863.

A review points out that Brown (Pharm. Ztg., 1896, No. 37) was able to produce a satisfactory and stable wine of coca by using a fluid extract of coca made with 25 per cent of alcohol. This weak alcohol does not extract the undesirable chlorophyl and yields a fluid extract that is readily miscible in wine.—Pharm. Ztg., Berl., 1906, v. 51, p. 481.

COCAINA.

Herting, Otto, points out that cocaine is readily decomposed by either alkalies or mineral acids into ecgonin, benzoic acid, and methyl alcohol.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 1.

Riedel's Berichte points out that the melting point of cocaine hydrochloride is variously given as being from 180° to 193° C. This variation appears to be justified, to some extent, by the difference in behavior under varying methods of heating. Pure cocaine hydrochloride, carefully dried over sulphuric acid, will, with slow heating, melt uniformly at 182° C.—Riedel's Berichte, Berlin, 1906, p. 23.

de Jong, A. W. K. (Rec. trav. chim. Pays-Bas., v. 25, pp. 1–6), outlines a method of analysis for crude cocaine by saponification with barytes, washing with ether to remove the acids, and determining the bases as pseudotropin and ecgonin.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 909.

He also discusses the action of bromine on cocaine and points out that in the presence of hydrobromic acid, in a solution of cocaine in carbon tetrachloride or water, yellow crystals of a combination having the formula $C_{17}H_{21}O_4N.HBrBr_2$ and insoluble in water are formed.—*Ibid.*, v. 5, p. 909.

Spiegel, L., discusses the chemistry of cocaine and its decomposition products.—*Ibid.*, v. 5, p. 159.

Reichard, C., discusses the several reactions for cocaine and its differentiation from other alkaloids.—Pharm. Zentralh., 1906, v. 47, pp. 347–353, 925–927.

He outlines a new reaction for cocaine: a color reaction produced by a mixture of α-nitroso β-napthol, hydrochloric acid, and nickel sulphate.—*Ibid.*, v. 47, p. 383. (See also Pharm. Ztg., Berl., 1906, v. 51, p. 168, 592.)

Gehe & Co. discuss the market conditions prevailing for cocaine, the available supply, accession, the sale of crude cocaine in the Hamburg market, and the prices prevailing for pure as well as for crude cocaine.—Handels-Ber., Gehe & Co., 1906, pp. 69, 70.

Gonnermann, M., discusses the action of enzymes on cocaine. He finds that the liver of various animals, pancreatin, trypsin, and some of the vegetable ferments decompose cocaine more or less readily.—Apoth. Ztg., Berl., 1906, v. 21, pp. 989–998.

Günther (Tierärztl. Centralbl., 1906) points out that with cocaine the pharmacologic action is evidently confined to the whole cocaine molecule, as neither benzoylecgonin or ecgoninmethylester are active. He also calls attention to the present practice of decomposing the amorphous alkaloids of coca to ecgonin and the synthesis of this to cocaine.—Pharm. Post, Wien, 1906, v. 39, p. 56.

Rost, E., presents a review of the constitution of cocaine and the efforts made to produce synthetically substitutes for this article as a local anæsthetic. He points out that while at least some of the synthetic preparations have advantages over cocaine, they are all less active as local anæsthetics, and concludes that their final disposition must after all rest with the results obtained in active practice.—Therap. d. Gegenw., 1906, v. 47, pp. 122–125,

Gössling, W., discusses the chemistry and composition of cocaine and several of the newer anæsthetics.—Südd. Apoth. Ztg., 1906, v. 46, p. 512.

Maas, Th. A., discusses the use of cocaine and of other substances for rendering definite, circumscribed regions insensible to pain. He concludes that in face of the number of local anæsthetics before the profession it is difficult to form a conclusive opinion.—Therapist, Lond., 1906, v. 16, pp. 121, 122, 137, 138, 147, 148.

Reichmuth (Zeitschr. f. Augenheilk., v. 16, p. 3) presents observations on the structural damage done by the several local anæsthetics—cocaine, holocaine, beta-eucaine, tropacocaine, acoin, alypin.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 809.

Läwen, A., presents the results of the comparative study of the local action of cocaine, holocaine, alypin, and stovaine on motor nerve trunks (Arch. f. exper. Path., 1906, v. 56, p. 138).—*Ibid.*, v. 5, p. 909.

Wintersteiner (Wien. klin. Wochenschr., 1906) discusses the use and the applicability of cocaine and its substitutes in ophthalmology, and concludes that cocaine is superior to all of the several substitutes so far offered.—*Ibid.*, p. 909.

Scrini (Bull. Commerc., 1906, No. 1) recommends the use of 2 per cent solutions of cocaine (alkaloid) in peanut or olive oil for use in the eye in place of aqueous solutions of the salts of cocaine.—Pharm. Ztg., Berl., 1906, v. 51, p. 301.

Moore, T. W., reports a case of idiosyncrasy to the use of cocaine in the eye; the lids became very much swollen, and when a single drop of a 4 per cent solution of cocaine was dropped into the eye on a subsequent occasion the same symptoms were seen in a milder form.—J. Am. M. Ass., 1906, v. 47, p. 1486.

Pruyn, C. P. (Dent. Rev.), thinks the septic troubles often following the use of cocaine in dental surgery are to be attributed to the infection and not to the cocaine.—Dental Cosmos, Phila., 1906, v. 48, p. 967.

Touchard, F., (L'Odontol, Paris, Sept. 15, 1906) discusses the technique of cocaine injections in dental surgery, and is inclined to use it even for very minor operations.—*Ibid.*, pp. 1264–1267.

Apropos of Touchard's article, an editorial argues, on physiological, moral, and ethical grounds, against "cocainizing humanity for every disagreeable sensation from which the hysterical or morally weak desire to escape."—*Ibid.*, pp. 1256–1261.

Schieffelin, Wm. J., discusses the constitution, synthesis, and the safeguarding the sale of cocaine. He asserts that the annual consumption of cocaine in the United States is between 100,000 and 120,000 ounces, and that, judging from the decline of the sale in a locality where a strict cocaine law is enacted and enforced, at least 20 per cent is used for indulgence.—Abstract in Am. Druggist, N. Y., 1906, v. 48, pp. 177, 178.

The editor of "Notes and Queries" estimates the consumption of cocaine in the United States, based upon custom-house figures, as 156,032 ounces in 1903, 150,632 ounces in 1904, and quotes W. J. Schieffelin's estimate at 100,000 to 120,000 ounces annually. (See under "Morphine.")—Drug Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 130.

A contributor to the "Medical News" column states that the druggists of Brewton (Georgia) have voluntarily pledged themselves not to sell cocaine except on prescription.—J. Am. M. Ass., 1906, v. 47, p. 2098.

Additional references on the use of cocaine and the comparative value of the synthetic products will be found in the Index Medicus and J. Am. M. Ass.

COCAINÆ HYDROCHLORIDUM.

Herting, Otto, points out that the melting point of cocaine hydrochloride is given as 189.9° in the U. S. P. VIII, 183° in the Ph. Germ. IV., and 180–186° C. in the Ph. Brit. IV., and expresses the belief that the correct melting point is probably 185° C.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 1.

The Ph. Brit. Committee of Reference in Pharmacy says that the permanganate test for cocaine hydrochloride is unreliable and that the U. S. P. test should be used.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Evans Sons Lescher & Webb report that out of 20 samples of cocaine hydrochloride examined by them only 1 was found to be thoroughly unsatisfactory when subjected to McLagan's test. This sample showed no crystalline precipitate for seven minutes, the usual time being from a half to two minutes.—Analytical Notes, for 1906, 1907, p. 14.

Breteau, Pierre, reports examining a sample of cocaine, upward of 15 years old, that had manifestly undergone decomposition as evidenced by the presence of methyl benzoate, free benzoic acid, and ecgonin hydrochloride.—Bull. Soc. de Chim., Par., 1906, v. 35, pp. 674–676.

Cripps, R. A., reports some experiments and observations which lead him to assert that cocaine hydrochloride is more stable, and for this reason more reliable than the alkaloid itself, when prepared in the form of ointment.—Yearbook of Pharmacy, 1906, pp. 260, 261.

An abstract (La Odontol, Madrid, 1905) concludes that cocaine solutions may be sterilized without decomposition at a temperature not exceeding 100° C. and that anæsthetic solutions should be kept in receptacles made of insoluble glass.—Dental Cosmos, Phila., 1906, v. 48, p. 111.

An abstract asserts that the addition of 0.01 gm. of salicylic acid to each 10 gm. of a solution of cocaine will obviate the need for sterilization.—Am. Vet. Rev., N. Y., 1906–7, v. 30, p. 973.

An unsigned article states that the law of Massachusetts prohibits all traffic in cocaine, alpha or beta eucaine, except on the prescription of a physician, dentist, or veterinary surgeon.—J. Am. M. Ass., 1906, v. 47, p. 1955.

COCCUS.

Holmes, E. M., discusses the origin of cochineal and points out that the Canary Islands furnish practically all of the drug which comes to the London market. He refers to some of the literature relating to cochineal and suggests that the residual ash is an indication of the amount of adulteration present.—Pharm. J., Lond., 1906, v. 22, p. 314.

Hankey, William T., has experienced considerable difficulty in securing cochineal which would comply with the U. S. P. VIII limit for ash; he suggests the addition of a method of valuation based on tinctorial power.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Caesar and Loretz suggest that for cochineal it is advisable to determine the moisture content, the ash content, and the tinctorial power. For the latter they outline a method.—Geschäfts-Ber. v. Caesar & Loretz, 1906, p. 92.

Lackey, R. H., quotes a correspondent who asserts that cochineal is adulterated both in the whole cochineal and in the powdered, and that he was unable to secure the pure in this country.—Proc. Pennsylvania Pharm. Ass., 1906, p. 116.

Patch, E. L., asserts that neither the silver nor the black cochineal on the market are of official standard. The pharmacopœia recognizes but 6 per cent of ash. Different samples gave 29, 17.5, and 25 per cent of ash, respectively. Only one lot was found in the country that met the present requirements. This had 5.5 per cent of ash.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Kebler, Lyman F., reports finding a sample of cochineal containing 39.14 per cent of ash, and another with 21.89 per cent of ash. The U. S. P., VIII, limits the ash content to 6 per cent. Taking a good specimen of cochineal as having a tinctorial value of 100, the first sample had a value of 20 and the second 75.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 162, 163.

Graham, Willard, examined 7 samples of cochineal, 4 samples of black and 3 samples of silver; 6 samples contained less than 6 per cent of ash. One lot was found to contain 16 per cent of ash.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

CODEINA.

Gordin, H. M., reviews the progress in the chemistry of codeine during the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 188.

Herting, Otto, discusses the methylation of morphine and the production of so-called synthetic codeine, by means of dimethylsulphate in the presence of sodium and methyl alcohol, and illustrates the reaction.—D.-A. Apoth. Ztg., N. Y., 1906, v. 27, p. 16.

Knorr. Ludwig, in collaboration with Heinrich Hörlein discusses the conversion of thebaïne into codeinone and codeine.—Ber. d. deut. chem. Gesellsch., Berl., 1906, v. 39, pp. 1409–1414.

The Ph. Brit. Committee of Reference in Pharmacy report on codeine says:

> In the color test, sodium arsenate should be substituted for potassium ferricyanide. Add to the tests "codeine which has been dried at 100° C. melts at 155° C."—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Reichard, C., reviews the tests and reactions for codeine and the differentiation of this alkaloid from other substances.—Pharm. Zentralh., 1906, v. 47, pp. 727–733.

Pschorr, R., (Chem. Ber., 1906, v. 39, pp. 3130–3139) discusses the production of halogen derivatives of codeine.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 762.

Lowe, Clement B., asserts that codeine is usually considered as being one-fourth the strength of morphine and that the average dose of the former, one-half grain, does not compare well with the dose of morphine which is given as being one-fourth grain.—Proc. Pennsylvania Pharm. Ass., 1906, p. 102.

Wokes has noticed that sirup of codeine does not keep well, and suggests that in place of simple sirup, as ordered in the Ph. Brit., IV, and in the N. F., sirup of tolu should be used in making it.—Pharm. J., Lond., 1906, v. 22, p. 175.

Taylor, S., with others, finds that this sirup does not keep well; he would suggest that the codeine phosphate be dissolved in the liquor tolu, and this added to the sirup, making a compound sirup of tolu and codeine.—*Ibid.*, v. 23, p. 670.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the formula for sirup of codeine should be revised.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Tinkham, H. C., is reported to have said at the meeting of the Vermont State Medical Society that codeine is the best form in which to administer opium after surgical operations to keep the patient quiet. Morphine is to be given if necessary.—J. Am. M. Ass., 1906, v. 47, p. 1677.

COLCHICI CORMUS.

Smith, F. A. Upshur, reviews the history of, and the literature relating to, the chemistry of colchicum; and presents a summary of the reported work on the colchicine content of the drug.—Brit. & Col. Drug., Lond., 1906, v. 49, pp. 274–276.

Mittelbach, Wm., asks, Why recognize both the root and the seed; if one be stronger than the other, why not drop the weaker?—Proc. Missouri Pharm. Ass., 1906, p. 41.

Gordin, H. M., for the assay of colchicum, advises the use of the shaking tube. In case of the corm, the colchicine before it is weighed undergoes an extra purification; if this be desirable here it should also be used in the case of the seeds.—Am. J. Pharm., Phila., 1906, v. 78, p. 455.

Francis, John M., reports 17 lots of colchicum root which varied from 0.2 to 0.4 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Smith, Kline & French Co. report on the examination of 2 samples of colchicum root which contained, respectively, 0.48 and 0.50 per cent colchicine.—Lab. Rep. S. K. & F., 1906, p. 16.

Moerk, Frank X., points out that the extract of colchicum corm represents four times the strength of the drug.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

COLCHICI SEMEN.

The Ph. Brit. Committee of Reference in Pharmacy report on colchicum seed says: If the suggestion of the international conference to use seeds, and not corm, be adopted for galenical preparations, the finished preparation should be assayed.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Schieffelin, Wm. Jay, speaking for the committee of the N. W. D. A., suggested that the standard for colchicum seed be reduced from 0.56 per cent of colchicine to 0.45 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 347.

Dohme, A. R. L., reports that seven reputable chemists operating upon the same sample of colchicum, by the same process, found from 0.55 to 0.84 per cent of alkaloid.—*Ibid.*, v. 49, p. 268.

Lyons, A. B., believes that the U. S. P. assay process for colchicum seed could readily be improved upon. For rapid work he has found that titration with Mayer's reagent in a strongly acid solution is quite satisfactory, the results checking well with the gravimetric determinations.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 439.

Panchaud, Adalbert, discusses the quantitative determination of colchicine in colchicum and elaborates on a previously published suggestion to precipitate the colchicine from a solution in an ether-chloroform mixture by means of petroleum ether.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 563, 564.

Francis, John M., assayed 11 lots of colchicum seed which varied from 0.5 to 0.6 per cent of alkaloids.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Evans Sons Lescher and Webb report on a sample of colchicum seed which was more sticky than usual. Compared with a standard sample for glucose, both yielded approximately 1 per cent with Fehling's solution.—Analytical Notes, for 1906, 1907, p. 15.

The annual report of Philipp Röder, Wien, suggests that tincture of colchicum should be of a designated specific gravity, in addition to containing the specified amount of alkaloids.—Pharm. Zentralh., 1906, v. 47, p. 523.

Lyons, A. B., reports that 6 of the 12 replies received indicated that the original U. S. P. requirement of 0.5 gm. of colchicine in 100 cc. of fluid extract was satisfactory and readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Moerk, Frank X., points out that the official fluid extract of colchicum seed represents 91 per cent of the active constituents of the drug in place of 100 per cent as generally supposed. The tincture represents 9.1 per cent of the contained alkaloids.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

A review points out that Fischer-Hartwich, in their Commentary, assert that freshly powdered colchicum seed is an important factor in the production of a satisfactory wine of colchicum seed.—Pharm. Ztg., Berl., 1906, v. 51, p. 481.

Caldwell, Paul, believes that for wine of colchicum seed it would be preferable to use a detannated wine and also a stronger wine than that prescribed. By adding an extra 12.5 per cent of alcohol to the preparation a wine of due permanency is obtained.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 160.

Smith, F. A. Upshur, points out that as colchicine appears to require protection by amber glass it might be advantageous to direct that preparations of colchicum be preserved in like fashion.—Pharm. J., Lond., 1906, v. 22, p. 32.

Haines, Oliver L., asserts that in rheumatic pericarditis, with serious effusion, the action of colchicum is most effectual. One patient, "a lad," is quoted as having taken two drops of colchicum tincture every half hour, for five doses, then the same dose every three hours.—Trans. Am. Inst. Homœop., 1906, 62d sess., pt. 1, p. 430.

COLCHICINA.

Puckner, W. A., points out that, being a "weak base" whose salts are strongly hydrolyzed, colchicine can not be quantitatively abstracted from its ether or chloroform solution by means of dilute acid, and, being an ester, is rather easily decomposed, saponified; hence the estimation of the alkaloid is not a simple matter, especially when the seed, containing much fat, is to be assayed. The methods so far proposed are far from satisfactory, usually tedious and not exact. To this the methods found in the new pharmacopœia are no exception.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 237.

Francis, John M., reports that three lots of colchicine examined contained only 63.0, 63.6, 66.7 per cent of colchicine.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Kionka, H., reports experiments to determine the influence of various remedies used in gout on biliary secretions and agrees with Jacobi that colchicine does not appear to act as such, but as a decomposition product, oxydicolchicine—Ztschr. f. exper. Path. u. Therap., 1906, v. 2, p. 15.

COLLODIUM.

Wiebelitz, H., suggests that the pharmacopœia require that the film of collodion left after the evaporation of the solvent be clear and transparent and not opaque, indicating the freedom from water.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Philipp Röder, Wien, points out that testing collodion for free acid is most readily accomplished by shaking the collodion with an equal or double amount of water and then testing the resulting aqueous solution with litmus.—*Ibid.*, v. 51, p. 277.

Beringer, George M., suggests the use of acetone as a solvent for pyroxylon and presents several formulas for acetone collodions.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 501–503.

Taylor, S., hopes to see these preparations made with acetone, which yields, by reason of its somewhat slower evaporation, thinner and quite as elastic films, and of remarkable tenacity.—Pharm. J., Lond., 1906, v. 23, p. 669.

COLLODIUM CANTHARIDATUM.

Wiebelitz, H., proposes to add to the description for cantharidal collodion, "an olive-green liquid becoming brown in the course of time."—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

COLLODIUM FLEXILE.

The author of an article (from Pharm. Ztg., li, No. 73, 1906, 806) suggests that in the preparation of Collodium elasticum of the Ph. Germ., the castor oil (1) and turpentine (5) should be dissolved in spirit of ether (5), the solution filtered, evaporated, and sufficient collodion (to make 100) then added. He points out that this insures the removal of impurities and water, which are usually present in the Ph. Germ. turpentine. If larch turpentine is substituted for the official pinus turpentine this purification is not necessary. The oil and the larch turpentine are melted together, and the collodion is then directly added.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 650.

COLOCYNTHIS.

The Ph. Brit. Committee of Reference in Pharmacy report on colocynth pulp says:

> Ash 9 to 12 per cent, a limit for fixed oil (extraction with petroleum spirit), and microscopical characters of the powder should be introduced.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Francis, John M., asserts that 100 pounds of drug yields 30 pounds of pulp—10.5 pounds of extract. If the seeds are extracted with benzin to remove the oil, dried, extracted with 75 per cent alcohol, the extract is almost as active as the U. S. P. product.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Evans Sons Lescher and Webb found the petroleum ether extract of two samples of colocynth pulp, freed from seeds, to be 0.2 per cent and 0.4 per cent, respectively. The results from powder were 0.7, 1.4, 0.3, and 9 per cent. They assert that they had previously noticed Spanish pulp, quite free from seeds, with as much as 14 per cent of ether extract.—Analytical Notes for 1906, 1907, p. 15.

Patch, E. L., reports on two samples of colocynth pulp which yielded 49.6 and 46.5 per cent of extractive, respectively, to dilute alcohol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

MacCallum, John Bruce, includes colocynth in a study of the action of certain vegetable cathartics on the isolated center of a jellyfish (*Polyorchis*).—J. Biol. Chem., 1906–7, v. 2, p. 390.

Chiron, Paul, (L'Art Méd.) recommends colocynth in sciatica of the right side.—Abstr. Hahneman. Month., Phila., 1906, v. 41, p. 878.

CONIUM.

Henkel, Alice, mentions *Conium maculatum* L., commonly known as conium, poison hemlock, spotted parsley, and spotted cowbane, as naturalized from Europe; common in waste places, especially in the Eastern and Middle States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, v. 23.

The Ph. Brit. Committee of Reference in Pharmacy report on conium fruit says: These preparations should be assayed. The U. S. P. minimum (0.5 per cent of coniine) is too low.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Smith, F. A. Upshur, points out that the U. S. P. VIII age limitation of two years on conium is important and should be remembered also in connection with the preparations of conium.—Pharm. J., Lond., 1906, v. 22, p. 63.

Gordin, H. M., reviews the progress made in the chemistry of coniine during the year 1905, and among other points outlines the two color reactions devised by Reichard to distinguish coniine from nicotine.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 209.

Spiegel, L., refers briefly to the work of Ahrens, Braun, Willstätter, Löffler, and Meyer on the conium alkaloids.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 99.

Sc. reviews the work done on the composition of coniine and related bodies and the efforts made by Ladenburg to produce the alkaloid synthetically.—Pharm. Zentralh., 1906, v. 47, p. 807.

Herder, M., discusses the reaction of coniine with various agents, and records some experiments that were made to demonstrate this alkaloid in situ in conium seed.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 131, 132.

Gabutti, Emilio, discusses the recognition of coniine and its differentiation from other liquid alkaloids.—Boll. chim. farm., Milan, 1906, v. 45, pp. 289, 290.

Gane, E. H., says conium will average 0.2 per cent coniine.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Lyons, A. B., asserts that conium deteriorates so rapidly that only the large manufacturers have opportunity to procure a prime article. The fluid extract is very little used, and hardly deserves a place in the pharmacopœia.—*Ibid.*, v. 54, p. 439.

Gordin, H. M., considers the assay method very complicated; it will hardly give concordant results in the hands of different chemists.—Am. J. Pharm., Phila., 1906, v. 78, pp. 455–457.

Lyons, A. B., reports that 5 out of 8 persons who had tried the assay process for conium thought the U. S. P. standard for the fluid extract satisfactory and readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Puckner, W. A., reviews some of the recent literature relating to the assay of conium, and points out that the retention of a little fat will cause an appreciable error in the final result. On the other hand, since the free alkaloid is volatile at ordinary temperature, its loss by evaporation is rather liable to occur in case of faulty procedure and cause low results.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 267.

Moerk, Frank X., points out that fluid extract of conium represents but 90 per cent of the active constituents of the drug in place of 100 per cent as is generally supposed.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Webster, Herbert T., commends conium in the treatment of chronic diseases. * * * "Those who devote themselves largely to acute practice will get little help from it."—Eclectic Med. J., Cincin., 1906, v. 66, pp. 255–260.

McMillen says:

> The specific indication for conium by which I have selected it for use is excessive motility. The patient is in constant motion; when awake, often noisy, and destructive of clothing and furniture; under acute maniacal excitement.—*Ibid.*, p. 456.

Fyfe, John William, says that conium was employed in acute diseases as a means of relieving pain, also to "discuss scrofulous and cancerous tumors of the breasts," both internally and locally.—*Ibid.*, v. 66, p. 319.

CONVALLARIA.

Henkel, Alice, mentions *Convallaria majalis* L., commonly called convallaria, lily of the valley, as being found on the higher mountains from Virginia to the Carolinas.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 23.

Maurel, E., finds that the pigeon is more susceptible to the action of convallamarine than is the rabbit or the frog. The intravenous method can not be employed in the rabbit; in this animal it is twice as active as is the hypodermic. Intramuscular and hypodermic injections are more active than gastric ingestion.—J. de pharm. et de chim., Par., 1906, v. 24, p. 286.

Maurel, before the Biologic Society, announced that convallamarine in therapeutic doses is surely a vaso-constrictor and an accelerator of the circulation. In these doses it is also toxic to the heart; but the mortal dose does not necessarily kill the animal through the heart.—*Ibid.*, p. 325.

COPAIBA.

Weigel, G., asserts that the Ph. Ndl. IV requirement that copaiba dissolve in double its volume of 90 per cent alcohol is not in keeping with fact, as frequently this drug will not dissolve in double its volume of 96 per cent alcohol.—Pharm. Zentralh., 1906, v. 47, p. 398.

Caesar and Loretz point out that the requirements made for copaiba by the Ph. Ndl. IV and the Ph. Austr. VIII are particularly worthy of note.—Geschäfts-Ber. v. Caesar & Loretz in Halle a. S., 1906, p. 11.

van Itallie and Nieuwland discuss the composition of Surinam copaiba, particularly the resin, the resene, and the sesquiterpenalcohol. They also report a comparative study of the color reaction of Para, Bahia, Angostura, and Surinam copaiba with a mixture of sulphuric acid and acetic acid anhydride.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 161–164.

Weigel, G., discusses the several properties of the balsam derived from *Hardwickia pinnata* and its relation to copaiba and gurjun balsam.—Pharm. Zentralh., 1906, v. 47, pp. 773–776.

Caesar and Loretz assert that copaiba should have a specific gravity that ranges between 0.970 and 0.990 at 15° C. On heating, the resulting resinous mass should not be hard and brittle. The tests depending on solubility in 70 per cent alcohol, amyl alcohol, chloroform, and petroleum ether are not considered reliable. The determination of the acid and ester number is considered useless unless it can be shown that the drug is free from added rosin or gurjun balsam, which may be used to regulate these factors.—Geschäfts-Ber. v. Caesar & Loretz, in Halle a. S., 1906, pp. 88–89.

Geo. Hell & Co., in Troppau, report that the specific gravity of copaiba was found to vary from 0.986 to 0.992: the residue on drying at 100°, 51.08 to 60.25 per cent; the acid number 76.5 to 87.6; and the ester number 76.5 to 87.6.—Pharm. Post, Wien, 1906, v. 39, p. 150.

Utz discusses the possible application of the refractometer in the examination of copaiba and the detection of probable adulterations. Reports a series of experiments.—Apoth. Ztg., Berl., 1906, v. 21, pp. 72–73.

Schimmel & Co. caution against attaching too great value to the determination of the refractive index of copaiba by itself; when it is a question of slight adulterations this method will fail more readily than the usual one. The same applies to Rosenthaler's test, which depends on the observation of the colorations produced by a solution of vanillin in hydrochloric acid.—Semi-Ann. Rep., Schimmel & Co., 1906, April–May, p. 22.

Walbum discusses copaiba tests and outlines a method for the detection of rosin in copaiba which depends on the red brown color produced by rosin with dilute ammonia.—Arch. f. Pharm. og Chem., Copenhagen, 1906, v. 13, pp. 281–288.

Utz suggests the determination of the saponification and ester numbers of copaiba with separate quantities of the drug. He records his experiments and points out that in many instances the resulting figures are much lower with a cold saponification than with the Ph. Germ., IV, method.—Apoth. Ztg. Berl., 1906, v 21, p. 205.

Beille, L., asserts that gurjun balsam tends to replace the use of copaiba in France.—Bull. Soc. de Pharm de Bordeaux, 1906, v 46, p. 180.

Lackey, R. H., quotes a correspondent who asserts that copaiba is generally adulterated and that this adulterated balsam will respond properly to the tests.—Proc. Pennsylvania Pharm. Ass., 1906, p. 115.

Gane, E. H., reports a lot of copaiba containing only 16 per cent of resin. He asserts that copaiba is still frequently adulterated with gurjun balsam and that it is the exception to find the pure article.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 330, 336.

Patch, E. L., reports on 10 samples of copaiba which yielded from 31 to 48 per cent of resin, average 40 per cent. Of other samples examined one contained common rosin, and five contained fixed oil or gurjun balsam. The samples of Central American copaiba yielded from 50 to 56 per cent of resin.—*Ibid.*, v. 54, p. 336.

Vanderkleed, Chas. E., asserts that but one sample of copaiba, of many examined, was found to be adulterated with added resin.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Ohliger, Willard, reports that copaiba continues of bad quality, the most common adulterant still being gurjun balsam; also contains paraffin oil and other foreign matter. Color dark.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Caspari, Chas. E., reports six samples examined: Two U. S. P., three contained gurjun balsam, one had too low specific gravity.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Blome, W. H., reports on eleven samples of copaiba, only one of which was even passable, while none would pass a rigid test; all contained gurjun.—Proc. Michigan Pharm. Ass., 1906, p. 104.

Evans Sons Lescher and Webb report that 60 samples of imported copaiba balsam, with very few exceptions, fulfilled the requirements. They have examined two samples of cheap German balsam, which complied with the tests of the Ph. Brit., IV, but the behavior of the volatile oil showed adulteration. They assert that the tests of the Ph. Brit., IV, are quite insufficient to detect any but the crudest adulteration.—Analytical Notes for 1906, 1907, p. 16.

Marris, G. W., presents some interesting notes on a sample of copaiba, labeled "B. P.," quite normal in appearance, showing no definite departure from recognized standards, and yet giving evidence of the presence of a petroleum product, and of different botanical and geographical sources from those required by the Ph. Brit.—Pharm. J., Lond., 1906, v. 23, p. 720.

An editorial comments on the economic conditions affecting copaiba and presents a table giving the highest and lowest prices for copaiba during the years 1903 to 1906, inclusive.—Oil, Paint and Drug Rep., 1906, v. 70, Dec. 31, p. 7.

CREOSOTUM.

Smith, F. A. Upshur, suggests that the U. S. P. color limitations for creosote are too stringent and asserts that he has not seen a creosote that did not become brown in color on exposure to light. Amber glass hinders the development of this color.—Pharm. J., Lond., 1906, v. 22, p. 63.

Ohliger, Willard, found most samples to be coal-tar creosote, a particularly dangerous and reprehensible substitution.—Proc. Michigan Pharm. Ass., 1906, p. 46.

An editorial states that creosote becomes more repellant instead of less so, and calls attention to the work of Bouchet (Poutou médical, July 1; Progrès médical, Sept. 1), who has sought to find a suitable method of administering creosote. If taken in capsules it may come in contact with the wall of the empty stomach and act as an irritant. The creosote may be mixed with powdered charcoal and administered in wafers or capsules. The editorial also suggests that the creosote may be incorporated with a bland substance such as curd soap with licorice or althæa and put into capsules.—N. York M. J., 1906, v. 84, p. 898.

Le Fevre, R. E., states that he has used creosote in the treatment of whooping cough, in which it allays irritation, facilitates the expulsion of mucus, and possibly acts as an antiseptic.—*Ibid.*, v. 83, p. 764.

Porter, W., states that creosote is of minor importance in the treatment of tuberculosis and that larger doses are not indicated.—J. Am. M. Ass., 1906, v. 46, p. 1574.

Van den Berg, William H., asserts that creosote, or its derivative guaiacol, is still useful in a number of cases as an intestinal antiseptic.—Trans. Am. Inst. Homœop., 1906, 62d sess., p. 397.

CRESOL.

Riedel's Berichte presents an exhaustive study on commercial cresol with the conclusion that the Ph. Germ. should require that cresol contain a specified quantity of a fraction that will distill between 195° and 205° C., as it is in this particular fraction that the more valuable cresols are found.—Riedel's Berichte, Berl., 1906, pp. 40–43.

Dreyfus, W. E., reviews the U. S. P. VIII requirements for cresol and says, "on the whole I find that cresol has not been thoroughly studied by the member of the committee having this special subject in charge."—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 296.

Vanderkleed, Charles E., reports difficulty in obtaining cresol that would answer the U. S. P. requirements as regards absence of phenol.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Graham, Willard, asserts that considerable trouble was experienced in obtaining cresol which would answer to the tests laid down in the U. S. P.—*Ibid.*, p. 153.

Patch, E. L., reports that three out of six samples of cresol examined answered the pharmacopœial requirements.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Francis, John M., asserts that it is almost impossible to find a U. S. P. product.—*Ibid.*, p. 336.

Vanderkleed, Charles E., points out that great care is necessary in applying the test for phenol in cresol. If more than the prescribed quantity of glycerin is used, even absolutely pure cresol will not entirely separate out, thus leading to the wrong conclusion that phenol is present.—Proc. Pennsylvania Pharm. Ass., 1906, p. 133.

Coblentz, Virgil, urges great care in the application of this test and calls attention to its lack of delicacy, quoting M. F. E. Dodge, of the Barrett Mfg. Co.—Apothecary, Bost., 1906, v. 18, p. 911.

La Wall and Cook report the results of experiments to determine the quality of the cresol on the market, and suggest that a slight modification of the official formula for compound solution of cresol, as outlined by them, produces a more satisfactory preparation.—Am. J. Pharm. Phila., 1906, v. 78, pp. 169–172.

Jonescu and Bukarest discuss the changes that the cresols undergo in the organism and their influence on metabolism and intestinal putrefaction in carnivora. They report a number of experiments and conclude that the toxicity of the three isomers of phenol is the controlling factor of their behavior in the animal organism.—Biochem. Ztschr. Berl., 1906, v. 1, pp. 399–407.

Blumenthal, Ferdinand, discusses the chemistry of the poisonous action of cresol and of cresol soap solutions.—*Ibid.*, v. 1, pp. 134–152.

Wandel presents a contribution to the study of lysol and cresol poisoning, records a number of experiments, and discusses the dose, the structural changes produced, and the results of chemical examination.—Arch. f. exper. Path. u. Pharmakol., 1906, v. 56, pp. 161–185.

Bial, Manfred, presents some additional observations and criticises some of the conclusions arrived at by Wandel.—*Ibid.*, pp. 416–419.

Wohlgemuth, J., (Berl. klin. Wchnschr., v. 43, No. 17) describes the results of examination of urine of patient poisoned with lysol; the urine was black, free from preformed sulphates, and contained much glycuronic acid.—J. Am. M. Ass., 1906, v. 47, p. 394.

CRETA PRÆPARATA.

Schimpf, Henry W., thinks the purity standard for prepared chalk very indefinite, "trifling residue" is relative and may mean more or less; definite tests for impurities, such as were given in the U. S. P., 1890, should have been continued.—Am. J. Pharm., Phila., 1906, v. 78, p. 22.

Ohliger, Willard, reports prepared chalk with a considerable amount of matter insoluble in nitric or hydrochloric acids.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Boom, Henry H., (Stomatologist) discusses tooth powders and warns against the use of Creta præparata U. S. P. because it is "gritty."—Dental Cosmos, Phila., 1906, v. 48, p. 618.

CUBEBA.

Nelson, Burt E., describes and figures the structural characteristics of powdered cubeb.—Merck's Report, N. Y., 1906, v. 15, p. 321.

The Ph. Brit. Committee of Reference in Pharmacy report on cubeb berries says: "Should have microscopical characters, an ash limit, and a standard for oleoresin (not less than 17 per cent.)"—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Philipp Röder, Wien, asserts that cubeb should yield not more than 7.5 per cent of ash, and recommends the determination of the alcohol ether extract content.—Pharm. Zentralh., 1906, v. 47, p. 522.

Evans Sons Lescher and Webb assert that of eight samples of cubeb offered to them, two were of the " macy type and gave a yellowish brown color with sulphuric acid. They believe this simple test is of very great value, but agree that a fixed standard for oleoresin is also to be recommended.—Analytical Notes for 1906, 1907, p. 17.

La Wall, Charles H., explains why alcohol is preferred to acetone or ether in the extraction of the oleoresin; the latter, while extracting a larger proportion of the oleoresin, gives a turbid product.—Proc. New Jersey Pharm. Ass., 1906, p. 72.

Smith, F. A. Upshur, points out that in the U. S. P. oil of cubeb is directed to be protected from light, while the oleoresin is not given the same consideration.—Pharm. J., Lond., 1906, v. 22, p. 33.

An editorial reviews the market conditions relating to cubeb and gives figures showing the prevailing prices during 1902–1906.—Oil, Paint and Drug. Rep., 1906, v. 70, Sept. 3, p. 7.

CUPRI SULPHAS.

Kebler, Lyman F., reports copper sulphate containing iron in appreciable quantities.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Read, Ezra L., discusses the estimation of copper by titanium trichloride.—J. Chem. Soc., Lond., 1906, v. 89, pt. 2, pp. 1491–1495.

An editorial discusses the claims made for the efficiency of copper sulphate as a purifier of water for drinking purposes.—J. Am. M. Ass., 1906, v. 46, p. 513.

Clark and Gage (from J. Infect. Dis., Chicago, February, 1906) point out the danger of depending on the use of copper sulphate or the storing of water in copper vessels, and conclude that very dilute solutions of copper sulphate or of colloidal copper may have a decided invigorating effect on bacterial activity.—*Ibid.*, v. 46, p. 915.

Toyonaga, M., (Bull. Coll. Agric., Tokyo, 1906, v. 7, pp. 25–28) reports that rabbits were kept for eight months with copper carbonate given in the food (2 gm. in all) without showing any signs of copper poisoning.—Abstr. in Biochem. Centralbl. Leipz., 1906–7, v. 5, p. 247.

Moulden, W. R., (Med. Rec. N. Y., July 28) thinks that copper sulphate shows a more or less selective action on the *Amœba coli*, hence that it is useful in the treatment of intestinal amœbiasis.—J. Am. M. Ass., 1906, v. 47, p. 458.

Stevens, J. F., (Western Med. Rev., Lincoln, Nov.) included the use of copper by the mouth and flushing of the colon by solution of copper sulphate with other measures in the treatment of typhoid fever.—*Ibid.*, v. 47, p. 2122.

CUSSO.

Kraemer, Henry, asserts that the available kousso is chiefly staminate flowers.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 336.

Hellström, A., (Farmaceutiskt Notisblad, 1906, No. 4) reports an examination of a commercial sample of kousso which was largely contaminated with leaves and flower stalks (20 per cent) and male flowers (17 per cent). He gives a detailed description of the drug and points out that the occurrence of large quantities of pollen grains in the powdered drug is an evidence of sophistication.—*Ibid.*, v. 54, p. 785.

CYPRIPEDIUM.

Henkel, Alice, mentions *Cypripedium hirsutum* Mill., also known as *Cypripedium pubescens* Willd., commonly known as cypripedium, large yellow lady's slipper, yellow moccasin flower, and American valerian as a native in woods and thickets from Nova Scotia south to Alabama and west to Nebraska and Missouri.

Cypripedium parviflorum Salisb., commonly known as cypripedium and small yellow lady's slipper, is also mentioned. Native in woods and thickets from British America to Georgia, Missouri, and Oregon.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 25.

Felter, Harvey Wickes, considers *Cypripedium pubescens* a splendid remedy for weak women and nervous children. He quotes J. Paul Harvil (Modern Eclecticism, February, 1906), who employs it in the nervousness attendant upon the disorders of the male as well as the female genital tract, spermatorrhœa with melancholia and sleeplessness, hyperæsthesia caused by uterine or ovarian disorders, and in the extreme nervous condition associated with or following gleet.—Eclectic Med. J., Cincin., 1906, v. 66, p. 193.

Fyfe, John William, says that *Cypripedium pubescens* was used in cases requiring a sedative, nervine, and antispasmodic.—*Ibid.*, v. 66, p. 321.

DECOCTA.

The Ph. Belg., III, under a general heading "Decocta et Infusa," gives directions for their preparation, the strength usually desired, and points out that for potent medicaments the strength is to be indicated by the physician. The Ph. Austr., VIII, also has a general heading for decocta containing directions for the preparation of this class of galenicals.

DIACETYL-MORPHINE.

Fonteyne, A., records observations on the influence of heroin on blood pressure and respiration and gives a number of historical and pharmacological references in addition to the details of his own researches.—Arch. internat. de pharmacod. et de thérap., Par., 1906, v. 16, pp. 34–356. (See also General Conclusions, *Ibid.*, p. 449 ff.)

Lewin discusses the apparent discrepancy in the maximum dose of diacetyl-morphine hydrochloride (heroin hydrochloride) as given in the several authoritative lists. He points out that heroin has been shown to be 33 per cent more poisonous than morphine and that the maximum daily dose is more than 100 per cent more poisonous than morphine. He also points out that many persons are particularly susceptible to the effects of heroin and that this effect should not be lost sight of.—Apoth. Ztg. Berl., 1906, v. 21, p. 502.

DIGITALIS.

Henkel, Alice, mentions *Digitalis purpurea* L., commonly known as digitalis, foxglove, fairy fingers, thimbles, and lady's glove, as having been introduced from Europe as a garden plant, and now escaped from cultivation in parts of Oregon, Washington, and West Virginia.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 26.

True, Rodney H., points out that the cultivator of digitalis must contend with the fact that the leaves should be gathered in the second year at the time of flowering, that they are distributed along the stem and must be gathered one by one, and that the plant occupies the ground for two years.—Oil, Paint, and Drug. Rep., 1906, v. 70, Oct. 17, p. 37.

Grier, J., suggests that the Ph. Brit. restrict the official digitalis to the English grown biennial leaves, not more than 1 year old.—Pharm. J., Lond., 1906, v. 22, p. 238.

The Ph. Brit. Committee of Reference in Pharmacy report on digitalis leaves says:

> Chemical assay impossible, and physiological assay not feasible. Directions must be given for carefully drying and storing. Also ash limit and revised microscopical characters.—Chem. & Drug. Lond., 1906, v. 69, p. 863.

Wang, E. (Festschr. f. O. Hammarstein), points out that Norwegian digitalis leaves have an average value, rather than an abnormally high one as generally supposed.—Biochem. Centrlbl. Leipz., 1906–7, v. 5, p. 703.

Bohny, Paul, (Inaug-Dissertation, Zürich, 1906) presents a comprehensive description of the morphology and anatomy of the leaves of *Digitalis purpurea* L. and of the leaves used as adulterants of this drug.—Bot. Centralbl. Cassel, 1906, v. 102, p. 267.

Wippern, Franz, asserts that it would be desirable for the pharmacopœia to define more clearly how the leaves of digitalis are to be kept. He also points out that to avoid possible disappointment with the liquid preparations of digitalis these are to be freshly prepared at more or less frequent intervals.—Pharm. Ztg. Berl., 1906, v. 51, p. 807.

An editorial calls attention to the results of examinations of digitalis leaves which had been stored with especial precautions. The leaves and possibly tablet triturates are hygroscopic, and the moisture favors the decomposition of the contained glucosides by enzymes.—N. York, M. J., 1906, v. 84, p. 1279.

Focke (Viertel Jahresschr., f. gericht. Med. u. öffentl. Sanitätswesen, 1906) outlines the requirements that should be made by the pharmacopœia for digitalis leaf. Among the several requirements he suggests a description for the powdered drug; he outlines requirement for its physiological action and the requirement that the drug be preserved not longer than two years.—Apoth. Ztg., Berl., 1906, v. 21, p. 580.

Caesar and Loretz call attention to the importance of having digitalis tested physiologically, and assert that when properly powdered and dried this drug can be kept for years without any appreciable change.—Geschäfts-Ber. v. Cæsar and Loretz, 1906, pp. 29–31.

Smith, F. A. Upshur, points out that in digitalis we have a drug which has yielded to various chemical investigators a multitude of different, more or less pure, substances, some of them closely resembling others. It would appear from this, even allowing for experimental error, that the active principles of digitalis are very readily changed from one chemical form into another. On this account the action of solar light, one of the most potent agents for chemical change, should be excluded from the liquid preparations of digitalis.—Pharm. J., Lond., 1906, v. 22, p. 85.

Philipp Röder, Wien, proposes a quantitative test for tincture of digitalis, as follows: Ten gm. of tincture of digitalis are mixed with an equal volume of water and evaporated, on a water bath, to one-half the volume, precipitated with basic lead acetate, filtered, and the filtrate shaken out with chloroform. This chloroform solution should, on evaporation, leave a residue which, when dissolved in concentrated sulphuric acid, will give a violet coloration on the addition of bromine water.—Pharm. Zentralh., 1906, v. 47, p. 523.

An editorial discusses some of the recent contributions to our knowledge of digitalis and points out the need for keeping the leaves free from moisture.—Am. Druggist, N. Y., 1906, v. 49, p. 355.

Hartwich and Bohny discuss the adulteration of digitalis with special regard to the composition of commercial powdered digitalis. They point out that the purchase of drugs in the powdered form by pharmicists is on the increase, but insist that it is only permissible when these powders are properly controlled by microscopic and chemical means. They discuss the several varieties of digitalis and their characteristic structures, also describe other leaves used as adulterants or occurring as admixtures of digitalis.—Apoth. Ztg., Berl., 1906, v. 21, pp. 230–232, 242–246, 251–253, 267–271, 276–278.

Fernan, Albert, reports examining a supposed sample of digitalis which was found to be Verbascum.—Ztschr. d. allgem. österr. Apoth.-Ver. Wien, 1906, v. 44, p. 79.

Weigel, G., characterizes the U. S. P. VIII monograph on infusion of digitalis as being remarkable in that it does not require, specifically, that infusion of digitalis be freshly prepared.—Pharm. Zentralh., 1906, v. 47, p. 85.

Löwy, J., points out that hydrochloric acid, of the same concentration as that present in the gastric juice, materially weakens the activity of the infusion of digitalis, while pepsin itself has no such action. The infusion of digitalis is said to be reduced in strength one-half in twenty-four hours by the organic acids present or formed. (Wien. klin. Wchnschr., 1906, v. 19, p. 1157.)—Chem. Repert, Cöthen, 1906, v. 30, p. 411.

An abstract (from Pharm. Ztg., li, No. 28, 1906, 322) outlines a method which the new Austrian Pharmacopœia directs for the identification of tincture of digitalis.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 666.

The inspectors of pharmacies found samples of tincture of digitalis with as little as 0.42 to 2.70 per cent of dry extract.—J. de pharm. d'Anvers., 1906, v. 62, p. 91.

Cline, R. R. D., outlines a method for making a tincture of digitalis which he asserts to be practically colorless, odorless, and tasteless and still active and efficient. He extracts the leaves with petroleum benzin, dries and extracts with a mixture of alcohol and water in the usual way. The resulting tincture is treated with ferric hydroxide in the proportion of about 8 ounces per pint, and is subsequently filtered through talcum. The filtrate is chilled for six hours and again filtered.—Proc. Texas Pharm. Ass., 1906, p. 26.

Caesar and Loretz assert that tincture of digitalis, even under the most favorable conditions, deteriorates to the extent of fully 10 per cent annually. They recommend that pharmacists prepare only sufficient of this tincture and renew the same with a fresh preparation as soon as the fresh crop of digitalis is available.—Geschäfts-Ber., v. Caesar & Loretz, 1906, p. 85.

Bedall, C., points out that a number of proprietary preparations of digitalis are being exploited in Germany and that the apothecary is not in position to control their efficiency. He suggests that a government laboratory be developed which should standardize or test all digitalis preparations.—Apoth. Ztg., Berl., 1906, v. 21, p. 852.

Kockmann, M. (Bull. de la soc. de Méd. de Gand., 1906), discusses the variability of the action of digitalis leaf and reports a series of blood pressure experiments on dogs.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 630.

The same (Inst. de Pharmacodyn. et de Thér. Gand.) discusses the action of several bodies of the digitalis group on the vagus nerve. (From Arch. int. d. pharmacodyn. et de thérap., 1906, v. 16, p. 321.)—*Ibid.*, v. 5, p. 630.

Beckstroem, R., suggests that the Ph. Germ. require that tincture of digitalis be directed to be protected from light.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 327.

Focke (Berl. Klin. Wchnschr., 1906, p. 642) discusses the value of frogs for the qualitative as well the quantitative estimation of the activity of digitalis; also the need for a disinterested control of digitalis preparations.—Apoth. Ztg., Berl., 1906, v. 21, pp. 400–401.

Focke (Vierteljahresschrift f. gerichtl. Med. u. öffentl. Sanitätswesen, 1906) outlines the following requirement for the physiological activity of digitalis: The one-fiftieth part of the weight of a frog (*Rana temporaria*) of a 1–10 infusion of digitalis, injected into the lymphatics, near the thigh, should require not less than seven and not more than fifteen minutes to effect the complete cessation of pulsation in the exposed heart; in at least four experiments the average time being from nine to eleven minutes.—*Ibid.*, v. 21, p. 580.

Wang, E., discusses the formula advanced by Focke $\frac{p}{d+t}$ = the weight of the frog divided by the dose and the time, and its application in a practical way. He has examined a number of samples of digitalis grown in Norway and finds them to be average and never above normal. He confirms assertions made by Focke that there is a distinct degeneration in the leaf unless carefully preserved. (From Chem. Ztg., Rep., 1906, p. 338.)—*Ibid.*, v. 21, p. 890.

Pfaff, Franz, discusses the use and abuse of digitalis and reviews the history of the introduction of digitalis with special reference to the work done by Withering and by Ferriar.—Bost. Med. & Surg. J., 1906, v. 154, pp. 551–552.

Gottlieb R., (Med. Klinik, 1906, p. 955) writes on the theory of digitalis action. The total action of digitalis substances, he believes, includes (1) increase of the work of the heart, (2) constricting the splanchnic area, (3) reducing the number of beats, (4) regulating the arythmia.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 751.

von Tabora, D., reports a series of experiments made to determine the influence of digitalis on the mammalian heart.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 499–510.

Hatcher, Robert A., discusses the pharmacology of digitalis and some of the digitalis principles.—J. Am. M. Ass., 1906, v. 47, pp. 2059–2061.

Cloetta and Fischer discuss the behavior of digitoxin in the organism and report a series of experiments to determine the distribution of digitoxin in various organs and parts of the body. (From Ztschr. f. physiol. Chem. v. 47.)—Biochem. Centralbl., Leipz., 1906–7, v. 77, p. 1369.

von den Velden, R., reports experiments with digitalis substances, digitoxin and convallamarin, to determine their action on the depressor nerve.—Arch. f. exper. Path. u. Pharmakol. Leipz., 1906, v. 55, pp. 223–239.

Haynes, G. S., considers digitalis less efficient as a cardiac stimulant (that is, a drug which increases the cardiac output per beat) than squill, in that it has not the same effect in increasing the energy of contraction of the heart.—Biochem. J., Liverpool, 1906, v. 1. pp. 62–87.

An editorial discusses the results of Hayne's experiments, published in the second number of the Bio-Chemical Journal, in which the actions of digitalis, squills, and strophanthus were compared. Haynes is quoted as recommending a more extended use of squill in cardiac disease, but attention is called to the greater vaso-constriction and the more pronounced action on the gastro-intestinal tract.—Brit. M. J., Lond., 1906, v. 1, p. 1494.

Filippi, Eduardo, undertook a research to determine whether there is indeed an analogy between digitalis and barium. He arrives at the general conclusion that the chloride of barium is a myocardial poison. The paper gives eight figures of cardiograms and a tabulated statement of pressure variations, He does not share the enthusiasm of those who have clinically adopted $BaCl_2$ as a substitute for digitalis.—Arch. di farmacol. sperim., 1906, v. 5, pp. 103–122.

Schmidt, Ad., (Berl. kiln. Wchnschr. v. 43, No. 13) states that digitalis is more useful than all other measures combined for certain forms of gastro-intestinal troubles.—J. Am. M. Ass., 1906, v. 47, p. 241.

Reilly, T. F., calls attention to the intravenous use of digitalis preparations in Germany, while this method has not thus far made progress here.—*Ibid.*, v. 47, p. 649.

Goepp, R. Max, discusses the action of digitalis, discredits the opinion that it is cumulative, and has found digitalin, German, Merck, an efficient remedy in doses of from one-thirtieth to one-eighth grain.—Merck's Arch., N. Y., 1906, v. 8, pp. 10–12.

Cloetta, M., (München med. Wchnschr., v. 53, No. 47) states that the cumulative action of digitalis leaves is not seen with the fresh leaves, but results from changes occurring with age.—J. Am. M. Ass., 1907, v. 48, p. 181.

Saundby, Robert, says that so long as digitalis does not reduce the pulse rate below 80, the good effects are as apparent in aortic disease as in other conditions.—Brit. Med. J. Lond., 1906, v. 2, p. 987.

Taylor, Seymour, discusses the use of digitalis in aortic insufficiency, in which conditions he considers it not only a dangerous drug but an actual poison.—*Ibid.*, v. 1, 1461.

This paper calls out several interesting communications from the standpoint of the clinician.—*Ibid.*, v. 2, pp. 173, 277, 329.

Colbeck, E. H., discusses the use of digitalis in valvular disease of the heart.—*Ibid.*, v. 2, p. 1539.

Umber, F., discusses the therapeutic use of digitalis and indorses the assertion made by Sahli that the proper use of digitalis is an art. He discusses several preparations of digitalis and asserts that digitoxin, or preparations containing digitoxin exclusively, are not as desirable as preparations representing all of the active constituents of digitalis leaves.—Therap. d. Gegenw. Berl., 1906, v. 47, pp. 6–16.

Felter says that specific digitalis meets a weak circulation with or without fever, but with a markedly weak heart. The pulse is feeble, irregular, often fluttering, and sometimes dicrotic. The least exertion causes the heart to beat rapidly but feebly. It is the remedy for asthenia only, and then proves a veritable heart tonic.—Eclectic Med. J., Cincin., 1906, v. 66, p. 204.

Fyfe, John William, quotes an early writer to the effect that digitalis diminishes the activity of the pulse and the general irritability of the system, and increases the action of the absorbents and the discharge of urine. In dropsy in the chest this medicine is very useful. It never fails to increase the discharge of urine and afford relief.—*Ibid.*, v. 66, p. 318.

Baker, William, discusses delirium and hallucinations as toxic effects of digitalis.—Hahneman. Month., Phila., 1906, v. 41, pp. 127–131.

Wells, G. Harlan, discussing the value of digitalis in heart diseases associated with failing compensation and dilatation, comments on the inefficiency of many of the preparations of the drug; he adds that in cases where the drug seems well indicated we should never give it up as useless until we have used a preparation which has been shown to be active by physiological tests.—*Ibid.*, p. 259.

Haines, Oliver L., says that in pericarditis digitalis should be used in a potency removed from danger of physiological effect.—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. I, p. 435.

Collins, C. D., recommends the use of digitalis in cases of pruritus vulvæ with bluish red and œdematous skin, with feeble circulation;

chronic pustular dermatitis with seborrhœa; circulatory disturbances.—*Ibid.*, Pt. II, p. 287.

Additional references on the use of digitalis will be found in the Index Medicus and J. Am. M. Ass.

ELASTICA.

Esch, Werner, reviews the advances made in the production and the utilization of rubber and gutta-percha. The paper contains a comprehensive bibliography relating to the various phases of the rubber industry.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 195–198.

Schellman, W., reports examining several of the varieties of crude rubber produced in East Africa.—Der Pflanzer, Tanga, 1906, v. 2, pp. 1–6, 193–207.

He discusses the cultivation of various rubber-producing trees and plants.—*Ibid.*, v. 2, pp. 9–20, 130–137.

Eismann-Hale, Gust., discusses the cultivation of rubber in East Africa.—*Ibid.*, v. 2, pp. 22–29.

Zimmermann, A., reports his experiments on the production of rubber from *Manihot glaziovii*, discusses the cultivation and the production of rubber from varieties of *Castilloa*, and presents a list of literature relating thereto.—*Ibid.*, v. 2, pp. 30–57, 81–123.

Harris, W., presents a compilation of information relating to rubber-producing plants for the use of intending rubber planters in Jamaica.—Bull. Dept. Agric., Jamaica, 1906, v. 4, pp. 241–282.

Moore, J. C., (West Indian Bul., 7, 1906, No. 1, pp. 21–29, figs. 3) gives some data on tapping experiments with *Castilloa elastica*. The trees were 15 to 17 years old and the average yield of rubber obtained was 11.06 oz. per tree.—Exper. Sta. Rec., 1906, v. 18, p. 148.

Ahern, G. P., ([Philippine] Bur. Forestry Bul. 3, p. 40, figs. 2, map 1) brings together a large amount of material relative to the culture, preparation, and uses of ceara, castilloa, and para rubber.—*Ibid.*, v. 18, p. 148.

Additional references on the cultivation and production of rubber will be found in Exper. Sta. Rec., v. 18, and in Just's Bot. Jahresb.

ELATERINUM.

Thoms, H., presents some general notes on elaterin, its origin and use, and discusses the chemical composition.—Pharm. Zentralh., 1906, v. 47, pp. 825–826.

Berg, A., reviews the work done in connection with elaterin, reports some additional experiments, and proposes $C_{28}H_{38}O_7$ as representing the molecule composition.—Bull. Soc. de chim., Par., 1906, v. 35, pp. 435–437.

v. Hemmelmayr, Franz, discusses the literature relating to elaterin and expresses the belief that the molecular formula $C_{28}H_{38}O_7$

proposed by A. Berg is not correct and that $C_{24}H_{34}O_6$ would more really represent the true composition of this product.—Monatsh. f. Chem., Wien, 1906, v. 27, pp. 1167–1182.

ELIXIRIA.

Hommel, P. E., thinks the revision committee of the U. S. P. would have been perfectly safe and sane if they had increased the list of elixirs. He commends elixirs of sodium salicylate, sodium bromide, potassium bromide, pepsin, bismuth and strychnine, compound cramp bark, calisaya bark, and cinchona bark and its alkaloids. He thinks it a great mistake to substitute common alcohol for the deodorized in the formulas for the aromatic elixirs, and quotes Oldberg in support of his proposition.—Proc. New Jersey Pharm. Ass., 1906, pp. 91–93.

Caldwell, Paul, gives the alcohol content of elixir adjuvant and elixir aromatic as being approximately 25 per cent.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

ELIXIR AROMATICUM.

Toplis, William G., presents an expeditious method for the preparation of aromatic elixirs, which he characterizes as one of the greatest time consumers of the U. S. P.—Am. J. Pharm., Phila., 1906, v. 78, p. 332. (For discussion, see *Ibid.*, p. 347.)

Dunning proposes a modification of the method of preparation; he dissolves the sugar and adds the hydro-alcoholic solution of the oils.—Proc. Maryland Pharm. Ass., 1906, p. 97.

Heffner, Edgar E., points out that simple elixir contains upward of 25 per cent of alcohol and that some physicians at least appear to think that it is nearly or quite free from alcohol. He questions the desirability of using such a strongly alcoholic vehicle for children.—Proc. Pennsylvania Pharm. Ass., 1906., pp. 77–79.

An editorial calls attention to the large amount of alcohol which the physicians may unwittingly prescribe in the use of aromatic elixir.—N. York M. J., 1906, v. 84, p. 138.

ELIXIR BISMUTHI N. F.

Caldwell, Paul, believes the elixir of bismuth is now too sweet and suggests that a portion of the glycerin be omitted.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR BUCHU N. F.

Caldwell, Paul, prefers magnesium carbonate as a filtering medium and deprecates the change to talcum; also suggests the addition of more alcohol in the making of elixir of buchu.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR BUCHU COMPOSITUM N. F.

Caldwell, Paul, points out that the compound elixir of buchu now contains twice as much extractive matter as before and suggests that the amount of alcohol be materially increased.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR BUCHU ET POTASSII ACETATIS N. F.

Caldwell, Paul, asserts that potassium acetate is frequently acid and is then incompatible with elixir of buchu. He also suggests the addition of 5 per cent of glycerin.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR CHLOROFORMI COMPOSITUM N. F.

Caldwell. Paul. points out that compound elixir of chloroform is not an elegant preparation. He also says:

> It is an encouraging condition in pharmacy when preparations such as this fail to command attention from the conscientious pharmacist.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR CINCHONÆ N. F.

Caldwell, Paul, believes that the new formula for elixir of calisaya is objectionable in some ways and that the resulting preparation is not so satisfactory as one made by percolating the various aromatic drugs together with the cinchona bark and then adding the usual diluents.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

F. S. H. deplores the fact that elixir of cinchona of the previous editions of the N. F. has been replaced by an elixir of cinchona made from the alkaloids. He thinks that the old elixir filled a want not supplied by the present substitute.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 349.

ELIXIR CINCHONÆ ET FERRI N. F.

Caldwell, Paul, asserts that his experience with the scale salts of iron solution with aromatic elixir has not been satisfactory and suggests the use of the precipitated phosphate of iron and sufficient phosphoric acid to dissolve in the making of elixir of cinchona and iron.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR CINCHONÆ ET HYPOPHOSPHITUM N. F.

Caldwell, Paul, asserts that double the amount of hypophosphorous acid in the formula for elixir of cinchona and hypophosphites would be preferable.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR CINCHONÆ, FERRI, ET CALCII LACTOPHOSPHATIS N. F.

F. S. H. points out that elixir of cinchona, iron, and calcium lactophosphate presents considerable difficulty because of the incompatibility between the acid condition required to keep the calcium lactophosphate in solution and the neutral or alkaline conditions required to retain the iron.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 350.

ELIXIR DIGESTIVUM COMPOSITUM N. F.

Caldwell, Paul, asserts that compound digestive elixir has not received attention from the physician because it is said to be therapeutically incorrect.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR ERIODICTYI AROMATICUM N. F.

Caldwell, Paul, asserts that the aromatic elixir of yerba santa might well have been considered obsolete, as the aromatic syrup of yerba santa is the preparation most generally used when a vehicle for quinine or other bitter remedies is required.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR FERRI, QUININÆ, ET STRYCHNINÆ N. F.

Beringer, George M., jr., suggests a modification of the formula: Replacing the quinine hydrochloride by an equivalent of alkaloid, the alkalinization of the tincture of citro-chloride of iron with ammonia water, and finally acidification with hydrochloric acid.—Proc. New Jersey Pharm. Ass., 1906, p. 98.

Caldwell, Paul, asserts that elixir of iron, quinine, and strychnine made according to the N. F. darkens quickly and the alkaloids precipitate freely after standing a short time.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR FERRI, QUININÆ, ET STRYCHNINÆ PHOSPHATUM.

Cook, E. Fullerton, reports that Harry C. Hughes suggests a slightly acid elixir, which is more permanent as to color and more free from likelihood of precipitation. Instead of neutralizing with ammonia water at the end of the process, as is directed by the U. S. P., he allows it to remain slightly acid and says it is miscible in all proportions with water and will keep well.—Am. J. Pharm., Phila., v. 78, p. 420.

Eliel, Leo, commends this as a popular and exceedingly valuable addition, but cautions against a too close following of the directions, as it can not be so quickly finished. The addition of the strong acid to the alkaloidal solution produces a thick magma which is but slowly soluble. The directions should be read to divide the aromatic elixir between the alkaloidal solution and the phosphoric acid, and then to mix the two solutions. A clear mixture results.—Proc. Indiana Pharm. Ass., 1906, p. 69.

In the discussion, Tepe asks whether the Committee of Revision does not test all formulas before publishing them. Every time the new pharmacopœia comes out some one always makes changes or recommends a change in some of the formulas.—*Ibid.*, p. 72.

Mittelbach, Wm., inquires as to the improvement, if any, in the new process; he thinks it complicated and involving very careful manipulation.—Proc. Missouri Pharm. Ass., 1906, p. 45.

Hemm, Francis, presented three samples: The old, made of sulphates; the 1896 formula, calling for the alkaloids; and the new formula. He thinks that while the formula looks complicated it is not difficult and the product is a very nice one.—*Ibid.*, p. 52.

Boring, Edwin M., asserts that he has failed to get a satisfactory preparation by following the formula in the U. S. P. VIII.—Proc. Pennsylvania Pharm. Ass., 1906, p. 104.

ELIXIR GENTIANÆ ET FERRI PHOSPHATIS N. F.

Caldwell, Paul, asserts that 5 per cent of glycerin should be added to the elixir of gentian and iron phosphate, to prevent gelatinization and to prevent the elixir of gentian from becoming sour.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR GLYCERPHOSPHATUM N. F.

Dunning, H. A. B., presents a formula for elixir of glycerophosphates compound which can also be made the basis of the simple elixir of calcium and sodium.—Bull. Pharm., Detroit, 1906, v. 20, pp. 157–159.

He points out that the elixir of glycerophosphates of the N. F. contains so much phosphoric acid that it is nearly a solution of phosphates containing variable proportions of gylcerophosphates according to age.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

ELIXIR GLYCYRRHIZÆ N. F.

Caldwell, Paul, asserts that elixir of glycyrrhiza should have been dropped from the N. F., as it is now contained in the U. S. P. VIII under the title of elixir adjuvans.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR GRINDELIÆ N. F.

Caldwell, Paul, suggests the addition of potassium carbonate and the use of magnesium carbonate as a filtering agent in the making of elixir of grindelia.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR GUARANÆ N. F.

Caldwell, Paul, asserts that alcohol should replace the aromatic elixir in the formula for elixir of guarana on account of the resinous nature of the fluid extract.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR HYPOPHOSPHITUM CUM FERRO N. F.

Caldwell, Paul, points out that in the formula for elixir of hypophosphites with iron the ferrous sulphate could be easily replaced by the hypophosphite and the solution effected by the addition of sufficient potassium or sodium citrate.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR PEPSINI N. F.

Caldwell, Paul, asserts that the addition of hydrochloric acid to the formula for elixir of pepsin is not necessary.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR PEPSINI ET BISMUTHI N. F.

Caldwell, Paul, believes that in the making of elixir of pepsin and bismuth a solution of pepsin in water, together with an equal amount of glycerin, as required in the glycerite of pepsin, is far better than using the glycerite itself, as the acid present tends to precipitate the bismuth.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR PEPSINI, BISMUTHI ET STRYCHNINÆ N. F.

Caldwell, Paul, asserts that the tartaric acid in the formula for elixir of pepsin, bismuth, and strychnine is objectionable. He suggests the use of strychnine sulphate dissolved in hot water.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR POTASSII BROMIDI N. F.

Caldwell, Paul, points out that tincture of cudbear does not color alkaline solutions well, and that cochineal color, N. F., would be a much more desirable coloring agent for elixir of potassium bromide.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

ELIXIR QUININÆ ET PHOSPHATUM COMPOSITUM N. F.

F. S. H. asserts that no possible manipulation that he knows of will make a permanent preparation of the elixir of quinine and phosphates compound N. F. III, since the soluble ferric phosphate can not remain in solution if the finished preparation is very acid, as it necessarily will be from the syrup of calcium lactophosphate. On the other hand, the calcium lactophosphate will not remain in solution if the excess of acid is neutralized with ammonia in order to hold the iron in solution.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 350.

ELIXIR RHAMNI PURSHIANÆ COMPOSITUM N. F.

Caldwell, Paul, believes that the compound elixir of cascara sagrada is superfluous, particularly as it has failed to be noticed by medical practitioners.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

ELIXIR TARAXICI COMPOSITUM N. F.

Caldwell, Paul, asserts that the frequently observed precipitate in compound elixir of taraxacum may be avoided by mixing the fluid extracts with the tinctures and adding glycerin equivalent to 5 per cent of the total finished product. Filter with the aid of magnesium carbonate, returning the filtrate to the filter until it passes entirely soluble in water. He believes that the use of the tincture of sweet orange peel in the formula for compound elixir of taraxacum is a disturbing factor that may be remedied by treating the elixir with magnesium carbonate.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 159, 393.

ELIXIR TERPINI HYDRATIS CUM HEROINA N. F.

In answer to a query the Bulletin of Pharmacy (1906, v. 20, p. 44) gives a formula for this elixir. Exposed to a lower temperature than when made it will deposit crystals.

Charles, W. J., comments (*Ibid.*, p. 294) on this formula and his method of preparing it to obviate this difficulty. He even places it on ice in the soda fountain and then filters it.

Two formulas from the Canadian National Formulary are given.—*Ibid.*, p. 345.

EMPLASTRA.

Taylor, S., asks how far are plasters to be allowed to remain in their present condition? The value and superiority of the india-rubber basis is undoubted, and either the Ph. Brit. should be brought into line with this or the whole manufacture of plasters should be left to the manufacturers, the pharmacopœia only requiring a certain strength of the medicament. This strength should have reference to the thickness of the plaster—e. g., belladonna plaster should contain 0.5 per cent root alkaloids—but the thickness to secure a definite weight should be stated, not percentage of alkaloids per square inch.—Pharm. J., Lond., 1906, v. 23, p. 669.

Cruse, E., (Pharm. Ztg., li, No. 82, 1906, 907) recommends a novel method of spreading plaster masses, which depends on the transfer of the plaster mass on a nonadhesive surface to another (adhesive plaster), to which it adheres permanently, the selection of the nonadhesive surface depending on the character or composition of the plaster. He gives a number of examples.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 652.

An editorial refers to the growing use of emplastrum plumbi in England as an abortifacient, and calls attention to the dangerous properties of this preparation when taken internally, resulting frequently in paralysis, blindness, insanity, and death.—Brit. & Col. Druggist, Lond., 1906, v. 49, p. 311.

Hall and Ransom discuss plumbism from the ingestion of diachylon as an abortifacient. They state that the practice has apparently spread as the result of passing the prescription from mouth to mouth. They state that many cases of lead poisoning have resulted.—Brit. M. J. Lond., 1906, v. 1, p. 428.

EMULSA.

Eberle, E. G., believes that the recently added formulas for emulsions, in the U. S. P., should be relegated to the National Formulary.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Caldwell, Paul, asserts that the preservation of emulsions by the addition of alcohol is impracticable and suggests the use of glycerin.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

Dunning, H. A. B., basing his opinion on a long series of experiments, asserts that emulsion of cod liver oil should be freshly prepared, and gives reasons.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 484.

Wippern, Franz, suggests, in the interest of uniformity in the practice of dispensing, that the text of the Ph. Germ. on emulsions be expanded so as to include emulsion of camphor, of creosote carbonate, of castor oil, and of cod liver oil.—Pharm. Ztg. Berl., 1906, v. 51, p. 806.

Williams, J. K., points out that the emulsification of oils, especially essential oils, seems to give much trouble, but that there is not the slightest difficulty with these if the proportions of the "dry" or so-called continental process are followed. He describes this method. (From Proc. Connecticut Pharm. Ass., 1906.)—Bull. Pharm., July, 1906, v. 20, p. 301.

EMULSUM OLEI MORRHUÆ CUM PRUNO VIRGINIANA N. F.

Caldwell, Paul, thinks that in the formula for emulsion of cod liver oil with wild cherry the fluid extract of wild cherry should be directed to be detannated.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

EMULSUM PHOSPHATICUM N. F.

Caldwell, Paul, suggests the desirability of devising a formula that will yield a permanent phosphatic emulsion.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

EPINEPHRINA.

The Council on Pharmacy and Chemistry describes a number of commercial suprarenal preparations.—J. Am. M. Ass., 1906, v. 47, p. 857.

Maben, Thomas, thinks the statement of the Ph. Belg. III that the active principle of the suprarenal gland is not yet defined from a chemical point of view is somewhat surprising considering that Aldrich, Pauly, Jowett, and other workers are all agreed as to the constitution of the principle. He declares that the quantitative test prescribed in the Ph. Belg. III is an official recognition for the first time of the principle of physiological standardization.—Chem. & Drug., Lond., 1906, v. 69, p. 155.

Friedmann, E., briefly describes the work on the constitution of adrenalin and accepts the formula $C_9H_{13}NO_3$, proposed by Aldrich, as being the correct one. He discusses at some length the probable constitution of the adrenalin molecule.—Beitr. z. chem. Phys. u. Path., Brnschwg., 1906, v. 8, pp. 94–120.

Farner, A., in a review of the progress of pharmaceutical chemistry, points out that the composition of the active principle of the suprarenal gland is being gradually cleared up and that the body $C_9H_{13}NO_3$ appears to be a derivative of pyrocatechin.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 617.

An abstract from U. S. P. patent No. 829220 outlines a method for the separation of the active principle from suprarenal glands.—Chem. Repert., Cöthen, 1906, v. 30, p. 303.

Vanderkleed, Charles E., outlines a method for the preparation of solutions of the active principle of the suprarenal gland, reviews the contributions on the subject from the time of Vulpian (1856) to the present, and gives in detail the method of preparing and standardizing the resulting solutions.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 388.

"Gnomon," commenting on Vanderkleed's paper, says it may be permissible that extracts of the suprarenal gland should vary in appearance, but anything which is claimed to be the active principle of the gland, and of definite composition, should hardly differ to such an extent as do adrenalin, suprarenalin, and other kindred substances. A standard is certainly needed in this case, as much as in the case of strychnine or morphine.—Pharm. J., Lond., 1906, v. 23, p. 698.

Crawford, A. C., reviews in a very comprehensive way the literature of the separation of the active principles, color tests, principal physiological tests, and toxicity of the active principle of suprarenal gland.—Bull. Bur. Plant. Ind. U. S. Dept. Agric., 1907, No. 112.

Cameron, I. D., summarizes his work on the standardization of adrenalin preparations: (*a*) The colorimetric method is not reliable with weak or impure solutions. (*b*) The effect on the pupil of the frog's eye gives uncertain results. (*c*) The determination of the minimum effective dose on the arterioles of the perfused frog is tedious and uncertain; on an average 0.1 per million produces an effect. (*d*) The determination of the minimum effective dose in causing a rise on the blood pressure of the atropinised rabbit yields satisfactory results. (*e*) Adrenalin, suprarenalin, and hemisine all give a precisely similar result, 0.0003 mg. per kilo of body weight, or 0.006 per million, of the rabbit's blood, causing a distinct rise in the blood pressure in the rabbit, and 0.012 mg. per kilo of body weight, or 0.24 per million, of the blood causing a rise in the cat. (*f*) The most satisfactory method is the determination of the dose just sufficient to antagonize 0.6 mg ($\frac{1}{100}$ gr.) of nitroglycerin. Of adrenalin, 0.0075 mg. is sufficient.—Reprint from Proc. Roy. Soc. Edinburgh, 1906, v. 26, pt. 3, pp. 157–171.

Hunt, Reid, compares the physiologic activity of several commercial suprarenal preparations, and finds some specimens to be five times as active as others.—J. Am. M. Ass., 1906, v. 47, pp. 790–792.

Sollmann and Brown compare the physiologic activity of several commercial suprarenal preparations and find considerable variation in their physiologic activity and their keeping qualities.—*Ibid.*, v. 47, p. 792.

Friedman, E., (Hofmeister's Beitr. Bd. 8, pp. 95–120) discusses the formula of adrenalin and some of its derivatives and suggests that the origin of adrenalin, in the organism, is probably albumin.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 274.

Hall, Walter L., discusses the chemistry of adrenalin and its formation in the organism.—Beitr. z. chem. Physiol. u. Path. Brnschwg., 1906, v. 8, pp. 278–280.

Möller, S., completes an exhaustive study of epinephrine with an extensive bibliographic list.—Therap. Monatsh., Berl., 1906, v. 20, pp. 25–39, 85–99.

Elliott and Durham report experiments made to determine whether the continued administration of adrenalin would tend to produce antibodies in the animal organism. (J. of Physiol., 1906, v. 34, p. 490).—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 908.

D'Amato and Fagella report a study on the nature and meaning of the aortic lesions caused by extracts of the suprarenal gland.—

(From Med. Klinik, Neapel.)—Biophysik. Centralbl., Leipz., 1905–6, v. 1, p. 680.

Gatin-Gruzewska, Z., records observations on the action of adrenalin on the glycogen content of the muscles.—Compt. rend. Acad. des sc., Par., 1906, v. 142, pp. 1165–1167.

Osborne, W. A., outlines some of the properties of hormones and discusses the physiological effects and uses of epinephrine.—Chem. & Drug. Australas., 1906, v. 21, pp. 296–298.

Underhill and Closson discuss adrenalin glycosuria and the influence of adrenalin upon nitrogenous metabolism. They point out that there is no relationship between the glycosuria produced by adrenalin and diabetes.—Am. J. of Physiol., 1906, v. 17, pp. 42–54.

Halle, Walter, (Hofmeister's Beitr. v. 8, pp. 276–280) presents a preliminary communication on the probable formation of adrenalin in the animal organism.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 451.

Chidichimo, F., reports observations on the action of adrenalin on the uterus, stomach, and intestine. (From La Ginecol, 1906, v. 2.)—Biophysik. Centralbl., Leipz., 1905–6, v. 1, p. 665.

Crile and Dolley describe a series of resuscitation experiments in which adrenalin was injected after the asphyxiation of animals or death [sic] by chloroform.—J. Exper. M., N. Y., 1906, v. 8, pp. 713–725.

Beck (Ann. of Ophth., 1905) reports an unexpected complication following the instillation of a solution of adrenalin in a patient with syphylitic iritis.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 400.

Stargardt (Klin. Monatsbl. f. Aughkde, 1906, Feb.-Mar.) after injection of 8 drops of suprarenin has twice seen severe necrosis of the whole infiltrated region (extirpation of the tear sac). The preparation was fresh and not spoiled.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 141.

Bennett, F. C., says alarming symptoms followed the injection of half a drachm of solution of adrenalin chloride (1–1000) into the urethra of a patient.—J. Am. M. Ass., 1906, v. 47, p. 1655.

Solis-Cohen, S., advises the use of suprarenalin tablets on the tongue or in the nose, but not by the stomach, in the treatment of hay fever. The technic of treatment is detailed.—*Ibid.*, v. 47, pp. 265–268.

Warbrick, J. C., (Therap. Gaz., Detroit, Apr. 15, 1906) writes on adrenalin and chloretone in the treatment of chronic rhinitis and pharyngitis.—*Ibid.*, 46, p. 1477.

Potts, B. H., calls attention to the danger from the careless use of the alkaloid of the suprarenal gland in hay fever.—*Ibid.*, v. 47, p. 1188.

Dixon, W. E., (Lancet, London, Mar. 24, 1906) thinks that adrenalin is worse than useless for internal hæmorrhage.—*Ibid.*, v. 46, p. 1242.

An editorial calls attention to W. E. Dixon's work (Lancet, Mar. 24, 1906, p. 826) showing the uselessness of adrenalin, ergot, and astringents in general taken internally to control hæmorrhage.—*Ibid.*, v. 47, p. 41.

Barr, James, states that arterial tension is usually increased by adrenalin and that it is therefore injurious in arteriosclerosis but it occasionally does good when combined with thyroid or iodine by maintaining the arterial tension.—Brit. M. J., Lond., 1906, v. 1, p. 126.

Reilly, T. F., calls attention to some of the disadvantages of the use of suprarenal preparations, sloughing after subcutaneous injections. Arterial degeneration is caused in animals when the active principle is injected repeatedly.—J. Am. M. Ass., 1906, v. 47, p. 649.

Davis, Theodore G., reviews the literature of the suprarenal glands and their application to clinical medicine.—N. York M. J., 1906, v. 84, pp. 263–270.

See under Glandulæ suprarenales siccæ and Glandulæ thyroideæ reference to the exhaustive paper by Aldo Patto in Arch. di farmacol. sperim., 1906, v. 5, pp. 188–215.

Additional references on the properties and uses of epinephrine and related compounds will be found in the Index Medicus, J. Am. M. Ass., and Jahresber, ü. Tier Chem.

ERGOTA.

Schneider, Albert, gives a list of the grasses on which *Claviceps purpurea*, Tul. is found in the western plains, and asserts that the Indians are familiar with the general medicinal uses of ergot, and employ it to check hæmorrhage and to produce abortion.—Merck's Rep., N. Y., 1906, v. 15, p. 66.

Ridgely, B. H., (in Daily Consular and Trade Reports) points out that the amount of ergot used for various medicinal purposes in all countries is very large and that Spain supplies the best quality of this drug.—Am. Druggist, N. Y., 1906, v. 49, p. 369.

Schnell, Carl, points out that the apothecary who desires to produce really active preparations of ergot must first assure himself of the identity and origin of his crude material. The ergot must be from rye and not from any other variety of grass. He also believes that it would be preferable to make preparations of ergot during the winter months so as to prevent possible decomposition, caused by high or uncertain temperature.—Pharm. Ztg., Berl., 1906, v. 51, p. 448.

Zimmermann (Ztschr. Pflanzenkrank., 16, 1906, No. 3, pp. 129–131) points out that studies were made in the greenhouse and in the open air to determine the germinative ability of old sclerotia of the common ergot, *Claviceps purpurea.* He found that sclerotia more than 2 years old had lost all power of germination.—Exper. Sta. Rec., 1906, v. 18, pp. 645, 646.

Weigel, G., records the occurrence of an abnormal ergot on the Hamburg market. This drug came from southern Russia, had a strikingly black color, and was much smaller than ergot of good quality.—Pharm. Zentralh., 1906, v. 47, p. 864.

John, A., describes and figures some abnormal specimens of ergot.—*Ibid.*, v. 47, pp. 943–945.

Philipp Röder, Wien, asserts that the determination of alkaloids in extract of ergot does not yield reliable data, and points out that the odor, solubility in water, and the determination of the ash content are factors that are more reliable. The ash content of extract of ergot should not exceed 9.5 per cent.—Pharm. Ztg., Berl., 1906, v. 51, p. 278.

Caesar and Loretz report finding ergot to vary in cornutin content from 0.027 to 0.364 per cent, the greater portion of the drug, however, averaging from 0.240 to 0.320 per cent. They outline a colorimetric test for the ready determination of cornutin, and suggest the estimation of the moisture content and outline a method for the quantitative determination of cornutin.—Geschäfts.-Ber. v. Caesar & Loretz, in Halle, a. S., 1906, pp. 51, 52, 114, 115.

Kraft, F., discusses the present status and the work done on ergot and reports a series of experiments to determine the chemical constituents of ergot and their physiological activity. He concludes that the specific ingredients in ergot are the ergosterin of Tanret and two alkaloids, the crystalline ergotinine of Tanret and amorphous hydroergotinine. While the alkaloids will produce gangrene they do not produce the characteristic uterus contraction produced by the drug itself. The principles isolated by Kobert and Jakobj are not chemically pure, but mixtures of variable nature, and their physiological action is due to contained alkaloids. Cornutin (Keller) and secalin (Jakobj) are identical with ergotinine.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 336–359.

Barger and Dale discuss the communication by Kraft on the constituents of ergot. They differ from him in his conclusions in regard to the relations existing between the alkaloids of this drug.—*Ibid.*, v. 244. pp. 550–555.

Barger and Carr discuss ergotinine and ergotoxine. The former is unique among alkaloids in having four nitrogent atoms. * * * There seems little doubt that ergotoxine is the more important, if not the one essential active principle, whereas pure crystalline ergotinine is physiologically almost or quite as active.—Abstr. in Pharm. J., Lond., 1906, v. 23, p. 257.

"Gnomom," having studied this subject for some time past, is disposed to think that Barger and Carr have solved a very difficult problem, and it may yet be found that the comparatively inert crystalline ergotinine is really a decomposition product of the active amorphous ergotoxine.—*Ibid.*, v. 23, p. 282.

Tanret, C., replies to the criticisms of Barger and Carr (in Chem. News. Aug., 1906, and Pharm. J., Lond., 1906, v. 23, p. 257), who consider that ergotoxine and not ergotinine is the active principle of ergot. He suggests the formula $C_{35}H_{40}N_5O_5$ as being more in keeping with the findings than $C_{28}H_{32}N_4O_4$ proposed by Barger and Carr.—J. de pharm. et de chim. Par., 1906, v. 24, pp. 397–403, 420.

Vahlen, Ernst, in a German patent outlines a method for the isolation of a water soluble, crystalline, nitrogen containing constituent of ergot.—Chem. Ind. Berl., 1906, v. 29, p. 148.

Vahlen, E., describes a new active constituent, clavin, that he has separated from ergot and outlines the method employed in its production, discusses the properties and composition of the substance, and reports experiments made to determine its general action and the action of clavin on the uterus.—Arch. f. exper. Path. u. Pharmacol. Leipz., 1906, v. 55, pp. 55–163.

Ohliger, Willard, finds all qualities offered for sale, from samples having their full activity to those entirely inert.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Patch, E. L., asserts that ergot is lower than the usual average in extractive. Seven bales varied from 13.3 to 14.8 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Dieterich, Karl, reports a total of eight samples of ergot. The six unobjectionable samples yielded from 0.080 to 0.10 per cent of alkaloid and from 14.58 to 17 per cent of dry aqueous extract; the two other samples yielded 0.067 and 0.069 per cent of alkaloid, respectively.—Helfenberger Annalen, 1905, 1906, v. 18, p. 108.

Dixon, W. E., is quoted as asserting that preparations of ergot as sold by the leading wholesale houses vary enormously in potency; and, further, that preparations which they themselves made from different samples of the crude drug show the same variability.—Pharm., J., Lond., 1906, v. 22, p. 117.

Schnell, Carl, presents an historical and critical review of the production of active preparations of ergot. He divides these preparations into dry, thick, and fluid extracts. He points out that as yet an aqueous extract is the only one that contains all of the active ingredients of ergot intact. He discusses at some length the method proposed by Bonjean and outlines some of the history of Bonjean's

Ergotin, and describes the modifications that have been proposed by Cadet, Cotillon, Wernicht, Wenzel, Portans, Hager, and others.—Pharm. Ztg. Berl., 1906, v. 51, pp. 413, 414, 447–449.

Cline, R. R. D., outlines a method for making fluid extract of ergot which he asserts is devoid of the objectionable features of the U. S. P. fluid extracts and still preserves all of the active ingredients.—Proc. Texas Pharm. Ass., 1906, p. 5, 15.

Taylor, S., thinks the semifluid condition of the extract of ergot leaves much to be desired. Having in view the dual therapeutic character of the drug, much work remains to be done. In fact, he thinks this drug presents the utmost possibilities to research workers in all departments.—Pharm. J., Lond., 1906, v. 23, p. 669.

Dixon, W. E., gives a chart showing the variability of ergot preparations as shown by their effect upon blood pressure. He thinks that the effect upon mammalian blood pressure is the only satisfactory method of standardization; the effect upon the cock's comb being of an entirely different nature, not, he thinks, brought about by vasoconstriction, and therefore not necessarily a criterion of useful activity of the drug.—Brit. Med. J., Lond., 1906, v. 2, p. 1459.

Dale, H. H., (J. Physiol., 1906, v. 34, pp. 163–206) reports some observations on the physiological action of ergot.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 452.

Meltzer and Auer present some observations on the action of ergot upon the stomach and intestine.—Am. J. Physiol., 1906, v. 17, pp. 143–166.

Dixon, W. E., (Lancet, Lond., Mar. 24, 1906, p. 826) thinks that ergot is worse than useless for internal hæmorrhage.—J. Am. M. Ass., 1906, v. 46, p. 1242. (See also editorial, *Ibid.*, v. 47, p. 41.)

Osborne, O. T., discusses the therapeutic value of ergot and points out some of the cases in which preparations of ergot may prove to be valuable.—Trans. Am. Therap. Soc., 1906, pp. 108–113.

For additional references on the properties and uses of ergot see Index Medicus and J. Am. M. Ass.

ERIODICTYON.

Henkel, Alice, mentions *Eriodictyon californicum* H. &. A. Greene, also known as *Eriodictyon glutinosum* Benth., commonly known as eriodictyon, yerba santa, mountain balm, consumptive's weed, and bear's weed, as growing in clumps in dry situations and among rocks throughout California and northern Mexico.—Bul. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 28.

Schneider, Albert, asserts that the Indians, as well as the whites, consider the leaves of *Eriodictyon californicum* a specific for colds, asthma, and the grippe, that it is highly valued as a blood purifier, as a cure for consumption, catarrh, and rheumatism, and that the leaves are smoked and chewed like tobacco, and made into a tea.—Merck's Report, N. Y.. 1906, v. 15, p. 95.

Power and Tutin record a chemical examination of eriodictyon. They review the literature relating to this plant, record the experiments carried out, and conclude that *Eriodictyon californicum* contains, in addition to some essential oil, resins and other amorphous bodies, triacontane, eriodictyol, homo-eriodictyol, and a new yellow crystalline substance phenolic in character.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 352–369.

Caldwell, Paul, asserts that in order to produce a perfectly clear aromatic sirup of yerba santa N. F., the oils should be mixed with the fluid extract and alkali together with the water. and the whole filtered through magnesium carbonate until the filtrate makes a clear mixture with water. The sugar may then be added and dissolved.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

See also under Elixiria.

EUCALYPTOL.

Schimmel & Co. assert that the specific gravity of eucalyptol, at 25° C., is not 0.925, as originally given in the U. S. P. VIII but varies between 0.921 and 0.923. They point out that solidification has to be started in case of need by rubbing a glass rod on the wall of the vessel. They also assert that eucalyptol has been offered in commerce which, on examination, proved to be nothing else than a rectified oil of eucalyptus.—Semi-Ann. Rep., 1906, Apr.–May, pp. 73, 89.

Evans Sons Lescher and Webb point out that eucalyptol is usually found to contain upward of 98 per cent of cineol by weight, but that one sample which came to their attention only yielded 84 per cent.—Analytical Notes for 1906, 1907, p. 18.

Francis, John M., reports finding oil of eucalyptus in eucalyptol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

EUCALYPTUS.

Smith, Henry C., discusses the variety and the interesting nature of the constituents of the several eucalypts, and the assistance given by this knowledge to facilitate the botanical arrangement and the classification of the several species. The author discusses more particularly the kinos or astringent exudations, oxalic acid, and the oils.—Yearbook of Pharmacy, 1906, pp. 295–298. (See also Pharm. J., Lond., 1906, v. 23, p. 101.)

Schimmel & Co. call attention to the seventh part of "A critical revision of the genus Eucalyptus," by J. H. Maiden.—Semi-Ann. Rep., Schimmel & Co., 1906, Apr.–May, p. 35.

A news item discusses the proposed use of a barren waste of country for the cultivation of eucalyptus for oil, and points out that *Eucalyptus smithii* has been recommended as being the more profitable, the leaves of even the young plants yielding as high as 2 per cent of an oil which contains 60 per cent of eucalyptol.—Chem. & Drug., Australas., 1906, v. 21, p. 183.

EUGENOL.

Schimmel & Co. assert that the specific gravity of eugenol at 25° C. lies between 1.064 and 1.067.—Semi-Ann. Rep., 1906, Apr.–May, p. 74.

They point out that eugenol distilled *in vacuo* and absolutely free from water is frequently somewhat lighter than the Ph. Ndl. IV limit, 1.072 at 15° C. They have recently observed, in their own preparation, a specific gravity of 1.0713 at 15° C.—*Ibid.*, Oct.–Nov., p. 86.

EUONYMUS.

Henkel, Alice, mentions *Euonymus atropurpureus* Jacj., commonly known as euonymus, wahoo, burningbush, spindle-tree, and Indian arrow-wood, as growing in woods and thickets from Ontario and eastern United States west to Montana.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 29.

Naylor, W. A. H., suggests that the U. S. P. extract of euonymus is probably an efficient preparation, where a powerful hepatic is required, and that an equally active preparation be included in the Ph. Brit. in place of the weaker preparation now official.—Yearbook of Pharmacy, 1906, pp. 209, 210.

EUPATORIUM.

Henkel, Alice, mentions *Eupatorium perfoliatum*, commonly known as eupatorium, boneset, thoroughwort, Indian sage, agueweed, and crosswort, as being found in low wet places from Canada to Florida, west to Texas and Nebraska.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 29.

Fyfe, John William, notes that *Eupatorium perfoliatum* was classed among the most efficient drugs in the treatment of intermittent fever and in yellow fever. It was also successfully used in many cases of dyspepsia.—Eclectic Med. J., Cincin., 1906, v. 66, p. 321.

EXTRACTA.

Moerk, Frank X., points out that the extract of belladonna leaves, colchicum corm, nux vomica, scopola, and stramonium are 4 times the strength of the drug; hyoscyamus 3.75, opium 1.6, and physostigma 13.33 times the strength of the drug.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Matthes and Rammstedt give the results of their experiments with the method recommended by H. Thoms for the determination of the alkaloidal content of narcotic extracts by means of potassium-bismuth iodide, and of the tannins, particularly in the extract of belladonna, by means of potassium permanganate.—Pharm. Ztg., Berl., 1906, v. 51, p. 1031.

Dieterich, Karl, reports the determination of the moisture and ash content of a number of the Ph. Germ. IV extracts.—Helfenberger Annalen, 1905, 1906, v. 18, p. 158.

Herzog, J., discusses a communication by W. Bruns, published in No. 28 of the Pharm. Zentralh., 1905, and reasserts that the method as outlined by Bruns is not designed to furnish a satisfactory pharmacopœial extract.—Arb. a. d. pharm. Inst. d. Univer. Berl., 1906, pp. 99–104.

EXTRACTUM GLYCYRRHIZÆ DEPURATUM N. F.

Caldwell, Paul, believes that purified extract of licorice should have been omitted from the N. F., as the U. S. P. VIII contains a pure extract of licorice.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

FEL BOVIS.

Croftan, A. C., recommends the use of bile acids in intestinal putrefaction, hepatic insufficiency, and gallstone disease.—N. Y. Med. J., 1906, v. 83, pp. 810–812.

Nigay (Soc. méd. de l'Elysèe, 1906, 2, April) thinks the use of bile in the treatment of biliary insufficiency and its consequences is worthy of special attention, since it is nonpoisonous in the usual doses up to 1 gm. (gr. 15), and has an excellent action in lithiasis, icterus, acholia, cholæmia, and in fact in all functional disturbances of the bile in man.—Abstr. in Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, p. 104.

FERRI CARBONAS SACCHARATUS.

Gadd, Sydney C., (Trans. Brit. Pharm. Conf. [Yearbook of Pharmacy] 1905, 472) gives a formula and outlines a process for making ferrous carbonate suitable for preparing pills, which are less bulky than Blaud's pills obtained ordinarily.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 840, 841.

FERRI CHLORIDUM.

Lefeldt, Max, points out that the oxidation of the ferrous chloride may be accomplished much more rapidly, and with less nitric acid, if the heating is done in a flask with a funnel in the neck to avoid unnecessary loss. He also advises heating the finished solution, in a porcelain vessel, directly over the fire, and asserts that this combined change will materially shorten the time required to make this preparation.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 339.

The Ph. Brit. Committee of Reference in Pharmacy report on strong solution of ferric chloride says a solution of specific gravity 1.42 does not yield the quantity of ferric oxide stated. The specific gravity might be altered to 1.49; the yield of oxide would then be 1.6 grammes for 5 cc.—Chem. & Drug. Lond., 1906, v. 69, p. 864.

Lefeldt, Max, suggests that the directions for preparing liquor ferri oxychlorati, Ph. Germ. IV, should specify that the washing of the magma be done as rapidly as possible. The making of the preparation should not extend over two days, as the precipitate loses the property of dissolving in the prescribed amount of acid.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 338.

Vanderkleed, Charles E., found one sample of solution of ferric chloride testing 13.1 per cent of metallic iron, and, in striking contrast, another sample which assayed only 6.55 per cent of metallic iron instead of the required 10 per cent of the U. S. P. VIII.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Barnard, H. E., reports that of 177 samples of tincture of ferric chloride examined, 138, or 78.5 per cent, were below the U. S. P. VIII, standard. He concludes that the low percentage of iron may be due to the use of impure chemicals, incomplete solution, or carelessness in preparation, as samples prepared according to the U. S. P. method complied fully on analysis.—Rep. Indiana Bd. Health, 1906, pp. 387–390.

Brown, Linwood A., reports examining 17 samples of tincture of ferric chloride which varied from 4.10 to 6.50 per cent of iron, or from 89.5 to 136 per cent of the required U. S. P. VIII strength.—Rep. North Dakota Agric. Exper. Stat., 1906, Part II, p. 152.

Nieder, C. F., recommends the use of tincture of ferric chloride and quinine sulphate in the treatment of pneumonia.—J. Am. M. Ass., 1906, v. 47, p. 272.

Reilly, T. F., states that massive doses of quinine sulphate and ferric chloride, lauded as a specific for pneumonia in the Southwest, do not give the desired results in the East.—*Ibid.*, v. 47, p. 649.

Lambert, Alexander, states that iron perchloride and silver nitrate are much used in gastric ulcer to promote cicatrization, the silver nitrate being much the more useful.—*Ibid.*, v. 47, p. 847.

FERRI HYDROXIDUM.

Hill and Umney suggest a new nomenclature for ferric oxide and, incidentally, give an interesting table of 19 official names, together with the methods of preparation, taken from the several London. Dublin, Edinburgh, and British pharmacopœias and the U. S. P., 1870.—Pharm. J., Lond., 1906, v. 23, p. 694.

FERRI SULPHAS.

Ohliger, Willard, reports ferrous sulphate with traces of free acid, which required about twice the proper amount of water to effect solution.—Proc. Michigan Pharm. Ass., 1906, p. 47.

FERRI SULPHAS EXSICCATUS.

The Ph. Brit. Committee of Reference in Pharmacy report on exsiccated ferrous sulphate says either omit temperature for drying or say 100° to 110° C.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Patch, E. L., reports on 3 samples of exsiccated ferrous sulphate: 88.43, 84.85, 84.5 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

FERRUM.

Lücker, Ed., discusses the pulverization of metallic iron and describes the method adopted in a mill devoted to the production of powdered iron.—Apoth. Ztg., Berl., 1906, v. 21, p. 271.

FERRUM.

SCALE SALTS.

Arny, H. V., regrets the omission of the process of making scale salts of iron. If the manufacture of ferric citrate was deemed too intricate for the retailer, the Committee on Revision could have at least retained the recipes for those scale salts made from the citrate, and especially those containing alkaloids, it being well known that many of the preparations found in commerce are deficient in strength.—Am. J. Pharm., Phila., 1906, v. 78, p. 13.

FERRI ET AMMONII CITRAS.

Caspari, Chas. E., reports two samples of iron and ammonium citrate examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

The Ph. Brit. Committee of Reference in Pharmacy report on iron and ammonium citrate says the U. S. P. iodometric determination of iron is preferable to the Ph. Brit. method.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Shurly, B. R., advises the use of iron and ammonium citrate hypodermically in anæmia of the pre-tubercular stage.—J. Am. M. Ass., 1906, v. 46, p. 1835.

FERRI ET AMMONII TARTRAS.

Caspari, Chas. E., reports two samples of iron and ammonium tartrate examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

The Ph. Brit. Committee of Reference in Pharmacy prefers an iodometric method for iron in tartrated iron.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

FERRI ET POTASSII TARTRAS.

Caspari, Chas. E., reports two samples of iron and potassium tartrate examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

FERRI ET QUININÆ CITRAS.

Baird, J. W., reports 14 samples of iron and quinine citrate examined in 1904: Two adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Caspari, Chas. E., reports two samples examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Liverseege, J. F., reports that the amount of quinine yielded by 11 samples of the citrate of iron and quinine varied from 14.4 to 15.9 per cent, the proper quantity being 15 per cent. Five of them lost 6.9 to 8.3 per cent of moisture on drying in the water oven and yielded 18.9 to 19.3 per cent of ash.—Pharm. J., Lond., 1906, v. 23, p. 96.

FERRI PHOSPHAS SOLUBILIS.

Siboni, G., discusses the chemistry of the several phosphates of iron and their probable composition.—Boll. chim. farm., Milan, 1906, v. 45, pp. 5–17.

Patch, E. L., points out that the soluble ferric phosphate of the U. S. P. VIII is the sodium salt of the U. S. P. VII, and not the ammonium salt frequently sold as U. S. P.—Proc. Am. Pharm. Ass., 1906, v. 54. p. 329.

Caspari, Chas. E., reports two samples examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Patch, E. L., reports finding two samples of iron phosphate scale insoluble, two samples slowly but completely soluble, and two samples which proved to be ammonium and not sodium salts.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

FERRI PYROPHOSPHAS SOLUBILIS.

Caspari, Chas. E., reports two samples of soluble ferric pyrophosphate examined: One U. S. P., one contained excess of iron.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Patch, E. L., found a sample of ferric pyrophosphate scale which was labeled "U. S. P." and contained 12.8 per cent iron, 9 per cent ammonia.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

FERRUM.

TESTS.

Funk, W., outlines a method for separating iron from manganese by acetic acid.—Ztschr. f. analyt. Chem., 1906, v. 45, pp. 181–196.

The same author discusses the separation of iron from manganese, nickel, cobalt, and zinc by means of ammonium formate.—*Ibid.*, pp. 489–504.

He also discusses the separation of iron and manganese from nickel and cobalt by treating their sulphides with diluted acids.—*Ibid.*, pp. 562–570.

Cowley, R. C., thinks the process introduced by Catford and himself for determining ferric salts by reduction with H_2S and subsequent oxidation, the simplest of all the volumetric processes involving reduction.—Pharm. J., Lond., 1906, v. 23, p. 430.

Brandt, L., presents a preliminary communication on the use of diphenylcarbohydrazid as an indicator in the titration of iron with bichromate.—Ztschr. f. anal. Chem. Wiesb., 1906, v. 45, pp. 95–99.

Mouneyrat, A., describes a method for the detection of small quantities of iron: he uses an ammoniacal solution containing 62 gm. of ammonia per liter and finds it much more sensitive than sulphocyanide.—Compt. rend. Soc. de biol., Par., 1906, v. 60, p. 768.

The same author presents a short study of the physical state of iron in solutions.—*Ibid.*, p. 810.

USES.

Castaigne, J., (Presse méd., Par., v. 14, No. 96) discusses the rôle of the liver with regard to the iron of the body, and states that when iron is administered to patients suffering from anæmia due to hæmorrhage, in aplastic anæmia and certain forms of tuberculosis, the effect upon the liver is perceptible before any is seen on the blood.—J. Am. M. Ass., 1907, v. 48, p. 458.

Abderhalden, Emil, discusses the importance of iron for the animal organism and points out that iron combinations, even the complex, so-called organic salts, are not absorbed unchanged and the frequently discussed question of preference for organic or inorganic combination is of little importance.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 360.

A contributor to the "Therapeutics" column states that iron in some form is almost invariably indicated in chlorosis, but an alterative, copper, arsenic, or mercury, will sometimes act better than iron alone.—J. Am. M. Ass., 1906, v. 47, p. 891.

Haines, Oliver L., asserts that ferrum is of value in the pale, anæmic, nervous, even hysterical state left after an attack of rheumatic fever.—Trans. Am. Inst. Homœop., Phila., 1906, 62d sess., Pt. 1, p. 35.

Oerum, H. P. T., reports experiments with organic and inorganic combinations of iron, reviews some of the conclusions arrived at by other experimenters, and asserts that inorganic iron stimulates the formation of blood, while organic iron compounds are utilized directly in the formation of hæmoglobin.—Ztschr. f. exper. Path. p. Therap., 1906, v. 3, pp. 144–156.

Reilly, T. F., calls attention to the fact that the popularity of the proprietary organic iron preparations is due mainly to their not disturbing the stomach or being repellant to the taste, and not to any idea that they are intrinsically better than the official preparations of iron.—J. Am. M. Ass., 1906, v. 47, p. 650.

The contributor of an unsigned article states that the official bitter wine of iron is an excellent ferruginous stimulant of the appetite and the digestion. He also quotes Bunge as distinctly warning physicians against the use of high-priced preparations of iron.—*Ibid.*, v. 46, p. 1282.

Wells, G. Harlan, says iron is the remedy par excellence in those forms of cardiac weakness and fatty infiltration associated with the chlorotic type of anæmia. The best results are obtained from the use of Blaud's mass, three grains three times daily. He finds the so-called organic preparations not so efficient as the older preparations, but useful where the stomach is irritable.—Hahneman. Month., Phila., 1906, v. 41, p. 263.

FERRUM REDUCTUM.

Wiebelitz, H., believes that the requirement that reduced iron be a "lusterless powder" is not generally complied with. He has met with but a single sample of really lusterless reduced iron.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Lefeldt, Max, suggests a modification of the Ph. Germ. IV, method for determining metallic iron in ferrum reductum. He suggests the use of 0.3 gm. of reduced iron with 1.5 gm. of iodine and 10 cc. of solution of potassium iodide, allow the mixture to stand for four hours with frequent shaking, dilute with water to 100 cc., and proceed as directed in the Ph. Germ. Practically identical with the

U. S. P., time longer.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 336.

Cormimboeuf and Grosman suggest a slight modification of the Ph. Germ. method of determining metallic iron in reduced iron. One gm. reduced iron is treated with 25 cc. double normal iodine solution; leave in contact for six hours, shaking occasionally; make up to 250 or 300 cc. with water and titrate the excess of iodine with double normal hyposulphite of soda.—Répert. de Pharm. Par., 1906, v. 18, pp. 446–448.

The Ph. Brit. Committee of Reference in Pharmacy says that of the U. S. P. limits of 1 in 100,000 for arsenic and 90 per cent for metallic iron for reduced iron, the latter is too stringent.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Smith, Kline & French Co., report on the examination of 3 samples of reduced iron which contained 83 per cent, 85.5 per cent, and 90 per cent of iron in the metallic state when assayed according to the U.S. P. 1900 method.—Lab. Rep., S. K. & F., 1906, p. 17.

Hill, Earl, examined seven samples: all showed the presence of sulphides and the following percentages of iron: 52.5, 92.4, 79.8, 92.6, 86.2, 80.0, 92.4.—Proc. Kansas Pharm. Ass., 1906, p. 36.

Caspari, Chas. E., reports eight samples examined; two contained excess of sulphide, one excess of oxide.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Baird, J. W., reports 18 samples examined in 1904, 9 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Evans Sons Lescher and Webb assert that they have recently been able to pass every sample of ferrum reductum as being below 60 parts of arsenic per million. The metallic iron ranged from 87 to 90 per cent, with one exception, which was as low as 80 per cent.—Analytical Notes for 1906, 1907, p. 19.

FLUIDEXTRACTA.

Searby, W. M., thinks the fluid extracts could have been got together very easily by adopting a heading for the several series of preparations, as in some of the earlier pharmacopœias, and that this would have been far more preferable to the coining of such a peculiar word as "fluidextractum."—Am. J. Pharm., Phila., 1906, v. 78, p. 212.

An editorial note points out that the writing of fluidextractum and fluidextract as one word has disturbed the minds of some of the good Latin scholars of England and ruffled the tempers of the compositors and proof readers in more than one printing office. The separation of fluid extracts and extracts in works of reference where the preparations are listed alphabetically is an advantage to the volumes as works of reference which more than offsets all that our English cousins have said about our Latin and that printers may think of our orthography.—Meyer Bros. Druggist, St. Louis, 1906, v. 27, p. 4.

Stevens, A. B., remarks that opinion seems to be about equally divided upon the union of extractum fluidum into fluidextractum.—Proc. Michigan Pharm. Ass., 1906, p. 95.

Moerk, Frank X., points out that the usually relied upon statement that 1 c. c. of fluid extract is the equivalent of 1 gm. of the drug is not correct in all cases. With assayed preparations there seems to be no reason why this relation should not be required in place of having the fluid extract represent from 80 to 90 per cent of the contained active constituent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Dott, D. B., discusses the variety of official methods for the production of liquid extracts and suggests that the resulting complication is to be deprecated, because unnecessary. He proposes the use of 60 per cent alcohol for all drugs, and discusses, in detail, the reasons for this suggestion.—Yearbook of Pharmacy, 1906, pp. 299–301.

An editorial declares that the attitude of D. B. Dott toward official methods of preparing liquid extracts is somewhat unorthodox, but there is a lot of common sense about it.—Chem. & Drug., Lond., 1906, v. 69, p. 130.

Beckstroem, R., proposes a preliminary maceration of forty-eight hours, in place of twenty-four hours, for the fluid extracts of the Ph. Germ.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 325.

Buttin, Louis, discusses the official, Swiss, fluid extracts and presents a table giving the amount of dry extract and of ash contained in the several preparations.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 848, 849.

Wiebelitz, H., suggests that the requirement for specific gravity and extract content for fluid extracts would be desirable, providing the permissible variations were not too exacting.—Pharm. Ztg. Berl., 1906, v. 51, p. 1003.

Hallberg, C. S. N., asserts that no two different lots of fluid extracts, whether bought or prepared, should ever be mixed, because there is always a slight variation in the alcoholic strength of the menstruum, and that will induce precipitation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 265.

Caspari, Chas., jr., points out that fluid extracts are very susceptible to changes in temperature, the influences of light and air, and particularly the change in alcoholic strength of the menstruum by exposure to heat.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 262.

Studdiford, W. E., reports an interview with a manufacturer in which the latter asserted that he would not be willing to guarantee the composition of fluid extracts containing mydriatic alkaloids for more than three months, and suggests the advisability of dating these preparations with a time limit beyond which they should not be used.—Am. Druggist, N. Y., 1906, v. 49, p. 373.

Bedall, C., asserts that fluid extracts have their shortcomings and are not suited for the making of other preparations by simple dilution.—Apoth. Ztg., Berl., 1906, v. 21, p. 852.

Lyons, A. B., points out that many details in connection with the assay processes for the alkaloid containing fluid extracts need modification, and enumerates some of the changes which he would like to see adopted.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 440, 441.

Gordin, H. M., reports experiments in the assay of fluid extracts by shaking the liquid out directly with a mixture of ether and petroleum benzin, using sodium carbonate as the alkali.—*Ibid.*, v. 54, p. 380.

Puckner, W. A., points out that in the valuation of fluid extracts the use of "aliquot parts" is uncalled for.—*Ibid.*, v. 54, p. 441.

Gordin, H. M., suggests a method for the assay of fluid extracts. using his special separatory funnels.—Am. J. Pharm., Phila., 1906, v. 78, p. 461.

Feil, Joseph, discusses the percentage of alcohol remaining in fluid extracts, reports the results of experimental alcohol determinations, and concludes that the percentage of alcohol remaining in fluid extracts is approximately the theoretical quantity and should not vary more than 2 per cent from this standard.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 433, 434.

Caldwell, Paul, gives the approximate percentage of alcohol in the several fluid extracts of the U. S. P. VIII.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

Lyons, A. B., thinks it impossible to say definitely within 3 or 5, and sometimes 10, per cent what is the amount of alcohol in the fluid extract.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 435.

Francis, John M., points out that there is no way, theoretically, of determining the percentage of alcohol in fluid extracts. He has conducted a series of experiments extending over a long period of time, and the nearest he has been able to come with any degree of accuracy is about 2 per cent of a given figure.—*Ibid.*, v. 54, p. 434.

Lloyd, John Uri, points out that half a century ago it was expected that the whole line of vegetable extracts would be made of glycerin instead of alcohol and water, and in the fluid extracts then becoming popular it was freely asserted that glycerin would replace alcohol, sugar, and water.—Midl. Drug., Columbus, 1906, v. 7, p. 641.

The quantitative analysis of glycerin in fluid extracts is of interest by reason of the possibility of falsification of these extracts through the addition of an excess of glycerin with the purpose of increasing the apparent content of extractive matter. Weiss, E. (Ztschr. d.

österr. Apoth. Ver., 1906, No. 21; from Pharm. Ztg., 1906, p. 502), converts the glycerin into propyl iodide, treats this with arsenite of soda and silver nitrate and weighs the resulting iodide of silver. The process involves an error of but 0.4 per cent which is practically negligible.—J. de pharm. et de chim., Par., 1906, v. 24, p. 316.

Stahel, A. W., thinks the use of dilute acetic acid as a menstruum in three of the fluid extracts is somewhat of an innovation, and, while it is doubtless a better method of extracting the virtues of the drug, it would seem that they should be placed in a class by themselves, and bear a distinctive name.—Proc. Arkansas Pharm. Ass., 1906, p. 65.

Eli Lilly & Co. report that in their experience the acetic acid menstruum has not proved satisfactory for fluid extracts and the demand for the U. S. P. VIII preparations remains very small.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 441.

Similar opinion was expressed by A. R. L. Dohme, A. B. Lyons, H. L. Meredith, E. L. Patch, and C. E. Vanderkleed.—*Ibid.*, 442.

An editorial discusses acetic extracts and the results obtained by Houghton, and points out that over zeal in new moves hinders rather than helps progress.—Merck's Report, N. Y., 1906, v. 15, p. 253.

For references to individual, U. S. P., fluid extracts, see under the respective drug headings.

FLUIDEXTRACTA N. F.

ANGELICÆ N. F.

Fyfe, John William, says that archangelica was deemed a good remedy for pain in the breast, and also in wrongs arising from flatulence and debility of the digestive organs.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

ASCLEPIADIS N. F.

Fyfe, John William, thinks *Asclepias tuberosa* may well be called an eclectic remedy, for it was highly esteemed and extensively employed by the founder of eclecticism, and has ever continued to constitute a medicament greatly valued by all eclectics. It was much used in pleurisy and all lung troubles, as well as in colic and flatulency.—Eclectic Med. J., Cincin., 1906, v. 66, p. 319.

Asclepias syriaca was regarded as a powerful diuretic and was employed in dropsy and suppression of urine. It cured several convicts in state prison laboring under dropsy.—*Ibid.*, p. 320.

COPTIS N. F.

Henkel, Alice, mentions *Coptis trifolia* (L.) Salisb., commonly known as goldthread, cankerroot, mouthroot, and yellowroot. Grows in damp, mossy woods and bogs from Canada and Alaska south to Maryland and Minnesota; most common in the New England States, northern New York and Michigan, and in Canada.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 23.

Fyfe, John William, says that *Coptis trifolia* was often used as a tonic and stomachic, promoting the digestion and strengthening the viscera. It is also good as a gargle in ulceration of the mouth.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

CORNUS N. F.

Henkel, Alice, mentions *Cornus florida* L., commonly known as flowering dogwood and boxwood, as growing in woods from Canada to Florida, Texas, and Missouri. Most abundant in the Middle States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 23.

HELIANTHEMI N. F.

Henkel, Alice, mentions *Helianthemum canadense* (L.) Michx., commonly known as frostweed, frostwort, frost-plant, and Canadian rock-rose, as growing in dry, sandy soil Maine to Wisconsin, south to North Carolina and Kentucky.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, v. 89, p. 36.

HYDRANGEÆ N. F.

Henkel, Alice, mentions *Hydrangea aborescens* L., commonly known as hydrangea, wild hydrangea, and seven-barks, as being found on river banks from southern New York to Florida, west to Iowa and Missouri; very abundant in the valley of the Delaware.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 37.

Mundy, in an editorial note, gives the specific indications for hydrangea as irritation of the bladder and urethra, with gravelly deposits. Deep-seated pain in the back, with or without the deposits of urates or uric acid; 10 drops to half a drachm of the sp. hydrangea, preferably in hot water.—Eclectic Med. J., Cincin., 1906, v. 66, p. 160.

IRIS N. F.

Henkel, Alice, mentions *Iris versicolor* L., commonly known as iris, blue flag, flag-lily, liver-lily, water-flag, and snake-lily, as being found in wet, marshy localities from Newfoundland to Manitoba, south to Florida and Arkansas.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 39.

JUGLANDIS N. F.

Henkel, Alice, mentions *Juglans cinerea* L., commonly known as juglans, butternut, and white walnut, as common in rich woods from

New Brunswick to North Dakota, south to Georgia, Mississippi, and Arkansas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 40.

Fyfe, John William, quotes an early writer to the effect that juglans, when given in doses of 15 to 30 grains, operates as a cathartic, without occasioning heat and irritation; also employed as an aperient in habitual costiveness, as it does not leave the bowels in a costive state.—Eclectic Med. J., Cincin., 1906, v. 66, p. 318.

JUNIPERI N. F.

Fyfe, John William, asserts that *Juniperus communis* was believed to exercise a very stimulating action on the general economy, but more especially on the kidneys, increasing the secretion of those organs. It was principally employed in dropsy.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

KAVÆ N. F.

Felter, Harvey Wickes, quotes S. M. Sherman as to the specificity of *Piper methysticum*. The patient presents an appearance that suggests Bright's disease, and yet an examination of the urine fails to show the characteristic signs of that disease. Really no organic disease seems to be present. Twenty to 30 drops of the specific in water four times a day for three or four months will cure him.—Eclectic Med. J., Cincin., 1906, v. 66, p. 394.

The editor of the California Med. J. adds his testimony as to uniform results from *Piper methysticum* in gastric atony.—Abstr. *Ibid.*, v. 66, p. 543.

MENISPERMI N. F.

Henkel, Alice, mentions *Menispermum canadense* L., likewise called menispermum, yellow parilla, Canada moonseed, Texas sarsaparilla, and vine maple, as being found in woods along streams from Canada to Georgia and Arkansas.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 46.

RUMICIS N. F.

Henkel, Alice, mentions *Rumex crispus* L., commonly known as rumex, yellow dock, curled dock, narrow dock, and sour dock, as a weed introduced from Europe, and common in cultivated and waste places throughout the United States. *Rumex obtusifolius* L., otherwise known as bitter dock, blunt-leaved dock, and broad-leaved dock, is also mentioned. Naturalized from Europe, and found in waste places from New England to Florida, west to Texas and Oregon. The root of *Rumex obtusifolius* is frequently collected with that of *Rumex crispus*.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 60.

STERCULLÆ N. F.

Hartwich, C., discusses the structural characteristics of the kola nut; points out the provisions to prevent evaporation. He also describes the several commercial varieties of cola and offers some remarks on the germination of the seed.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1906, v. 44, pp. 119–121.

Chevrotier and Vigne have prepared a powder which they declare contains all the divers constituents of the fresh kola nut; is a true food, by reason of its albumin and carbohydrate content, for which they have great hopes as a nerve tonic, etc.—Bull. des sc. pharmacol., Par., 1906, v. 13, p. 620–624.

TRILLII N. F.

Henkel, Alice, mentions *Trillium erectum* L., commonly called wake-robin, ill-scented bethroot, birthroot, and squawflower, as growing in rich soil in damp, shady woods from Canada south to Tennessee and Missouri.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 71.

Fyfe, John William, says that *Trillium latifolium* was deemed a good medicament in bleeding from the kidneys, bladder, and urethra, uterine hæmorrhage, spitting of blood, and immoderate menstrual evacuation. It was also employed in asthma, coughs, and hectic fever.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

TURNERÆ N. F.

Henkel, Alice, mentions *Turnera microphylla* Desv., also known as *Turnera aphrodisiaca* Ward., commonly called damiana, as a native of Lower California, Texas, and northern Mexico, growing in dry soil.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 71.

URTICÆ N. F.

Henkel, Alice, mentions *Urtica dioica* L., usually called stinging nettle and great nettle, as having been naturalized from Europe, and found in waste places from Canada and Minnesota south to South Carolina and Missouri.—Bull. Bur. Plant Ind., U. S. Dept Agric., 1906, No. 89, p. 72.

VERBASCI N. F.

Henkel, Alice, mentions *Verbascum thapsus* L., usually known as mullein, velvet dock, velvet-plant, and flannel-leaf, as naturalized from Europe, and growing in fields, pastures, and waste places, Nova Scotia to Minnesota southward to Florida.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 73.

FŒNICULUM.

Utz asserts that fennel should contain not more than 10 per cent of ash.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

An editorial note says that *Fœniculum vulgare* is mentioned in the Icelandic Pharmacopœia of the thirteenth century.—Chem. & Drug., Lond., 1906, v. 69, p. 969.

FRANGULA.

Mitlacher, Wilhelm, describes and figures the histologic structure of a new adulterant of cortex frangula. He suggests the probable origin of the adulterant as being *Rhamnus carniolica* A. Kern.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1906, v. 44, pp. 4–7.

Mitlacher, Wilhelm, outlines and describes Nestler's method for the demonstration of crystalline materials by sublimation, and its microchemical application to the demonstration of anthraquinone in emodin-containing drugs.—Pharm. Prax., 1906, v. 5, pp. 433–435.

GAMBIR.

An editorial says:

> The reports made by various wholesale drug firms on the influence of the substitution by the pharmacopœia of gambir for catechu do not seem to agree. One jobber says, "our experience since the new pharmocopœia became official is that nearly all orders call for gambir in place of catechu." Another firm writes, "We fail to notice any influence whatever on the relative number of orders for catechu and gambir since the latter became official." A third firm informs us that the drug trade orders for these goods is but a small fraction of the amount sold to tanners, dyers, manufacturers of boiler compounds, etc. The latter of course know nothing of the pharmacopœia.—Meyer Bros. Drug., St. Louis, 1906, v. 27, p. 376.

Bond, John S., sr., (Nat. Drug., Sept., 1906, 288) points out that pharmacists should remember that gambir is an extract from the leaves and twigs of one plant, while catechu is an extract from the wood of another plant, both of which are rich in tannic acid.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 787.

Searby, W. M., is at loss to understand why gambir was substituted for catechu, which he always preferred; he has never had any difficulty in obtaining the latter of good quality.—Am. J. Pharm., Phila., 1906, v. 78, p. 212.

An editorial reviews the gambir situation and presents figures giving the amount imported during the past three fiscal years and the amount on hand in New York and Boston.—Oil, Paint and Drug Rep., 1906, v. 70, Aug. 20, p. 8.

The Pharmacopœia of Japan, under the general heading, Catechu, includes a description of (*a*) gambir, the dry extract which is prepared from the leaves and twigs of *Ourouparia gambir* Bail. and (*b*) pegucatechu, the dry extract prepared from the heart-wood of *Acacia catechu* Wild.—Ph. Japan III, p. 74.

The Ph. Brit. Committee of Reference in Pharmacy report on Catechu says:

> Dieterich's gambier-fluorescein test might be introduced, and further details for the starch test.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Smith, Kline & French Co. report the result of the examination of two samples of gum catechu. The ash was 2.8 per cent and 3.1 per cent; they were 45 per cent and 80 per cent soluble in alcohol, respectively.—Lab. Rep. S. K. & F., 1906, p. 17.

Francis, John M., thinks the compound tincture of gambir a desirable substitution for the compound tincture of catechu, as the latter was entirely too crude for pharmaceutical use.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

GELATINUM.

Hankey, William T., points out that the statement that gelatin is inodorous is rather indefinite, as an article that is inodorous when dry and cool may show a very disagreeable odor on being dissolved and the solution warmed on a water bath. The relative firmness of the jelly formed with a 1 to 50 aqueous solution is also an important factor in grading; the better grades uniformly producing the firmest jelly.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Sadikoff, Wl. S., (Zeit. physiol. Chem. 1906, v. 48, pp. 130–139) proposes a method for the preparation and purification of gelatin by which all albumins, mucin, nucleo-proteids, etc., are dissolved, any calcium phosphate is precipitated, and fatty compounds are hydrolyzed. He also gives a method of purifying gelatin prepared by the ordinary method.—Abstr. in J. Chem. Soc. Lond., 1906, v. 90, pt. 1, p. 777.

Levene and Beatty (Zeitschr. f. physiol. Ch., 1906, v. 49, p. 247) report experiments on the decomposition of gelatin by means of sulphuric acid and an analysis of the decomposition products of gelatin.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 825.

Dieterich, Karl, reports on 8 samples of gelatin; the residual ash varied from 0.583 to 2.201 per cent and the contained moisture from 8.66 to 22.33 per cent.—Helfenberger Annalen 1905, 1906, v. 18, p. 82.

Winkelblech, K., discusses the gelatinization and the density of solutions of gelatin, also considers the influences exerted by various factors.—Ztschr. f. ang. Chem., 1906, v. 19, pt. 2, pp. 1260–1262.

Vogel, J., (Berl. Klin. Wchnschr., vol. 43, no. 15) reports that a tendency to hæmorrhage in the bladder was successfully treated by injecting a 2 per cent solution of gelatin.—J. Am. M. Ass., 1906, v. 47, p. 312.

Lancereaux uses a 2.50 to 3.50 per cent gelatin serum in the treatment of aneurism; 200 gm. injected every five or six days into the buttock may be administered without trouble, absorption generally complete in twenty-four hours.—Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des. soc. sav.) p. 209.

GELATINUM GLYCERINATUM.

Scatcard, Elmer E., recommends, as a practical addition to the U. S. P. VIII directions for preparing glycerinated gelatin, that instead of allowing the mass to cool in the dish, from which it is removed with considerable difficulty, it be poured upon glass plates slightly coated with liquid petrolatum. After cooling it may be removed without difficulty and cut into pieces for preservation in the stock bottle.—Am. J. Pharm., Phila., 1906, v. 75, p. 419.

GELSEMIUM.

Henkel, Alice, mentions *Gelsemium sempervirens* (L.) Ait. f., commonly known as gelsemium, yellow jasmine, Carolina jasmine, and wild woodbine, as growing on low ground in woods and thickets from eastern Virginia to Florida and Texas, mostly near the coast.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 32.

The Ph. Brit. Committee of Reference in Pharmacy suggests that for gelsemium root an ash limit is not necessary.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Naylor, W. A. H., in his presidential address, B. P. C., reviews the literature having reference to the chemical examination of gelsemium, and concludes, in consideration of the fact that gelsemium is a powerful drug and that its activity is due "almost solely" to its alkaloidal principles, it is a matter of surprise that the United States Pharmacopœia has not directed the liquid extract to be standardized, the more so as it is commonly obtainable of a definite alkaloidal strength. Year Book of Pharmacy, 1906, pp. 210, 211. (See also Pharm. J., Lond., 1906, v. 23, p. 75.)

Francis, John M., asserts that the alkaloids are easily separated and purified, hence would readily lend themselves to physiological experimentation. It is worthy of more thorough study than has yet been given it. Twelve samples of the cured root gave an average of 0.43 per cent of alkaloids, highest 0.50 and lowest 0.25 per cent.—Bull. Pharm., Detroit, 1906, v. 20, p. 13.

Sayre, L. E., reports a number of experiments to determine the alkaloidal content of gelsemium root and rhizome. He has not devised a satisfactory method of assay as yet, and has not been able to separate the two alkaloids alleged to be present.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 383–385.

Lyons, A. B., discussing the assay of gelsemium, says that the volumetric determination of gelsemium alkaloids is exceedingly unsatisfactory. He had never been able, by repeated extractions, to get anything that he could say was the alkaloid pure and simple.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 386.

Francis, John M., says this is one of the fluid extracts which is commonly adjusted to uniform strength by assay by the manufacturing pharmacists of the United States. It is fair to presume that the Revision Committee would have adopted an assay standard for this fluid if the time had not been consumed in the investigation of the assay processes of the more important drug extracts * * *. It has been difficult for some years to obtain an adequate supply of good quality. It is reasonable to assume that the next revision will include an assay standard for this fluid extract.—Bull. Pharm., Detroit, 1906, v. 20, p. 10.

He reports the assay of twelve samples of gelsemium which varied from 0.25 to 0.5 per cent of alkaloid.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Felter says specific gelsemium is the remedy for active, excited circulation, with marked determination of the blood to the brain and nerve centers, as shown by the nervous irritation, flushed face, bright eyes, contracted pupils, marked irritability, restlessness, and high temperature. The carotids pulsate more or less visibly, and often convulsions seem imminent or actually occur.—Eclectic Med. J., Cincin., 1906, v. 66, p. 204.

Wells, G. Harlan, finds gelsemium useful in neurotic and functional diseases of the heart, especially those brought on by depressing emotions or by the excessive use of tobacco.—Hahneman. Month., Phila., 1906, v. 41, p. 264.

GENTIANA.

Hankey, William T., suggests the grading of gentian by determining its identity and estimating the percentage of ash and of alcohol soluble matter. Ten samples reported on varied from 5.05 to 9.20 per cent of ash and from 22.5 to 39.5 per cent of alcohol soluble matter.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

van der Wal, G. H., asserts that for the determination of gentian the most satisfactory method is that based on the determination of gentisin as outlined by Leconte and Baumert. (From Pharm. Weekblad, 1906, v. 43.)—Chem. Centralbl., Berl., 1906, v. 77, p. 363.

Schurhoff, P., reports finding powdered gentian adulterated with stone cells and points out that the frequency of this adulteration amply warrants the systematic inspection of powdered drugs on the part of the pharmacists who are anxious not to be misled.—Pharm. Ztg., Berl., 1906, v. 51, p. 479.

An editorial notes that the chief county inspector reports four prosecutions on account of adulterated ground gentian root. In each case the adulterant was ground olive stones, which were present in extent varying from 25 to 45 per cent. This substance, under the name of poivrette, is offered by a continental firm for "mixing."—Pharm. J., Lond., 1906, v. 23, p. 451.

Taylor, S., quotes Greenish and Lanton to the effect that the extract of gentian is better prepared by cold infusion only.—*Ibid.*, p. 669.

Philipp Röder, Wien, outlines a qualitative test for tincture of gentian.—Pharm. Zentralh., 1906, v. 47, p. 523.

Llewellyn, J. F., asks what is the objection to making an infusion of gentian out of the fluid extract.

Hemm, Francis, explains that when drug principles are dissolved by water as well as alcohol we may introduce principles into infusions which are contraindicated.—Proc. Missouri Pharm. Ass., 1906, p. 59.

Tanret (Chem. Ztg., 1906) points out that the bitter principles of gentian, particularly gentiopicrin, have a destructive effect on infusoria, while they are harmless to higher animals. He recommends that gentian be used as a remedy in malaria.—Pharm. Zentralh., 1906, v. 47, p. 429.

GERANIUM.

Henkel, Alice, mentions *Geranium maculatum* L., commonly known as geranium, wild crane's-bill, spotted crane's-bill, wild geranium, spotted geranium, and alum-root, as found in low grounds and open woods from Canada south to Georgia and Missouri.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 33.

Alexander, B. J., uses fluid extract of geranium and extract of *Pinus canadensis* (dark) as a topical application in chronic endocervicitis.—Abstr. in Electic Med. J., Cincin., 1906, v. 66, p. 142.

Fyfe, John William, says that *Geranium maculatum* was regarded as one of the most valuable astringents in the materia medica and was a leading remedy in internal and external hæmorrhages.—*Ibid.*, p. 321.

GLANDULÆ SUPRARENALES SICCÆ.

Francis, John M., finds the description fairly accurate. A large number of samples, representing over 4,000 pounds of desiccated glands, gave an average content of 5.5 per cent of ash. The test for identity will not always prove satisfactory—the quantity used is too great, the color reaction not sharp enough. He suggests a method which he admits is not absolute and does not serve to distinguish good material from inferior. * * * No synthetic substitute has yet supplanted the natural product, nor is it likely to.—Bull. Pharm., Detroit, 1906, v. 20, p. 13.

Abelous, Soulie, and Toujan discuss the action of the extract of the cortical and medullary substance of the suprarenal gland and the influence of tissues and organs of animals on autolysis.—J. de Pharm. et de chim., Par., 1906, v. 23, pp. 49, 90, 120.

Patta, Aldo, contributes an exhaustive critical and experimental study of the action of suprarenal extract.—Arch. di farmacol. sper., Roma, 1906, v. 5, pp. 188–215.

See also under Epinephrina.

GLANDULÆ THYROIDEÆ SICCÆ.

Francis, John M., finds the ash from many samples of desiccated glands shows an average of 4.3 per cent. For the identity test, 5 gm. should be used instead of 1 gm., and, in any event, the chloroform reduced from 5 cc. to 2 cc. or less. Two gm. of sodium nitrite in the iodine test is a very evident misprint, * * * at any rate 0.2 gm. is wholly sufficient to accomplish the desired result. Stock readily spoils; fresh can be had within ten days to two weeks.—Bull., Pharm., Detroit, 1906, v. 20, p. 13.

Aeschbacher, S., reports the results of research relating to the content of iodine and phosphorus in the thyroid.—J. Am. M. Ass., 1906, v. 46, pp. 313.

Pouchet, before the Paris Academy of Medicine (26. XII. 05; LIV, 649), holds that glycerin extracts of the thyroid gland are not comparable in action with the fresh juice.—Bull. des sc. pharmacol., Par., v. 13 (Compt. rend. des soc. sav.), p. 43.

A report of the American Surgical Society quotes William J. Taylor as advising the use of thyroid extract to lessen the coagulation time in hæmophiliacs.—J. Am. M. Ass., 1906, v. 47, p. 67.

The Council on Pharmacy and Chemistry describes iodothyrine, the action of which is similar to that of the desiccated thyroid glands.—*Ibid.*, v. 47, p. 1487.

Kebler, L. F., states that the preparation sold as "Rengo," to reduce obesity, contained thyroid and other drugs, though sold as a harmless preparation derived from fruits.—*Ibid.*, v. 47, p. 1628.

Barr, James, states that thyroid preparations are extremely useful in arteriosclerosis. He cites experiments on himself showing that they increase tissue metabolism.—Brit. M. J., Lond., 1906, v. 1, p. 125.

Schulz, Oscar, reports some experiments in thyroid feeding to normal and thyroidectimized dogs.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 662.

Peiser, Jul., reports experiments made to determine the influence, if any, exercised by the administration of thyroid substance or extract on the normal thyroid of animals. The author concludes that in rats, the animals experimented on, no evident change is produced directly, and that the changes which have been noted are due to a general interference with normal metabolism caused by the administered thyroid.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 515–529.

A contributor to the "Miscellany" column calls attention to the experiments of Reid Hunt (J. Biol. Chem., v. 1, No. 1), which show that thyroid feeding renders white mice less susceptible to the toxic action of acetonitrile, but that it has no such effect on the toxic dose of sodium nitroprusside or hydrocyanic acid, showing that the action is due to some specific antitoxic action, and that it does not act by increasing sulphur compounds by the metabolism of proteids. Thyroidectin had a slight effect in increasing the susceptibility of mice to acetonitrile.—J. Am. Ass., 1906, v. 47, p. 1405.

Stelwagon, Henry W., states that thyroid acts beneficially in psoriasis, but he delays its use as long as possible owing to its disadvantages.—*Ibid.*, v. 47, p. 1637.

Kleinhans, F. A., states that he has used thyroid on himself in the treatment of psoriasis, but with little effect.—*Ibid.*, v. 47, p. 1638.

Kocher (Arch. f. klin, Chir., Berl., v. 79, No. 3) calls attention to the abuse of the thyroid preparations, which he thinks have done more harm than good in goiter.—*Ibid.*, v. 47, p. 1233.

Solis-Cohen, S., calls attention to the fact that thyroid acts in many respects like sodium nitrite with sodium iodide.—*Ibid.*, v. 47, p. 1478.

Osborne, Oliver T., calls attention to many conditions and functions which are affected by thyroid feeding or changes in the thyroid secretion. Among these are: Restoration of the procreative function, when thyroid is administered to a thyroidectomized patient; it sometimes increases the blood count in chlorotic patients; it may institute menstruation in cases of amenorrhœa or increase it if already normal; it sometimes stops epistaxis and uterine hæmorrhage in stout women with slow hearts.—*Ibid.*, v. 47, pp. 1475–1479.

Patta, Aldo, in an exhaustive study of the action of organic extracts on the circulatory function, discusses the action of the thyroid gland.—Arch. di farmacol. sper., Roma, 1906, v. 5, pp. 576–579.

The paper includes studies of the thymus (p. 579) and the hypophysis (p. 581). The full paper, with bibliography, is found (*Ibid.*, pp. 188–215, 576–605) and is to be continued.

Additional references on the use of thyroid will be found in the Index Medicus and the J. Am. M. Ass.

GLYCERINUM.

An abstract from an article by Riviere discusses the possible extraction of glycerin from the by-products of distilleries.—Oil, Paint and Drug Rep., N. Y., 1906, Jan. 1, p. 17.

Bell, J. Carter, believes that the limit of water in glycerin might, with advantage, be stated. And prosecutions instituted whenever necessary for " extraneous water."—Brit. & Col. Drug., Lond., 1906, v. 49, p. 549.

Schmatolla, A., discusses the tests proposed for the valuation of glycerin. He points out that freedom from odor is indicative of purity, but that this test is not applicable to small samples, but must be confined to large quantities, carboys, or drums. Indifference to litmus paper does not indicate the neutrality of glycerin. The silver test he believes to be reliable.—Pharm. Ztg., Berl., 1906, v. 51, p. 363.

Galimard and Verdier call attention to the presence of arsenic in so-called pure glycerins in the form of compounds not directly detectable by the Marsh apparatus, and suggest a modification of the method.—J. de pharm. et de chim., Par., 1906, v. 23, p. 183.

G. Hell & Co., in Troppau, found the specific gravity of samples of glycerin to vary from 1.125 to 1.254, two samples contained free fatty acids.—Pharm. Post, Wien, 1906, v. 39, p. 181.

Dieterich. Karl, reports on 17 samples of glycerin. The specific gravity varies from 1.2293 to 1.2340 at 15° C. Of two samples that were refused one contained heavy metals and the other had a specific gravity of 1.2209 at 15° C.—Helfenberger Annalen 1905, 1906, v. 18, p. 82.

Barnard, H. E., reports that of 61 samples of glycerin analyzed, 47, or 77 per cent, did not conform with the U. S. P. VIII requirements; in no case was there evidence of fraud, but the large number of samples of inferior quality indicate that the trade uses little care in purchasing this article.—Rep. Indiana Bd. Health, 1906, pp. 369, 370.

Kebler, Lyman F., reports that 15 samples of glycerin tested complied with the U. S. P. requirements excepting the volatile fatty acid test. Only three of the samples were free from this impurity. All were virtually free from arsenic.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Ohliger, Willard, reports glycerin containing traces of butyric acid, mineral impurities and sugars.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Baird, J. W., reports 93 samples examined in 1904, 5 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Thurston found glycerin generally up to standard; only one sample tested was low in specific gravity.—Proc. Ohio Pharm. Ass., 1906, p. 69.

Smith, Kline & French Co. report on the examination of 7 samples of glycerin, the average sp. gr. of which was 1.25 at 25° C. They point out but one fault in these samples, a distinct trace of arsenic by the Marsh test. They assert that practically all glycerins contain a trace of arsenic.—Lab. Report, S. K. & F. 1906, p. 16.

Liverseege, J. F., in a review of past analyses of drugs officially bought in Birmingham says that as a rule samples are genuine, containing 4 per cent of water and less. Minute traces of arsenic were found in a few instances. He reports finding two samples which were found to be adulterated with 40 and 45 per cent of glucose, respectively.—Year Book of Pharmacy, 1906, p. 268.

Ossendowski, A. M., (Pharm. Ztg., lii, 1907, No. 17, 169; from J. d. russ. phys.-chem. Ges., 1906, 1071) reports, in the form of a table, the results of his determination of the solvent action of glycerin on a variety of substances.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 902.

Thomann, Julius, discusses several methods proposed for the determination of the glycerin content of fluid extracts and points out the need for making such determinations.—Schweiz. Wchnschr. f. Chem. u. Pharm. 1906, v. 44, pp. 545, 546.

Weiss (Zeitschr. d. allg. oesterr. Apoth.-Ver., 1906, p. 281) outlines a method for the determination of glycerin in fluid extracts which is a modification of Zeisel's method for the determination of glycerin in wines.—Am. Druggist, N. Y., 1906, v. 49, p. 148.

Beecher, C. H., is reported to have advised the use of glycerin to wash out the stomach and colon as well as for internal administration in the treatment of trichinosis.—J. Am. M. Ass., 1906, v. 47, p. 1677.

The author of an unsigned article quotes J. F. Palmer in the Clinical Journal, Aug. 15, 1906, to the effect that corns may be cured by soaking the part with water or glycerin during the night and protecting with spongiopiline with glycerin during the day.—*Ibid.*, v. 47, p. 1909.

A contributor to the "Therapeutics" column quotes Yeo as advising large doses of glycerin by the mouth in treating patients for uric acid calculi.—*Ibid.*, v. 47, p. 805.

Knapp, Bernhard, reports some experiments on the nutritive value of glycerin. (Deut. Arch. f. klin. Med., 1906, v. 87, pp. 341–355.)—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 547.

Lloyd, John Uri, discusses the history and early uses of glycerin and points out that the present widespread use of this substance is quite different from what had been expected by the pioneers in the glycerin industry.—Midland Drug., Columbus, 1906, v. 7, pp. 641–642.

GLYCERITUM FERRI, QUININÆ, ET STRYCHNINÆ PHOSPHATUM.

Patch, E. L., says glycerite of the phosphates of iron, quinine, and strychnine is assumed to be a liquid by the U. S. P. He has yet to find a sample that remains liquid, and points out that every lot of solid sold, made with the exact ingredients, differs in appearance from the officially described product and would be classed as an adulteration.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 329.

GLYCYRRHIZA.

The Ph. Brit. Committee of Reference in Pharmacy report on glycyrrhiza says give ash determination and microscopical characters to exclude olive stones, etc., and include a test of the extractive or glycyrrhizin value.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

True, Rodney H., reports that the Agricultural Department has had half an acre of Spanish licorice under cultivation in South Carolina for upward of two years and that ultimately they expect to supply the American demand for this root.—Oil, Paint and Drug. Rep., 1906, v. 70, Oct. 17, p. 37.

Dieterich, Karl, reports the examination of 25 samples of Russian licorice root which was found to vary from 21.40 to 36.10 per cent of dry, aqueous extract.—Helfenberger Annalen, 1905, 1906, v. 18, p. 126.

Gawalowski, A., discusses the cultivation of glycyrrhiza in Austria-Hungary and enumerates the districts in which the drug is being extensively grown. He records his experiences in the production of commercial extract of glycyrrhiza and incidently points out that the content of glycyrrhizin in the fresh dried root is approximately 7 per cent, and in the 2-year-old root approximately 9 per cent.—Pharm. Post. Wien, 1906, v. 33, pp. 130–131, 362–363.

An abstract (from Techn. sbornik., 1906, v. 17, p. 19) directs attention to the development of the glycyrrhiza industry in the Caucasus and asserts that the bulk of the product is sent to the United States.—Chem. Report., Cöthen, 1906, v. 30, p. 234.

Noble, H. W., presents a report on 8 samples of stick licorice, 2 samples of block juice, and a sample of the official, Ph. Brit., extract of glycyrrhiza. The ash found varied from 3.87 to 7.22 per cent. The glycyrrhizin varied from 4.24 to 17.07 per cent, and matter insoluble in cold water from 6.86 to 30.47 per cent in the commercial extracts.—Pharm. J., Lond., 1906, v. 22, pp. 494–495.

Baird, J. W., reports 18 samples extract of glycyrrhiza examined in 1904, 16 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 58.

Pegurier points out that fluid extract of glycrrhiza is extensively employed in England and in the United States for masking the bitter or nauseous taste of other medicaments. He suggests a number of combinations to illustrate the possible uses.—Nouv. remèdes, Par., 1906, v. 22, pp. 14–16.

Francis, John M., comments on the superior qualities of fluid extract of glycyrrhiza of the U. S. P. VIII over that of the U. S. P. VII.—Bull. Pharm. Detroit, 1906, v. 20, p. 10.

Gane, E. H., points out that the U. S. P. VIII process for fluid extract of glycyrrhiza is too tedious, wasteful of alcohol, and generally unsatisfactory. It does not yield a product free from acridity. The resulting product is dark and not popular with the trade.

Eli Lilly & Co. assert that the preparation is too strong in ammonia after some time.

Lyons, A. B., thinks results have been disappointing.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 442.

Ed. B. discusses the liquid extracts of glycyrrhiza, official in the Ph. Brit. IV and in the U. S. P. VIII, and points out that the two preparations are quite distinct. He prefers the preparation of the U. S. P.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 75–76.

Taylor, S., says the Ph. Brit. preparation of liquid extract of glycyrrhiza is generally acid, and deposits somewhat freely. The addition of ammonia to the product obviates this. A preparation on the lines of the American fluid extract contains a greater percentage of glycyrrhizin and keeps better.—Pharm. J., Lond., 1906, v. 23, p. 669.

Dunning, H. A. B., suggests that the compound powder of glycyrrhiza can best be mixed by running back and forth through a No. 80 bolting cloth after having previously sieved the ingredients separately.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 484.

Bell, J. Carter, points out that compound powder of glycyrrhiza has been found adulterated with ground olive stones, and suggests that the microscopical characters might be described.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 549.

Evans, John, has recently examined a large number of samples in which he found a large percentage of sclerenchymatous tissue, probably olive stones. In one sample both ground olive stones and leguminous starch cells were found. He cites, with approval, Allen's method of determination.—Apothecary, Boston, 1906, v. 18, p. 906.

GLYCYRRHIZINUM AMMONIATUM.

Gawalowski, A., discusses the production of glycyrrhizinates and records some experiments with the use of borates and sulphites in the production of sodium and potassium glycyrrhizinates.—Pharm. Post., Wien, 1906, v. 39, pp. 130–131, 362–363.

Ohliger, Willard, reports on samples of ammoniated glycyrrhizin yielding considerable ash, were off color, insoluble in alcohol, but soluble in dilute alcohol. Commercial samples seldom conform to official requirements.—Proc. Michigan Pharm. Ass., 1906, p. 47.

GOSSYPIUM PURIFICATUM.

Cook, O. F., presents an exhaustive study on weevil-resisting adaptations of the cotton plant, including a comparative study of various conditions existing in Central America and in the cotton belt of the United States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 88.

(A number of references on the cultivation of cotton and related subjects are to be found in Just's Botanischer Jahresbericht.)

Bell (Med. Press & Cir., June 14, 1905) reports two cases. In one he administered a small handful of absorbent wool—teased up very finely, part in milk food, part in jam sandwiches—to an 18 months child who had gleefully swallowed a gold brooch with the letters "B-A-B-Y" sticking out on all sides. In the other, a boy, aged 4½, who had swallowed a small brass knob, which he had unscrewed from his bed, was given a handful of absorbent wool in bread and milk. A third case is cited, a patient of G. L. Lohnson, who had swallowed a metal denture.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, pp. 146–147.

GRANATUM.

The Ph. Brit. Committee of Reference in Pharmacy report on pomegranate says if not omitted no ash figure necessary, as it is not used in powder.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Philipp Röder, Wien, reports finding 12.74 and 14.82 per cent of ash in pomegranate bark, and doubts the practicability of the Ph. Austr., VIII, limit of 10 per cent of ash for this drug.—Pharm. Post., Wien, 1906, v. 39, p. 248.

An unsigned critique of the Ph. Ndl. IV notes the requirement of not less than 0.25 per cent of alkaloids.—Chem. & Drug., Lond., 1906, v. 68, p. 828.

Caesar and Loretz suggest the estimation of moisture and the alkaloid content in pomegranate bark. For the latter they outline a method.—Geschäfts-Ber. v. Caesar & Loretz, in Halle, a. S. 1906, pp. 95–97.

Puckner, W. A., reviews some of the recent literature relating to the assay of pomegranate, and points out that Fromme has come to the conclusion that the variable results obtained are due to the loss of pomegranate alkaloids by volatilization.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 272–273.

Irokawa, K., examined commercial pomegranate bark and found that there is no distinct difference as to the quantity of alkaloid contained in the bark of roots, stems, and branches. He recommends the inclusion of the stem bark in the new Japanese Pharmacopœia.—J. Pharm. Soc. Japan, 1906, p. 123.

Caesar and Loretz report that the alkaloid content of pomegranate bark varies from 0.235 to 0.442 per cent.—Geschäfts-Ber. v. Caesar & Loretz, in Halle, a. S. 1906, p. 15.

GRINDELIA.

Henkel, Alice, mentions *Grindelia robusta* Nutt., commonly known as grindelia and gum plant, as being a native in the States west of the Rocky Mountains.

Grindelia squarrosa, (Pursh.) Dunal., commonly known as grindelia, scaly grindelia, and broad-leaved gum plant, is also mentioned. It occurs on the plains and prairies from Saskatchewan to Minnesota, Texas, and California.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 34.

Schneider, Albert, points out that grindelia is used by the Indians for lung trouble and as a wash for poison-oak poisoning. The most common species are *G. cuneifolia*, *G. glutinosa*, *G. robusta*, and *G. squarrosa.*—Merck's Report, N. Y., 1906, v. 15, p. 95.

Perredes, Pierre Elie Felix, records a study of the botanical characters of some Californian species of grindelia and figures and describes *Grindelia robusta*, *G. camporum*, and *G. squarrosa.*—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 370–374.

GUAIACOL.

Francis, John M., asks why are not the sodium sulphonates of creosote and guaiacol as worthy of official recognition as the carbonate; he thinks they possess many advantages.—Bull. Pharm., Detroit, 1906, v. 20, p. 54.

Graham, Willard, reports that five samples of guaiacol examined showed the following results: Specific gravity, 25° C., 1.12 to 1.13; boiling point, 199° to 205° C. All of the samples were abnormal according to the original U. S. P. VIII test with sodium hydroxide.—Proc. Pennsylvania Pharm. Ass., 1906, p. 153.

Ohliger, Willard, reports that guaiacol sometimes contains 50 per cent of creosote.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Van den Burg, William H., asserts that guaiacol is useful in certain cases as an intestinal antiseptic.—Trans. Am. Inst. Homœop., Phila., 1906, 62d sess., p. 397.

Bryant, H. W. (Australas. Med. Gaz., Dec. 20), treated 200 cases of typhoid fever with guaiacol inunctions, with only one death. The temperature is controlled, the skin kept moist, and the patient is more comfortable; diarrhœa is rare.—J. Am. M. Ass., 1907, v. 48, p. 837.

GUAIACOLIS CARBONAS.

Fernan, Albert, found a sample of guaiacol carbonate with a yellow coloration that had a melting point of 89° C., 22.86 per cent methoxyl.—Ztschr. d. allg. österr. Apoth.-Ver. Wien, 1906, v. 44, p. 79.

Garceau, Edgar, recommends the internal use of guaiacol carbonate in tuberculosis of the urinary tract in women, in connection with injections of corrosive sublimate into the bladder according to the Guyon method—J. Am. M. Ass., 1906, v. 47, p. 1441.

GUAIACUM.

Naylor, W. A. H., reviews the chemistry of guaiacum and suggests that the U. S. P. test with cupric acetate be made to read: "When shaken with an equal volume of an aqueous solution of cupric acetate (1–10) the supernatant solution should not be colored green." The U. S. P. determination of the acid number is described as being unsatisfactory, inasmuch as the end reaction is indefinite, and a small error in reading off the volume of alkali required is the cause of a large error in the result.—Year Book of Pharmacy, 1906, p. 213. (See also Pharm. J., Lond., 1906, v. 23, p. 76.)

The Ph. Brit. Committee of Reference in Pharmacy report on guaiacum says not less than 90 per cent soluble in alcohol, and not more than 3 per cent of ash. Experiment on the acid value.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Richter, Paul, makes a contribution to the knowledge of the composition of guaiac resin. He discusses the literature and reports his findings in connection with the dry distillation of guaiac resin and of guaiac acid; also the nature of guaiac acid and its relation to guaiac blue; the nature of guaiac blue.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 90–119.

Francis, John M., found 90 per cent of the commercial samples of guaiacum to contain 85 per cent or more of alcohol-soluble resin; 70 per cent contained over 96 per cent; and less than 10 per cent fell below the U. S. P specifications.—Bull. Pharm., Detroit, 1906, v. 20, p. 54.

Hankey, William T, asserts that the great majority of the samples of guaiac examined by him exceeded the 15 per cent limit of insoluble matter permitted by the U. S. P. VIII, some samples running as high as 29 per cent insoluble matter, while others ran as low as 2.25 per cent. He found the ash to range from 0.50 to 6.40 per cent. He also calls attention to the difficulty of determining the acid number.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Roethtisberger, P. (Arch. f. Verdauungs Krank., Berl., v. 12, No. 3), states that C. W. Hufeland has highly recommended the use of guaiacum in the treatment of gout.—J. Am. M. Ass., 1906, v. 47, p. 312.

GUARANA.

Puckner, W. A., reviews the literature relating to the assay of caffeine-bearing drugs, and points out that the addition of ether to the residue remaining after the final evaporation of the chloroform is unnecessary. His experiments appear to indicate that caffeine does not become anhydrous when dried at the temperature of boiling water, even if continued for days.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 236–237.

Vanderkleed, C. E., is quoted as asserting that it is easy to obtain guarana assaying above the U. S. P. standard, but the drug is difficult to exhaust.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 439.

Francis, John M., has examined many samples, representing several thousand pounds, and has not yet found one to assay below 4 per cent of caffeine and associated principles.—Bull. Pharm., Detroit, 1906, v. 20, p. 54.

Patch, E. L., reports on three samples of guarana which contained 4.32 and 4.9 per cent of alkaloid, respectively.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Lyons, A. B., reports that eight of the twelve replies received indicated that the U. S. P. standard for fluid extract of guarana is satisfactory and readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

HAMAMELIS.

Henkel, Alice, mentions *Hamamelis virginiana* L., commonly called hamamelis, witch-hazel, winterbloom, and snapping hazel, as being found in damp woods from New Brunswick to Minnesota, south to Florida and Texas.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 88, p. 35.

Schneider, Albert, asserts that *Hamamelis virginiana* L., is a very popular Indian remedy for bruises, sores, cuts, and other injuries.—Merck's Report, N. Y., 1906, v. 15, pp. 95–96.

The Ph. Brit. Committee of Reference in Pharmacy report that for hamamelis bark and leaves an ash limit is not necessary.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Mittlebach, Wm., asks why both the leaves and the bark were recognized; why not recognize that part of the plant which is strongest in medicinal properties?

Hemm, Francis, and Hamill, E. C., note that different preparations are sometimes made from different parts of the drug.—Proc. Missouri Pharm. Ass., 1906, p. 38.

Mundy discusses the specific indications for "Hamamelis Virginius" [sic]; the three conditions in which he finds it especially valuable are "epiataxis" (internally), hæmorrhoids, and prolapsus ani (internally and topically). He sees no reason why it should not be as effective in hæmorrhages from other organs. The dose of the spirit and distillate is given as 5 to 60 drops.—Eclectic Med. J., Cincin., 1906, v. 66, p. 68.

Fyfe, John William, says that *Hamamelis virginica* was found useful in the treatment of ulcers and as an injection into the vagina for falling down of the womb, and as a wash for falling of the intestine.—*Ibid.*, p. 321.

AQUA HAMAMELIDIS.

Beal, J. H., has never been able to fathom what object the Revision Committee expect to accomplish by the introduction of the process for the manufacture of distilled witch hazel. It is not to be expected that any pharmacist in the United States in full possession of his senses would undertake the manufacture of this, and he can not see what is to be gained by it.—Proc. Ohio Pharm. Ass., 1906, p. 62.

Thurston defends the committee for introducing a standard, and hopes that some one may develop a method of determining whether the proper amount of bark has been used.—*Ibid.*, p. 70.

An unsigned article, illustrated, describes the manufacture of distilled extract of witch-hazel, records some of the history of the preparation and of the plant yielding it.—Pharm. Era., N. Y., 1906, v. 35, pp. 62–64.

Calder and Strickland discuss the official and several other methods for the detection of methyl alcohol and formaldehyde in distilled extract of witch-hazel, and suggest the use of a slight modification of the official U. S. P. VIII test. They suggest the use of resorcinol and strong sulphuric acid as the reagents.—Drug. Circ. & Chem. Gaz. N. Y., 1906, v. 50, p. 41.

Leach, Albert E., reports that out of 235 samples of hamamelis water analyzed 24 were pronounced to be adulterated. Two of the samples contained wood alcohol, and all of the objectionable samples contained formaldehyde, the amount varying from 0.06 to 0.25 per cent.—Rep. Massachusetts Bd. Health, 1906, pp. 400–402.

Ohliger, Willard, reports distilled extract of witch-hazel which varied in alcohol content from 11.5 to 14 per cent.—Proc. Michigan Pharm. Ass., 1906, p. 48.

HEDEOMA.

Matzel, R., (Arch. internat. de pharmocd. et de thérap. 1905, v. 15, p. 131) asserts that pulegon produces in mice only some degree of hypnosis without disturbing sensibility of reflexes.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 138.

Stephens commends hedeoma strongly for the relief of pruritis and eczematous eruptions. He finds a 1 per cent cerate useful also in irritation of the Schneiderian membrane.—Eclectic Med. J., Cincin., 1906, v. 66, p. 316.

HEXAMETHYLENAMINA.

Francis, John M., thinks hexamethylenamina is easily made but extremely difficult to purify; the identity and purity tests are ample; the identity once established the pharmacist may well rely upon his sense of smell, as when this substance is refined enough to be devoid of odor it will most probably meet all purity tests.—Bull. Pharm., Detroit, 1906, v. 20, p. 54.

Eastenbau, M., (Rev. Scientif. Professional) outlines a method for preparing hexamethylene-tetramine by simply combining the necessary quantities of a 40 per cent solution of formaldehyde and aqua ammonia. For purifying, the resulting crystals are dissolved in the smallest possible quantity of boiling alcohol, which is then allowed to cool slowly. The resulting crystals are to be dried on filter paper.—J. de pharm. d'Anvers., 1906, v. 62, p. 724.

Kahn, Joseph, outlines several readily applied tests for the identity of hexamethylenamine.—Am. Druggist, N. Y., 1906, v. 49, p. 6.

Ischidzu and Inouye have studied the nature of the decomposition products of hexamethylenamina and the influence of various acids and of Japanese saké on hexamethylenamina. They conclude that acids readily decompose hexamethylenamina into formaldehyde, carbon dioxide, and methylamine. Hexamethylenamina is more stable in alkaline solutions than in neutral, boiling water will liberate formaldehyde.—J. Pharm. Soc. Japan, 1906, p. 1.

Mohr, F., quotes Guiard, who (Ann. d. mal. d. org. génito-urin.) refers to a Swiss specimen of hexamethylene-tetramine so manifestly inferior as to be positively dangerous.—Bull. des sc. pharmacol. Par., 1906, v. 13, p. 387.

Stimson, Edward P., calls attention to the discrepancy between the price of hexamethylenamine as given in a current price list and that of some of the proprietary preparations.—J. Am. M. Ass., 1906, v. 47, p. 2024.

Thursfield, H., (Brit. M. J., Lond., Apr. 21) recommends urotropin in bacteriuria.—*Ibid.*, v. 46, p. 1566.

Coleman, W., (Clin. Rev.) reports having observed gastro-intestinal disturbances after 1 gm. doses of urotropin. He also reports other secondary effects.—Jahresber. ü. Tier. Chem., Wiesb., 1906, 1907, v. 36, p. 794.

Shattuck, Frederick C., says that for the past eight years his typhoid patients have had 7 to 10 grains of urotropin thrice daily, two successive days of each week, until convalescence was complete.

In no case has harm resulted. Were the practice universal there would be less typhoid.—Merck's Arch. N. Y., 1906, v. 8, p. 150.

HOMATROPINÆ HYDROBROMIDUM.

Francis, John M., thinks the last test for atropine, hyoscine, and hyoscyamine should never be omitted.—Bull. Pharm. Detroit, 1906, v. 20, p. 54.

Howe (Ophthalmology, 1906) discusses the effects of full and of minimum doses of homatropine hydrobromide and of atropine sulphate and concludes that homatropine is to be preferred as a mydriatic.—Biochem. Centralbl. Leipz., 1906–7, v. 5., p. 634.

Grube (Inaug.—Diss., Göttingen, 1905) discusses the comparative action of atropine, homatropine, and eumydrin on the eye.—Abstr., *Ibid.*, p. 249.

Brown, Horton, (Ann. of Opth., 1906) reports a case of poisoning by the instillation of homatropine.—*Ibid.*, p. 807.

Callan, Peter A., cites two cases of idiosyncrasy to homatropine hydrobromide, both females, in opthalmic practice. He uses a neutralizing solution consisting of a 1 per cent solution of eserine sulphate combined with 2 per cent pilocarpine hydrochloride.—Merck's Arch., N. Y., 1906, v. 8, p. 367.

Panas and Scrini suggest the use of a solution of homatropine alkaloid in olive oil in place of an aqueous solution of the salt for use in the eye.—Bull. Soc. de Pharm. de Bordeaux, 1906, v. 46, p. 57.

HUMULUS.

Schneider, Albert, points out that the Indians use poultices made of the strobiles of *Humulus lupulus* L. to relieve swellings and bruises.—Merck's Rep., N. Y., 1906, v. 15, p. 96.

The Bureau of Plant Industry points out that American hops are being discriminated against in many markets because of their supposed lack of certain desirable qualities. It is thought that these objections can be overcome, and a study of the problems of curing has been mapped out and is now in progress in the hop districts of the Pacific coast.—Ann. Rep., U. S. Dept. Agric., 1906, p. 206.

Naylor, W. A. H., reviews the literature relating to hops and suggests that, in so far as the activity of this drug has been shown to reside in lupulin, the bracts themselves being inactive, it would be practicable to suggest that hops be deleted from the pharmacopœia.—Year Book of Pharmacy, 1906, pp. 213–214.

Gehe & Co. discuss the economic conditions prevailing in the hop market and present a table showing the great increase in production over the preceding year.—Handels.-Ber., Gehe & Co., 1906, p. 27.

Merritt, E., (U. S. Dept. Agr.. Bur. Statis. Bul. 50. pp. 34, dgm. 1) discusses the production of hops in the United States from 1850–1900 and the annual production and commercial movement of this product from 1889–1905, together with the localization of the production in this and European countries. Figures are also given with reference to the trade and consumption of hops in the United States and abroad.—Exper. Sta. Rec., 1906, v. 18, p. 1040.

Chapman, A. C., (Lond. Brewing Trade Rev., 1905. pp. 99, pls. 10, figs. 3) presents a monograph on the hop plant; the topics discussed, treated by different authors, include the physical characteristics of a good hop, fertilization and cross fertilization of the plant, the manuring of the crop, the cold storage of hops, the essential oil, the bitter substances and resins of hops, hop alkaloids, and the part played by hop tannin in brewing.—*Ibid.*, v. 18, p. 137.

HYDRARGYRI CHLORIDUM CORROSIVUM.

Schmidt, Walter, records some experiments made to determine the mercuric chloride content and the antiseptic value of sublimate dressings obtained at various times.—Pharm. Zentralh., 1906, v. 47, pp. 965–972, 987–994.

Francis, John M., says that while the specifications of the pharmacopœia are ample, much of the bichloride of mercury marketed is not as soluble as it should be.—Bull. Pharm., Detroit, 1906, v. 20, p. 55.

Patch, E. L., reports a sample of mercuric chloride which contained an unusual amount of calomel.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Ohliger, Willard, found a sample which showed the presence of mercurous salt.—Proc. Michigan Pharm. Ass., 1906, p. 48.

The Ph. Brit Committee of Reference in Pharmacy points out that solutions of mercuric chloride should be preserved in amber bottles.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Foote and Levy discuss the double salts of mercuric chloride with the alkali chlorides and their solubility.—Am. Chem. J., 1906, v. 35, pp. 236–246.

Lefeldt, Max, points out that in dispensing tablets of mercuric chloride it is not always easy to determine what is wanted when a tablet for mercuric chloride 1 gm. is ordered. He suggests a more desirable definition.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 340.

Shekwana, P., (N. York Med. J., N. Y., Dec. 8) states that the hands of the physician may be sterilized in from five to ten minutes with a 1–1,000 solution of corrosive sublimate.—J. Am. M. Ass., 1906, v. 47, p. 2120.

Price, T. Slater, tested the poisonous action of mercuric chloride, bromide, and cyanide on the spores of anthrax bacillus; he concludes that in order to estimate the toxic effect of salt solutions it is not enough to determine merely the total concentration of the dissolved substance, but it is also necessary to find the concentration of the ions. This is true also when effects other than toxic are being studied.—Pharm. J., Lond., 1906, v. 23, pp. 89–91.

Stone, B. H., is reported to have said that bichloride would not destroy tetanus germs, but that peroxide of hydrogen would.—J. Am. M. Ass., 1906, v. 47, p. 1677.

Leming, William, (Modern Eclecticism) uses corrosive sublimate in ulcerative conditions of the lower bowel, with slimy, foul discharges.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, p. 441.

The author of the "Therapeutics" column quotes Osler as expressing doubt of the value of any internal treatment for erysipelas, but states that injections of mercuric chloride or biniodide may possibly do good.—J. Am. M. Ass., 1906, v. 47, p. 637.

Craig, G. G., states that a young woman applied a solution of corrosive sublimate in wood alcohol to her neck, back, and left arm for rheumatism. He found her hysterical and complaining of intolerable burning; death occurring in about five and a half days with the usual symptoms of poisoning by corrosive sublimate.—*Ibid.*, v. 47, p. 1484.

The editor adds a note to the article of Craig, stating that poisoning may occur from the external application of mercurial compounds, generally alcoholic solutions of corrosive sublimate or ointment, but even aqueous solutions may be absorbed.—*Ibid.*, p. 1485.

Additional references on the use of corrosive mercuric chloride will be found in the Index Medicus and the J. Am. M. Ass.

HYDRARGYRI CHLORIDUM MITE.

Francis, John M., calls attention to the fact that varying processes produce calomels indistinguishable by chemical test, but varying in physical properties and behaving differently in combination with other chemical substances. For instance, of tablets of calomel and soda bicarbonate prepared from half a dozen samples of calomel from American, European, and Japanese manufacturers, with identically the same proportions and manipulation, but one yielded a tablet which remained white; the others became grayish or discolored within from one to six weeks, showing reaction between the mercury salt and alkali. The most important tests are those for soluble impurities and for mercuric chloride, as these exclude the dangerous soluble mercury salts.—Bull. Pharm., Detroit, 1906, v. 20, p. 55.

Wiebelitz, H., asserts that even freshly prepared mild mercurous chloride soon develops traces of corrosive mercuric chloride, and believes that the pharmacopœia should permit a slight change in color on the addition of H_2S.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Vive and Budde (Chem. Ztg., Rep., 1905) have experimented with mixtures of mercurous chloride and sodium chloride, and find that at ordinary temperatures and even at the temperature of the human body there is no interaction between these two chemicals. At higher temperatures and in concentrated solution there is decomposition. They conclude that calomel tablets, made up with perfectly dry powders and preserved in a dry place, are indefinitely stable and remain unchanged.—Pharm. Zentralh., 1906, v. 47, p. 485.

Caspari, Chas. E., reports thirteen samples examined: Eight U. S. P.; four contained mercuric chloride, and one other metals.—Proc. Missouri Pharm. Ass., 1906, pp. 51, 99.

Hemm, Francis, comments on the necessity for testing calomel, and does not concur in the opinion that the English product is superior to the American.—*Ibid.*, p. 99.

An editorial calls attention to the fact that calomel is not wholly eliminated by the feces when given by the stomach. No conversion of calomel into corrosive sublimate occurs in the dog's stomach in an hour and a half, and it appears that the absorption due to the pancreatic secretions occurs only in the ileum or large intestine.—N. York M. J., 1906, v. 84, p. 754.

Pisek, G. R., advises the use of calomel or castor oil to run on the decomposing food in infantile diarrhœa.—J. Am. M. Ass., 1906, v. 47, p. 401.

Lambkin, F. J., (Lancet, Lond., Nov. 3) advises the intramuscular injection of calomel in so-called virulent cases of syphilis; he injects it until physiologic effects are obtained, after which he substitutes mercurial cream.—*Ibid.*, v. 47, p. 1859.

The author of an unsigned article states that Metchnikoff and Roux prevented the development of syphilis in monkeys, inoculated with virulent human material, by inunction with calomel and lanolin. Similar results were obtained on a healthy medical student.—*Ibid.*, v. 46, p. 1779.

Metchnikoff and Roux (Ann. de l'Inst. Pasteur, Par., xx, No. 10) reiterate their former assertions regarding the prophylactic value of calomel in lanolin against syphilis. The student inoculated with human virus and treated with the calomel ointment has now remained free from syphilis for a year.—*Ibid.*, 1907, v. 48, p. 84.

Gottheil, William S., calls attention to the advantages of treating syphilis with intramuscular injections of an insoluble salt of mercury which is slowly converted into a soluble salt and absorbed. The salicylate is preferred by nearly all syphilographers, calomel being the only competitor in this particular. Liquid petrolatum is preferred as the suspension fluid for this purpose. The technic of the treatment is detailed.—N. York M. J., 1906, v. 83, pp. 1340–1343.

Desesquelle, Ed., enters a vigorous protest against the employment of the insoluble compounds of mercury by injection, citing a number of accidents resulting therefrom.—Bull. de sc. pharmacol., Par., 1906, v. 13, pp. 245–247, 451–453.

Quéry states that the activity of a salt of mercury in the treatment of syphilis should be measured especially according to the quantity of mercury which it contains. He gives the following percentages as approximate: Calomel, 85 per cent; oxycyanide, 83 per cent; pomade, 50 per cent; sublimate, 73 per cent.—Compt. rend. Soc. de biol., Par., 1906, v. 60, pp. 177–179.

Louise and Moutier, as a result of their experiments on a goat, think it possible to subject a pregnant syphilitic mother to mercurial treatment without danger to the fœtus. After accouchement the treatment of the infant may be continued through the mother's milk. They hold that the mercury passes through the placenta to the fœtus and that it also passes into the mother's milk.—J. de pharm. et de chim., Par., 1906, v. 24, p. 575.

Thistle, W. B., (Brit. M. J., Lond., Oct. 29) advises calomel, followed by a purgative saline day after day, in the treatment of typhoid to lessen additional infection and to abstract toxins from the body.—J. Am. M. Ass., 1906, v. 47, p. 1686.

Graham, E. E., (Therap. Gaz., Detroit, July 15) begins the treatment of infantile diarrhœa due to toxæmia by administering calomel or castor oil.—*Ibid.*, v. 47, p. 540.

In a report of the meeting of the Philadelphia County Medical Society, Wilson is quoted as having advocated the use of calomel in cases of eclampsia, first on account of its diuretic effect; second, on acocunt of its hydragogue action which aids in elimination; and third, on account of its corrective effect in the presence of intestinal fermentation.—*Ibid.*, v. 46, p. 983.

Watkins says that a general condemnation of mercury as a remedy for disease has long been characteristic of the eclectic school, yet calomel, properly used, is a good remedy and fills a position in our armamentarium which could not well be taken by any other agent.—Eclectic Med J., Cincin., 1906, v. 66, p. 595.

Additional references on the use of mild mercurous chloride will be found in the Index Medicus and the J. Am. M. Ass.

HYDRARGYRI IODIDUM FLAVUM.

Francis, John M., thinks the process of manufacture will give an uncertain and costly product with all the blends of red, yellow, and green imaginable, which will finally be thrown away. Like calomel, samples of this salt while meeting all chemical identity and purity tests react differently under manipulation; some samples are more sensitive to light than others, probably due to a difference in molecular arrangement or physical constitution.—Bull. Pharm Detroit, 1906, v. 20, p. 55.

Garceau, A. (Northwest Med., Seattle, June), discusses the use of protiodide of mercury in syphilis.—J. Am. M. Ass., 1906, v. 47, p. 73.

HYDRARGYRI IODIDUM RUBRUM.

Francis, John M., thinks the red iodide of mercury can be more easily prepared than the yellow, but in limited quantity its production is costly and unsatisfactory. The most objectionable feature of the commercial article, the mercurous salts, is not provided for in the official process. He would modify the description of the test as follows: two gms. of red mercuric iodide should *wholly* and *quickly* dissolve in 100 c. c. of distilled water containing 2 gms. of potassium iodide. This test will secure a product suited for practically any pharmaceutical use.—Bull. Pharm., Detroit, 1906, v. 20, p. 55.

Seidell, Atherton, outlines a method for the determination of mercuric iodide in antiseptic soaps. He dissolves the soap in alcohol, acidifies with hydrochloric acid, dilutes with water, and precipitates the mercury with hydrogen sulphide. The iodine is determined by removing the liberated fats from the filtrate and treating the resulting fat free solution with nitrous acid to liberate the iodine which is washed out with chloroform, and finally titrated with sodium thiosulphate solution.—J. Am. Chem. Soc., 1906, v. 28, pp. 73–77.

Orlow, N. A., discusses several reactions of mercuric iodide and its behavior with palladium chloride and thallium chloride in the presence of silver chloride.—Chem. Ztg., Cöthen, 1906, v. 30, p. 1301.

Caspari, Chas. E., reports five samples examined; four U. S. P.; one contained excess of soluble chlorides or iodides.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Ronchi (Rif. med., 1906, No. 10) prefers the biniodide in spite of the fact that subcutaneous injections of the salt, in solution or in suspension, are very painful.

Batut (J. d. mal. cutan., 1905, December) also returned to mercuric iodide after trying other preparations.—Abstr. in Merck's Ann. Rep., 1906; Darmstadt, 1907, v. 20, p. 130.

HYDRARGYRI OXIDUM FLAVUM.

Dufau, Emile, makes further observations on an "orange" mercuric oxide proposed by him (see J. de Pharm. et de chim., [6], v. 16, p. 439, 1902; also Carles, Rép. d. pharm., 1904, p. 305), which is supposed to have properties intermediate between the red and yellow oxides and presents a new formula for an ointment.—J. de pharm et de chim., Par., 1906, v. 23, pp. 100–103.

Wiebelitz, H., points out that it is difficult to secure mercuric oxide free from the lower oxide, and that the majority of the available samples do not dissolve completely in diluted hydrochloric acid.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Caspari, Chas. E., reports 3 samples examined—2 U. S. P., 1 contained excess of red oxide.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Patch, E. L., found mercuric oxide to leave a large residue on ignition.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

HYDRARGYRI OXIDUM RUBRUM.

Caspari, Chas. E., reports 11 samples examined—2 U. S. P., 9 contained nitrate.

Mittelbach, Wm., says the two mecurial oxides are therapeutically and chemically the same; the only difference he could observe was the color and degree of fineness. He asks why there should be any difference at all, and thinks the Revision Committee could drop the red oxide.

Hemm, Francis, thinks the nitrate would make the red oxide corrosive in eye salves and that we should therefore stick to the yellow oxide which is the purer and finer.—Proc. Missouri Pharm. Ass., 1906, pp. 32, 51, 99.

HYDRARGYRUM.

Yale, C. G., (Eng. & Mining J., Jan. 6, 1906) notes that production in 1905 decreased by between 4,000 and 5,000 flasks. The grade of cinnabar ore, now being worked in California, is much lower than formerly; seemingly the high grade ore deposits have been exhausted, except where small bunches are occasionally found. Many mines are now working on ore carrying 0.5 per cent of metal. The Texas mines have ore up to 2.5 per cent, and are doing well.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 125.

Rupp, E., (Chem. Ber., 1906, v. 39, pp. 3702–3704) discusses the volumetric estimation of mercury, by means of formaldehyde, or an excess of iodine solution.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 884.

He also outlines a method for determining the amount of mercury in preparations, which depends on the dissolving of that metal in chlorine free nitric acid and titrating the resulting filtered and cleared solution with potassium sulphocyanide.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 537–540.

Dunning, H. A. B., discusses the preparation of extemporaneous mixtures of mercury with various ointment and oil bases, using lanum (anhydrous) as an extinguishing agent.—Proc. Maryland Pharm. Ass., 1906, p. 70.

Audry, C., (Ann. de dermat. et syph. Par., v. 7, No. 10) recommends the use of rectal suppositories containing metallic mercury and states that it is just as effective in this way, and no inconveniences were seen.—J. Am. M. Ass., 1906, v. 47, p. 76.

Conti and Zuccola (Riforma Med., v. 32, No. 9) state that the white corpuscles take up the mercury, no matter how administered, and transport it to liver and other organs. It is eliminated by the intestines and kidneys. It is found especially in the nuclei of cells.—*Ibid.*, v. 47, p. 244.

Klieneberger, Carl, (Zeitschr. f. klin Med., 1906, v. 58, p. 481) asserts that a study of the urine in 31 cases (12 of them nonluetic) during mercurial inunctions showed that in 84 per cent of the cases there were serious structural changes in the kidneys, shown especially in the form of a constant hyalin cylindruria. This cylindruria bears no relation to albuminuria, indeed significant albuminuria was demonstrated only in one case. Exclusive control of the urine by albumin is therefore insufficient.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 134.

Reilly, T. F., predicts that the treatment of syphilis by inunction must speedily give place to the new methods of injecting mercuric salts subcutaneously.—J. Am. M. Ass., 1906, v. 47, p. 649.

An editorial calls attention to the fact that nephritis is sometimes due to the mercury employed in the treatment of syphilis, rather than to the syphilis itself. Caution is enjoined in the study of cases to determine whether too much or too little mercury is being employed.—N. York M. J., 1906, v. 84, p. 1279.

Martinet (Presse Méd. 8. VII. 05) reports a case of intoxication resulting from the filling of a small carious cavity with amalgam containing certainly not over one-third of a grain of mecury. Severe stomatitis and a scarlatiniform erythema over the hypogastric and crural regions developed two days after the filling.—Dental Cosmos, Phila., 1906, v. 48, p. 112.

Parturien (Arch. de stomat., Par., 1905) recommends 1:4,000 solutions of mercuric chloride or cyanide in thrush, applied on cotton wrapped about the finger, with pressure sufficient to cause the solution to penetrate deeply.—*Ibid.*, p. 113.

Additional references to the use of mercury will be found in the Index Medicus and the J. Am. M. Ass.

HYDRARGYRUM AMMONIATUM.

Richard and Holdermann report a study of the constitution of complex mercury combinations, particularly the several forms of ammoniated mercury.—Pharm. Zentralh., 1906, v. 47, pp. 459, 460.

Tyrer, Thomas, criticises the Ph. Brit. definition of ammoniated mercury and declares that commercial and salable samples may legitimately vary between 75.50 per cent and 77.32 per cent.—Pharm. J., Lond., 1906, v. 23, p. 103.

Tyrer, Thomas, points out that looseness of definition or want of clearness in description may be sources of trouble and probably harm. The formula $HgClNH_2$ is that on which evidently the percentage of mercury is calculated. It is not founded on experimental work. He calls attention to the unstable character of the precipitate and asserts that thorough washing, as prescribed in the pharmacopœia, tends to increasing deterioration of the color of the precipitate. He believes 76 to 77 per cent to be a reasonable requirement for mercury content.—Year Book of Pharmacy, 1906, pp. 302–304.

The Ph. Brit. Committee of Reference in Pharmacy report on ammoniated mercury says the standard of mercury is too high, and should not be higher than 77 per cent. This preparation should be dried at not over 30° C.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Schmidt, Ernest, presents a discussion of the physical and chemical properties of ammoniated mercury, and points out the complex nature of its composition.—Pharm. Zentralh., 1906, v. 47, p. 804.

Bauer, Hugo, reports experiments that were conducted to determine the solubility of ammoniated mercury in acetic acid, and points out the irregularity with which complete solution is obtained.—Pharm. Ztg., Berl., 1906, v. 51, p. 930, 931.

Wiebelitz, H., points out that it will be necessary to define more accurately the nature and the conditions necessary to promote complete solution of ammoniated mercury in acetic acid.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Caspari, Chas. E., reports three samples examined—one contained mercurous compounds, two carbonate.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Fernan, Albert, reports finding a sample of ammoniated mercury containing 2.88 per cent of ammonium chloride, with traces of sulphate and of iron.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, p. 79.

Evans Sons Lescher and Webb report on five samples of mercuric-ammonium chloride which were examined for mercury by the hypophosphorous acid method, and gave the following amounts: (1) 76 per cent, (2) 77 per cent, (3) 76.6 per cent, (4) 77.8 per cent, (5) 78.4 per cent.—Analytical Notes, for 1906, 1907, p. 24.

HYDRARGYRUM CUM CRETA.

Caspari, Chas. E., reports two samples mercury with chalk examined. Both contained excess of mercuric and mercurous oxides.—Proc. Missouri Pharm. Ass., 1906, p. 101.

HYDRASTINA.

Riedel's Berichte (Berl., 1906, p. 24) asserts that recrystallized hydrastine hydrochloride melts at 210–211° C.

Herder, M., (Arch. d. Pharm., 244, No. 2, 1906, 120) in discussing the precipitation of alkaloids by calcium- and barium-mercuric iodides, asserts that when hydrastine is treated with the calcium salt in solutions of 1:2,000, and barium salt in solutions of 1:2.400, an immediate white, apparently crystalline precipitate is produced.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 921.

HYDRASTIS.

Henkel, Alice, mentions *Hydrastis canadensis* L., otherwise known as hydrastis, goldenseal, yellowroot, ground-raspberry, orangeroot, and yellow puccoon, as being a native in rich soil in shady woods, southern New York to Minnesota, south to Georgia and Missouri, but principally in Ohio, Indiana, Kentucky, and West Virginia.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 37.

Hus, Henri, discusses the cultivation of *Hydrastis canadensis.* He points out that the plant does best in rich woods and that the fruit should be gathered as soon as ripe, dried, and the seed planted. The literature relating to the germination of the seed is reviewed and a number of experiments, under varying conditions, are reported.—Rep. Missouri Bot. Gard., 1906, St. Louis, 1907. pp. 85–94.

True, Rodney H., reports that the methods of hydrastis culture have been worked out fairly well and the department has published a bulletin on the subject.—Oil, Paint and Drug Rep., 1906, v. 70, Oct. 17, p. 37.

Goris and Wallart present a comprehensive paper on the history, external morphology, geographic origin, description, anatomy, chemical composition, microchemic reactions, localization of the alkaloids, culture, methods of propagation, etc., of *Hydrastis canadensis* L.—Bul. des sc. pharm., Par., 1906, v. 13, pp. 624–633.

Barford, P. C. Tang, discusses the history and composition of hydrastis and the variability found in commercial fluid extract of hydrastis.—Arch. f. Pharm. og Chem., Copenhagen, 1906, v. 13, pp. 218–223, 233–235.

The Ph. Brit. Committee of Reference in Pharmacy believes that for hydrastis an ash limit is necessary.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Herder, M., discusses the behavior of the hydrastis alkaloids with various reagents and the demonstration, by microchemical means, of the situation of alkaloids.—Arch. d. Pharm., Berl., 1906, v. 244, p. 128.

Puckner, W. A., in reviewing the recent literature relating to the assay of hydrastis points out that the variation, in the processes of assay for hydrastis and its fluid extract, is quite marked and that the method of assay for the fluid extract yields a much purer hydrastine than does that for hydrastis itself.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 268.

See Gordin's comments on belladonna, in which he recommends the use of his percolator shaking tube.

Caesar & Loretz suggest the estimation of the moisture content and outline a method for determining the amount of alkaloid in hydrastis and in the fluid extract.—Geschäfts.-Ber. v. Caesar & Loretz, in Halle a. S., 1906, pp. 100–101, 112–113.

Dohme, A. R. L., reports a variation of from 3.23 to 4 per cent of alkaloid found by seven analysts in the same sample of hydrastis by the same process.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Hankey, William T., asserts that in assaying hydrastis he has never been able to get the alkaloid perfectly white, as the yellow alkaloid was always present in sufficient quantities to impart a marked yellow color. He doubts the advisability of using aliquot parts of the ether solution as a general proposition in assay work.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Francis, John M., thinks that prime drug will readily yield 2.5 per cent hydrastine; the pharmacopœial standard is therefore not too high in spite of the increased price of the drug.—Bul. Pharm., Detroit, 1906, v. 20, p. 55.

Lyons, A. B., asserts that hydrastis seldom contains less than 2.5 per cent of hydrastine, but in view of the reports from others it may be that a standard of 2 per cent is not too low. The assay process does not give a pure hydrastine, as is shown by the yellow color of the alkaloid extracted.—Proc. Am. Pharm. Ass., 1906, v. 54. p. 439.

Philipp Röder, Wien, reports examining 15 samples of hydrastis. They varied from 2.33 to 10.21 per cent of ash, in the air dry drug, and from 0.80 to 3.14 per cent of hydrastine. Five of the samples contained less than 2 per cent of hydrastine.—Pharm. Post, Wien, 1906, v. 39, p. 284.

Ohliger, Willard, reports that hydrastis usually runs higher than the required standard.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Vanderkleed, Charles E., reports the assay of 7 lots of hydrastis averaging 3.55 per cent of hydrastine. Two samples assayed below the required 2.5 per cent of hydrastine.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Smith, Kline & French Co. report that two samples of hydrastis examined contained 2.2 per cent and 2.85 per cent of hydrastine, respectively.—Lab. Rep. S. K. & F., 1906, p. 17.

Moerk, Frank X., points out that the fluid extract of hydrastis represents but 80 per cent of the alkaloidal strength of the drug and that the tincture represents 16 per cent in place of 20 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Lyons, A. B., reports that 9 of the 12 replies received would appear to indicate that the U. S. P. standard for fluid extract of hydrastis is readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Dott, D. B., says hydrastis rhizome is better extracted by 60 per cent alcohol than with the official (Ph. Brit.) 45 per cent. Sixty per cent is used for the tincture (Ph. Brit.).—Year Book of Pharmacy, 1906, p. 300.

Heyl, George, reviews the literature relating to fluid extract of hydrastis and reports on the examination of a number of commercial samples. The specific gravity of these samples varied from 0.9077 to 0.9874 and the extract content from 11.38 to 21.81 per cent. The hydrastine content varied from 1.293 to 2.904 per cent.—Apoth. Ztg. Berl., 1906, v. 21, pp. 797–799.

van der Haar, A. W., discusses the work done by Heyl and asserts that the Rusting-Smeets method is the only one that gives uniformly accurate and good results in the assay of fluid extract of hydrastis. He outlines the method.—*Ibid.*, v. 21, pp. 1050, 1051.

Heyl, George, replies and reaffirms his preference for Linde's method, which he outlines in the previous paper.—*Ibid.*, p. 1060.

Philipp Röder, Wien, reports on 12 samples of fluid extract of hydrastis which varied from 1.15 to 2.08 per cent of hydrastine. He points out the need for assay in connection with this preparation.—Pharm. Post, Wien, 1906, v. 39, p. 249.

Dieterich, Karl, reports examining four samples of fluid extract of hydrastis which were found to vary from 1.95 to 3.20 per cent of hydrastine. The specific gravity extract content, and ash were also determined.—Helfenberger Annalen, 1905, 1906, v. 18, p. 157.

Fernan, Albert, reports that three samples of fluid extract of hydrastis, out of eight examined, contained less than 2 per cent of hydrastine.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1906, v. 44, p. 79.

Spindler found eight samples of fluid extract of hyoscyamus containing less than the required per cent of hydrastine.—Südd. Apoth. Ztg., 1906, v. 46, p. 90.

Fellner, Leopold, discusses the physiologic action of hydrastis and of ergot on the uterus and concludes that the uterine contractions produced are independent of the general action on the circulatory system; he does not agree with Kurdinowski that the contractions produced by hydrastis are tetanic in character. (From Arch. f. Gyn., 1906, v. 68.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 632.

McMillen combines lupulin and hydrastis in digestive wrongs in the small intestines, with loss of appetite and disturbed sleep. The hydrastis is a tonic to all mucous membranes, and because of this action it is one of our best remedies to influence the sympathetic system. These nerves are largely distributed to mucous surfaces. It is a harmless remedy, but a good one, and should have the preference over the strong poisons as a nerve tonic.—Eclectic Med. J., Cincin., 1906, v. 66, p. 161.

Leming, William, (Modern Eclecticism) commends hydrastis when there are chronic catarrhal and congestive conditions of mucous membranes, with muscular atonicity and yellow-coated tongue, generally moist and of natural or increased redness.—*Ibid.*, v. 66, p. 441.

HYOSCINÆ HYDROBROMIDUM.

Francis, John M., refers to the controversy over the supposed identity of hyoscine and scopolamine and the added confusion made by Cushny's announcement that the scopolamine of commerce contains both lævo- and dextro-rotatory constituents which probably differ in therapeutic activity.—Bull. Pharm., Detroit, 1906, v. 20, p. 55.

See also under Scopolamina.

HYOSCYAMINÆ HYDROBROMIDUM.

Francis, John M., referring to identity tests thinks that the production and preparation of the chloraurates, suitable for determining melting points, is a matter requiring considerable skill and practice, and doubts if many busy pharmacists will care to attempt it. The therapeutic action of the two closely related alkaloids is similar but not identical.—Bull. Pharm., Detroit, 1906, v. 20, p. 56.

French, J. M., says, as to the details of the action of hyoscyamine, there is much difference of statement by different observers, due, very probably, to the great difficulty of procuring pure hyoscyamine, and the fact that many of the specimens used are contaminated with atropine.—Merck's Arch., N. Y., 1906, v. 8, pp. 35–40.

HYOSCYAMUS.

Henkel, Alice, mentions *Hyoscyamus niger* L., commonly known as hyoscyamus, henbane, hog's-bean, and insane-root, as having been sparingly naturalized from Europe. Found in waste places from Nova Scotia to Ontario, New York, and Michigan.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 38.

Rusby, H. H., asserts that hardly any hyoscyamus comes to New York which is second-year growth, as the U. S. P. VIII directs.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

Puckner, W. A., points out that in connection with the U. S. P. VIII assay for hyoscyamus, in the directions given for the evaporation of the chloroform prior to the titration, sufficient stress is not laid on the importance of insuring the complete evaporation of the volatile organic bases present in henbane.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 232.

The Ph. Brit. Committee of Reference in Pharmacy report on hyoscyamus says:

> The Brussels Conference decided to make a standardized extract from dried leaves. Both tincture and extract might be made from a liquid extract, and one standardization process serve for two. An important question arises, however, as to the properties of henbane and its principal uses as a sedative, whether it has not some other effects principally diuretic and whether it would be desirable to standardize its preparation on the basis of mydriatic alkaloids, seeing that other more powerful drugs, having practically the same active principles, are included in the Ph. Brit. The committee is of opinion that if the drug is retained it should not be retained on the grounds of its importance as a competitor of belladonna.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Caesar & Loretz suggest the determination of the moisture content in hyoscyamus and the estimation of the alkaloids by the method given by them for belladonna leaf.—Geschäfts-Ber. v. Caesar & Loretz in Halle a. S., 1906, p. 104.

Philipp Röder, Wien, outlines an assay process for extract of belladonna which provides for treating the extract with ammonia and extracting with a mixture of ether, alcohol, and chloroform. An aliquot part of this solution is washed out with 3 per cent hydrochloric acid, the acid solution washed with chloroform, the latter removed, and, after being made alkaline, the solution again washed out with chloroform, the chloroform evaporated, and the resulting residue weighed.—Pharm. Zentralh., 1906, v. 47, p. 482.

Dieterich, Karl, discusses the assay of extract of hyoscyamus and of extract of belladonna by means of the potassium bismuth iodide method. The results obtained are much lower than those obtained by the Ph. Germ., IV, method.—Pharm. Post, Wien, 1906, v. 39, pp. 551–552. See also p. 533.

Lyons, A. B., asserts that hyoscyamus is very variable. Results of assays range from 0.05 to 0.085; rarely higher. The standard should be not above 0.07 gm. in 100 c. c. of fluid extract.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 439.

Ohliger, Willard, reports that hyoscyamus usually runs lower than the required standard.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Gane, E. H., reports two assays of hyoscyamus yielding 0.0465 and 0.037 per cent of mydriatic alkaloids, respectively.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Francis, John M., reports an average of 0.10 per cent of alkaloids in hyoscyamus.—*Ibid.*, 337.

Vanderkleed, Charles E., reports the assay of 15 lots of hyoscyamus which averaged 0.111 per cent. Two samples assayed below the required 0.08 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Smith, Kline & French Co. report on the examination of one sample of hyoscyamus leaves which contained 0.11 per cent mydriatic alkaloids.—Lab. Rep. S. K. & F., 1906, p. 17.

Moerk, Frank X., points out that fluid extract of hyoscyamus represents but 93.75 per cent of the active ingredients in the drug. The tincture represents 9 per cent of the contained alkaloids and the extract is 3.75 times the strength of the drug itself.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Lyons, A. B., reports that 8 of the 12 replies received were in favor of, and not any objected to, the original U. S. P. standard of 0.075 per cent of alkaloids in fluid extract of hyoscyamus.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Francis, John M., thinks the adoption of the low standard of 0.075 per cent of alkaloids for fluid extract of hyoscyamus as illogical as the higher standard of 0.5 per cent of mydriatic alkaloids for fluid extracts of belladonna root [later 0.4 per cent]. Judging from ten years' records, he thinks the standard of 0.1 per cent of mydriatic alkaloids wholly practicable and nothing more than the fair average for commercial drug of fair quality. He thinks the abolition of the "double menstruum" a matter of congratulation.—Bull. Pharm., Detroit, 1906, v. 20, p. 10.

See Gordin's comment under Belladonna Radix.

Dieterich, Karl, reports on a number of samples of extract of hyoscyamus of the Ph. Germ. IV, Ph. Austr. VII, and Ph. Austr. VIII. The moisture content varied from 17.51 to 25.57 and the ash from 10.91 to 23.72 per cent. The alkaloid content varied from 0.170 to 1.11 per cent.—Helfenberger Annalen, 1905, 1906, v. 18, p. 161–162.

Philipp Röder, Wien, reports examining four samples of extract of hyoscyamus, which varied from 0.227 to 0.460 per cent of alkaloids.—Pharm. Post, Wien, 1906, v. 39, p. 263.

Mundy quotes Bartholow, Ellingwood, and Hare and summarizes thus: Specific indications, nervous irritability, with unrest and insomnia; terror, restlessness in sleep, delirium of a noisy character; delusions and hallucinations, agitation and the insomnia of debility and exhaustion. Dose, gtt. 2 to 10; hyoscyamine, one-sixtieth to one-fiftieth of a grain; hyoscine, one-ninetieth to one-eightieth of a grain.—Eclectic Med. J., Cincin., 1906, v. 66, p. 206.

INFUSA.

Corcoran and Griffiths protest against the making of certain infusions from fluid extracts.

Hemm, Francis, explains how this may introduce constituents not desired.—Proc. Missouri Pharm. Ass., 1906, pp. 107, 59.

Farr and Wright discuss the preparation of concentrated infusions and report a number of experiments made to determine the composition of infusions and the most satisfactory process of their production.—Pharm. J., London, 1906, v. 22, pp. 163–166.

Taylor, S., deplores the fact that the balance of opinion seems to be in favor of the concentrated liquors. He doubts the necessity for them, but thinks that if we are to have them, they should be called by their right names and should be of uniform composition, to secure which they must have official sanction.—*Ibid.*, v. 23, p. 670.

IODOFORMUM.

Francis, John M., notes the variation in color and density of different brands, any of which may meet all reasonable therapeutic demands. The darker and denser products yield the more ash and heavier traces of iodides; the best are the lightest, most yellow colored and finest powdered.—Bull. Pharm., Detroit, 1906, v. 20, p. 56.

Riedel's Berichte (Berl., 1906, p. 24) points out the variation in the melting-point requirement for iodoform and asserts that on slowly heating this substance melts regularly at from 115° to 116° C.; on heating more rapidly it requires 120° C.

Utz outlines a method for the determination of the iodoform content.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Schoorl and van den Berg (Pharm. Weekbld., 1906, v. 43) report observations on the influence of incandescent gas light on iodoform. The dry substance, in white glass, is slightly changed by the liberation of a trace of free iodine. A 5 per cent alcoholic solution was markedly changed both in white as well as dark amber glass.—Chem. Centralbl., Berl., 1906, v. 77, p. 696.

Patch, E. L., reports finding a slight excess of soluble iodides and chlorides in iodoform.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

Helfritz, K., discusses the formula submitted by Blanchi for a liquid iodoform and makes several suggestions and modifications.—Apoth. Ztg., Berl., 1906, v. 21, pp. 323, 324.

Kauffeisen, L., asserts that the discoloration of iodoform ointment, due to the liberation of free iodine, can be corrected or prevented by incorporating a sufficient quantity of sodium hyposulphite with the ointment.—Pharm. Ztg., Berl., 1906, v. 51, p. 759.

A contributor to the "Therapeutics" column quotes Prager as saying that iodoform should not be used in dusting extensive surfaces after burns for fear of poisoning.—J. Am. M. Ass., 1906, v. 47, p. 1679.

Dorrance, George Morris, states that a study of cases of osteomyelitis treated with iodoform bone plugging, as suggested by

Moorhof, shows the method to be far in advance of any hitherto suggested and the only one worthy of consideration.—*Ibid.*, v. 47, p. 2090.

Janzen, Rudolf, asserts that an iodoform oil injected into the tissues loses its iodoform, leaving the oil unabsorbed. (Diss. Giessen.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 803.

Kayser, Fritz, (Diss. Giessen) makes practically the same statement.—*Ibid.*, p. 803.

IODOLUM.

Francis, John M., says iodol has the advantage over iodoform of being devoid of objectionable odor.—Bull. Pharm., Detroit, 1906, v. 20, p. 56.

IODUM.

Rasmussen, B. M., (Daily Consular Rep.) presents a translation from a Norwegian journal on " Seaweed burning " which gives some detailed information relating to the iodine industry of Norway, the value of the annual product, and the methods employed.—Oil, Paint, and Drug Rep., 1906, v. 70, Sept. 3, p. 41.

Scruti, F., (Gaz. chim. ital., 1906) reports on the comparative iodine content of various algæ. He finds that the mineral constituents of algæ vary with the vegetative period, the maximum iodine content being in the spring and the minimum in the fall of the year.—Jahresb. d. Pharm., Götting., 1906, v. 41, p. 21.

An interesting and exhaustive account of the " Seaweed industry of Japan " is published in the Imperial Institute Bulletin, which gives valuable information about the extraction of iodine from seaweed. It is anticipated that the output of crude iodine from Japan will be greatly increased.—Chem. & Drug., Lond., 1906, v. 69, p. 132.

Philipp Röder, Wien, points out (Pharm. Post, Wien, 1906, v. 39, p. 264) that the assay for iodine, as given in recent pharmacopœias, gives results that are too high because of the action of the contained chlorine on potassium iodide. He reviews some of the literature on the subject and suggests that the titration be made in an alcoholic solution of iodine. He reports examining four samples of iodine.

	Aqueous solution with KI.	Alcoholic solution without KI.
	Per cent of iodine.	*Per cent of iodine.*
Sample 1	99.64	97.83
Sample 2	99.05	98.04
Sample 3	99.67	97.92
Sample 4	100.70	96.98

An abstract from an article by Vaubel (Rev. de chim. Ind.) outlines a method for the determination of chlorine, bromine, and iodine when these halogens are in a state of mixture.—Oil, Paint, and Drug Rep., 1906, Jan. 29, p. 24.

Milbauer and Hac outline a new method for the determination of iodocyanide in iodine. Available samples of commercial iodine were examined and found to be free from iodine cyanide.—Pharm. Zentralh., 1906, v. 47, p. 319.

Arnold and Werner outline a method for the estimation of the total iodine content of solutions of iodine in saponated petrolatum and similar preparations. The method consists of treating the mixture with sodium peroxide, burning off the oil, reducing the iodate to iodide, and finally titrating with silver nitrate.—Pharm. Ztg., Berl., 1906, v. 51, p. 84.

Eliel, Leo, thinks the process of trituration, in the preparation of the tincture (a readoption of the old Tr. Iodi Comp.) is wasteful and objectionable; he prefers one of the many methods of circulatory displacement.—Proc. Indiana Pharm. Ass., 1906, p. 71.

Alpers, William C., discusses circulatory displacement in making pharmaceutical preparations and recommends it for tincture of iodine.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 506–507.

Mittelbach, Wm., recommends the use of circulatory displacement in the making of tincture of iodine and says that he has used the method recommended by M. I. Wilbert at the Mackinac meeting of the A. Ph. A.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 508.

Utech, P. H., recommends the use of circulatory displacement in the making of tincture of iodine.—Proc. Pennsylvania Pharm. Ass., 1906, p. 81.

Remington, J. P., says the introduction of potassium iodide into the formula for tincture of iodine was the result of experiments made by the Committee on Revision, in the course of which it was shown that ordinary tincture of iodine would indicate a loss inside of six days and that this loss increased rapidly. Parallel experiments with tincture of iodine made with a small portion of potassium iodide showed that in three months there was but a small percentage of loss.—Proc. Pennsylvania Pharm. Ass., 1906, p. 82.

Hommell, P. E., says the potassium iodide is added to prevent the loss of iodine in the formation of iodo-ethylic alcohol, the potassium yielding the iodine. The cost of preparing the tincture is greatly increased by this addition and the amount of potassium is unnecessarily great. By chemical computation 12.75 gm. would yield sufficient iodine to satisfy the formation of the iodo-ethylic alcohol.—Proc. New Jersey Pharm. Ass., 1906, p. 109.

Barnard, H. E., reports that 21 out of 133 samples of tincture of iodine examined were of full strength; this corresponds to 84.2 per cent adulteration. The fault is doubtless in the method of preparation, neglect to use the proper quantities of iodine and potassium iodide, or incomplete solution of the chemicals.—Rep. Indiana Bd. Health, 1906, pp. 385–387.

Ladd, E. F., points out that in the case of tincture of iodine the range of variation has been from 25 to 127 per cent of the official standard of the U. S. P.—Rep. North Dakota Agric. Exper. Sta., 1906, Part II, p. 36.

Leach, Albert E., asserts that the quality of tincture of iodine as sold to-day in the average drug store is far higher than formerly. The worst five cases varied from 12 per cent to 65 per cent of the U. S. P. strength; 3 of the samples being below 50 per cent of the required strength.—Rep. Massachusetts Bd. Health, 1906, p. 404.

Blome, W. H., reports on eleven samples of tincture of iodine, which he found, as usual, very variable in iodine content, but constant, in so far as it failed to come up to requirements in any case.—Proc. Michigan Pharm. Ass., 1906, p. 105.

Swann, Mamie, reports the examination of samples of tincture of iodine, 5 c. c. of which required, respectively, 23.4, 27.7, 29.6 c. c. of volumetric solution for complete decoloration.—Proc. Kansas Pharm. Ass., 1906, p. 37.

Mims, J. C., reports on 46 samples of tincture of iodine with iodine percentages ranging from 2.64 to 8.93 free, from 0.00 to 4.89 combined, and from 2.94 to 11.50 total.—Proc. Louisiana Pharm. Ass., 1906, p. 62.

Christianson, Lars, asserts that two samples of tincture of iodine, prepared according to the U. S. P. VIII, were assayed by a state chemist, who found but 5.98 and 5.83 per cent of iodine.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 318.

The Inspectors of Pharmacies found tincture of iodine with but 1.76, 2.73, 4.87, and 4.31 per cent of iodine.—J. de pharm. d'Anvers, 1906, v. 62, p. 91.

Chassevant, Allyre, presents a formula for a tincture of iodine using chloroform as the solvent, and discusses some of the advantages of such a solution.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 41–43.

Burmeister (Centralb. f. Chir. Leipz., v. 33, No. 40) claims that his modification of the Claudius technic, using chloroform as a solvent for the iodine, affords a means of sterilizing catgut without its subsequently becoming friable.—J. Am. M. Ass., 1907, v. 48, p. 85.

Goebel, W. (Centralbl. f. Bact., 1906, v. 42, pp. 86, 176), reports observations on the disinfecting properties of Lugol's solution of iodine. He finds that a solution of 0.01 to 0.05 per cent of iodine with potassium iodide is an efficient disinfectant and quite devoid of objectionable properties.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 711.

Heusner describes a method for disinfecting the hands with a 1 per thousand solution of iodine in benzin, which he believes is destined to replace the use of soap and water and other disinfectants for surgical purposes.—J. Am. M. Ass., 1906, v. 46, p. 1066.

Kellermann discusses the absorption of iodine through the skin and its demonstration in the urine.—Ztschr. f. exper. Path. u. Therap., 1906, v. 2, pp. 416–418.

Wesenberg, G., discusses the Kellermann method of estimating the presence of iodine in urine and points out some of the possibilities of error.—Biochem. Centralbl., Leipz.; 1906–7, v. 5, p. 596.

Claret (Bull. Commerc., 1906) asserts that the local irritation caused by the formation of hydrogen iodide in tincture of iodine may be obviated by the addition of a small proportion of borax.—Jahresb. d. Pharm., Götting., 1906–7, v. 41, p. 372.

Harvill, J. Paul (Trans. Nat. Eclect. Med. Ass.), reports excellent results in the treatment of cough and night sweats, as well as the gastric derangements of phthisis, from Tr. Iodi z ss, Acidi Phosphorici Dil. z iiiss, Glycerini q. s. oz iv. Teaspoonful, twenty minutes after each meal.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 282.

Witzel, Adolph, discusses a case of iodine poisoning as a result of the application of tincture of iodine to the gum tissue, and cautions against the indiscriminate use of the drug by patients in their homes.—Dental Cosmos, Phila., 1906, v. 48, p. 612.

Brown, D. J., thinks that iodine as an antiseptic has not been fully appreciated.—*Ibid.*, v. 48, pp. 139–142.

Additional references on the use of iodine and iodides will be found in the Index Medicus and the J. Am. M. Ass.

IPECACUANHA.

Tschirch is quoted as objecting to the practice of giving two botanical sources for the same drug. In the case of ipecac particularly this should not have been done, as we know definitely that the root of *Cephaëlis ipecacuanha* (Rio ipecac) and *Cephaëlis acuminata* (Carthagena ipecac) differ materially in their chemical constituents.—Am. Druggist, N. Y., 1906, v. 49, p. 37.

Beille, L., points out that the ipecac grown in India is decidedly inferior to the natural root gathered in Brazil. Singapore ipecac was found to contain 0.54 per cent of emetine, while Rio ipecac yielded as high as 1.45 per cent. He believes that Madagascar appears to be specially designed for a trial in the cultivation of ipecac.—Bull. Soc. de Pharm. de Bordeaux, 1906, v. 46, p. 171.

The Ph. Brit. Committee of Reference in Pharmacy Report on ipecacuanha says:

> The Brussels Conference decided that only the Brazilian root, containing 2 per cent of total alkaloid, is to be used. Experiments are desirable as to whether it

would not be preferable to introduce solutions of emetine as expectorants. and solutions of cephaëline as emetics; or to make two series of preparations from Brazilian and Carthagena varieties for the two different purposes. If the Rio variety (from Brazil or India) is alone retained, it may be assayed for emetine by Paul and Cownley's process.—Chem. & Drug., Lond., 1906, v. 69, pp. 863, 864.

An unsigned critique of the Ph. Ndl. IV, notes the requirement of 2 per cent alkaloids in the powdered drug.—*Ibid.*, v. 68, p. 828.

Grier, J., believes that if ipecac is standardized at all it should be standardized for its "emetine" content. The attitude of the Ph. Brit. in including "Rio" ipecac only he thinks the proper one.—Pharm. J., Lond., 1906, v. 22, p. 238.

Gehe & Co. discuss the comparative price of the several varieties of ipecac during 1904 and 1905, and give the importation, use, and available supply of this drug during 1902–1905 inclusive.—Handels-Ber., Gehe & Co., p. 45.

Herting, Otto, points out that ipecac contains at least several alkaloids that are as yet not well understood, and doubts the advisability of providing for a titrimetric estimation of substances the identity of which can not be definitely determined.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 2.

Caesar & Loretz outline a method for the assay of ipecac, both titrimetrically as well as gravimetrically, and also suggest the determining of the moisture content of this root.—Geschäfts-Ber. v. Caesar & Loretz, in Halle a. S., 1906, pp. 109, 110.

Francis, John M., notes the "singular prescience" with which some pharmacists anticipated the pharmacopœial recognition of the Carthagena drug, and used it either alone or mixed with Rio to produce the official fluid extract. The weight of evidence shows that while both varieties contain both alkaloids, emetine predominates in Rio and cephaëline in Carthagena; it follows that the Rio is better suited for expectorant compounds. The committee probably concluded that practical considerations outweigh the theoretical. The physician can always get the fluid extract of genuine Rio ipecac if he wishes it.—Bull. Pharm., Detroit, 1906, v. 20, p. 10.

Schieffelin, Wm. Jay, on behalf of the committee of the N. W. D. A. is quoted as advising the reduction of the standard for ipecac from 2 per cent total alkaloids to 1.75 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 347.

Moerk, Frank X., points out that 8.03 c. c. of tenth normal sulphuric acid as given on page 572 of the U. S. P. VIII, correspond to 1.9111 per cent of alkaloids and not 2 per cent as originally required.—Proc. Pennsylvania Pharm. Ass., 1906, p. 160.

Gane, E. H., points out that the former standard for ipecac was rather high on account of difficulty in exhausting this drug. A good deal of ipecac comes in which does not run over 1.8 per cent of alkaloids.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 440.

Hankey, William T., believes that 1.75 per cent of ipecac alkaloids is a fair standard for average ipecac. He prefers iodeosin as an indicator.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Puckner, W. A., reviews some of the recent literature relating to the assay of ipecac and records Fromme's method in detail.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 268.

Gordin, H. M., outlines a method for the assay of ipecac root, using a mixture of ether three volume parts and chloroform one volume part to exhaust the drug after treating with a solution of sodium carbonate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 378.

Dohme, A. R. L., reports that seven analysts working with the same sample of fluid extract of ipecac, by the same process, found from 1.53 to 1.80 per cent of alkaloid.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Kebler, L. F., presents the results of some cooperative work on the assay of ipecac, by seven analysts using three methods given in detail. The maximum variation reported was from 1.57 to 2.1 per cent of alkaloid. The results with the U. S. P., VIII, method varied from 1.62 to 1.99 per cent.—Proc. Off. Agric. Chem., 23d Ann. Conv., pp. 138–139. (Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 105.)

Schürhoff, P., reports finding powdered ipecac adulterated with dextrin from potato starch. He points out that in this adulteration the characteristic shape of the potato starch is readily detected; being quite different from the compound starch grain normally present in ipecac.—Pharm. Ztg., Berl., 1906, v. 51, p. 479.

Vanderkleed, Charles E., found a sample of ipecac marked "probably very high test." which assayed only 1.52 per cent of ether soluble alkaloids; U. S. P. requires 2 per cent (now 1.75 per cent).—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Gane, E. H., reports on one sample of Carthagena ipecac which was found to contain 1.85 per cent of alkaloids. Eight samples of Rio ipecac varied from 1.55 to 2.3 per cent of alkaloids.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

Ohliger, Willard, reports that ipecac usually runs lower than the required standard.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Smith, Kline & French Co., report on the examination of 6 samples of Carthagena ipecac root, which contained from 2 per cent to 2.25 per cent total alkaloids.—Lab. Rep. S. K. & F., 1906, p. 17.

Dieterich, Karl, reports examining 15 samples of Rio ipecac, of which only three complied with requirements of 2 or more per cent of alkaloids.—Helfenberger Annalen, 1905, 1906, v. 18, p. 125.

Moerk, Frank X., points out that fluid extract of ipecac represents but 87.5 per cent of the active constituents of ipecac.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Lyons, A. B., points out that ipecac would appear to be a case where the alkaloidal strength of the fluid extract, after removing the alcohol by evaporation, can be quickly determined by the use of Mayer's reagent. Inasmuch as the drug contains two or more alkaloids this method can not be said to be less "scientific" than that by alkalimetric titration.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 440.

Lyons, A. B., reports that 7 of the 12 replies received were in favor of the U S. P. standard for fluid extract of ipecac.—*Ibid.*, v. 54, p. 437.

Gordin, H. M., thinks the method of assay for the fluid extract unworkable. For the powder he suggests a method, using the shaking-tube percolator and 2.5 c. c. of a 10 per cent solution of sodium carbonate and 25 c. c. of a mixture of three volumes of ether and one of chloroform.—Am. J. Pharm. Phila., 1906, v. 78, pp. 457–461.

Dott, D. B., asserts that ipecacuanha yields its alkaloids readily to 60 per cent alcohol. The Ph. Brit. treatment with lime he believes to be wholly superfluous.—Year Book of Pharmacy, 1906, p. 300.

Taylor, S., states that the great trouble with the preparation is that dilutions of it with weak spirit (wines) precipitate copiously. Birk has shown that it is possible to prepare an extract from the Ph. Brit. preparation by precipitation of resinous, oily, and inert matter. He also states that a 45 per cent alcohol is equally effective in exhausting the drug, and the resultant preparation does not precipitate with weak spirits. Like all standardized preparations too much attention has been given to the standardization and too little to the galenical.—Pharm. J. Lond., 1906, v. 23, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy report on liquid extract of ipecac, says:

> Process unsatisfactory, and should be entirely avoided. Assay method unsatisfactory.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Evans Sons Lescher and Webb point out that they found the Ph. Brit. process for ipecacuanha liquid extract very unreliable, and that they have made many experiments with the different published processes to determine their relative merit. They assert that the alkaloids obtained by the U. S. P. method were very clean and pure, but that they think the process of Farr and Wright leaves nothing to be desired as regards both speed and accuracy.—Analytical Notes for 1906, 1907, pp. 20, 21.

Philipp Röder, Wien, outlines a method of assay for tincture of ipecacuanha. The tincture is evaporated, treated with ammonia, and washed out with ether. The etheral solution is washed out with 0.5 per cent solution of hydrochloric acid, this is made alkaline with ammonia and washed out with ether. The ether is evaporated and the resulting alkaloid weighed.—Pharm. Zentralh., 1906, v. 47, pp. 523, 524.

Francis, John M., says of the sirup of ipecac, this is one of the simple looking formulæ which do not work out successfully. The official sirup will develop a flocculent precipitate after standing for a few days, and this can be prevented only by very tedious manipulation.—Bull. Pharm. Detroit, 1906, v. 20, p. 230.

Stanislaus, I. V. S., thinks that the pharmacopœial processes (both VII and VIII) leave something to be desired, the sirup does not keep as well as it should since the acetic acid causes the inversion of the cane sugar and consequent souring. He recommends a formula which will overcome these difficulties.—Bull. Pharm. Detroit, 1906, v. 20, p. 82.

A review points out that the addition of 4 drops of acetic acid to 100 gm. of wine of ipecac will prevent the precipitation of active principles, with the frequently observed sedimentation of inert material. It is also recommended that a detannated wine be used.—Pharm. Ztg. Berl., 1906, v. 51, p. 491.

The Ph. Brit. Committee of Reference in Pharmacy report on wine of ipecacuanha, says improve by using detannated wine and acidifying the liquid extract. Assay.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

The author of an unsigned article states that Castellani in Ceylon had found that ipecac had no effect in amœbic dysentery.—J. Am. M. Ass., 1906, v. 46, p. 1779.

Fyfe, John William, says that ipecacuanha, in small doses, was found useful in atonic conditions of the stomach, and was a frequently employed remedy in indigestion, biliousness, and liver complaints; also used in fevers as a means of keeping up a determination to the surface.—Eclectic Med. J. Cincin., 1906, v. 66, p. 319.

Douglass, Malcolm E., discussing camphor, refers to its use with opium and ipecac, one of each with seven parts of potassium sulphate; dose, 2 to 10 grains.—Hahneman. Month. Phila., 1906, v. 41, p. 43.

JALAPA.

Francis, John M., says the botanical description of this drug is hardly such as to enable the average pharmacist to distinguish the official from the spurious product, particularly if he purchase the ground drug, and woe to him who buys whole jalap tubers unless he has a power drug-mill with which to grind them. The resin assay is not of great service in protecting the would-be purchaser; after assaying his drug for resin he should turn to Resina Jalapæ and make the tests there specified for its identity. Of samples tested during the past year, 70 per cent assayed 8 per cent or above, and 30 per cent assayed below 6 per cent, the highest being 10.5 per cent.—Bull. Pharm. Detroit, 1906, v. 20, p. 56.

Weigel, G., points out that the minimum content of resin in Tubera Jalapæ Ph. Ndl. IV is 8 per cent, determined by extracting with hot alcohol, in a reflux condenser, washing the resin with hot water and drying at 105° C.—Pharm. Zentralh. 1906, v. 47, p. 440.

The Ph. Brit. Committee of Reference in Pharmacy report recommends to retain the present standard for jalap and give description of powder.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Schieffelin, Wm. Jay, speaking for the committee of the N. W. D. A., suggested that the standard for jalap be reduced from 8 per cent of total resin to 5.6 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 347.

Dohme, A. R. L., reports that seven chemists operating on the same sample of jalap, by the same process, found from 8.59 to 9.12 per cent of resin.—*Ibid.*, v. 49, p. 268.

Moore, Russell W., presents a report on the examination of 276 samples of jalap. Only 15 of these samples complied with the 11 per cent of resin prescribed by the Treasury regulations. The maximum resin content was 15.63 per cent, the minimum 2.10, and the average 5.95 per cent.—J. Soc. Chem. Ind. Lond., 1906, v. 25, p. 627. (See also Oil, Paint and Drug Rep. N. Y., 1906, v. 70, Sept. 3, p. 39.)

Caesar & Loretz report that the resin content of jalap varies considerably and that the several samples examined by them yielded from 5.5 to 13 per cent. The greater portion of the available drug yielding but 5.5 to 7.5 per cent of resin, while the exceptionally good drug varied from 11 to 13 per cent. They outline a method for determining the amount of resin in Jalap and also suggest that the moisture content of the tubers be estimated.—Geschäfts-Ber. v. Caesar & Loretz, 1906, p. 70, 119.

Weigel, G., points out that a consignment of jalap, partially destroyed by insects and therefore unsightly, was found, on examination, to yield 12 per cent of resin. This was thought to be due to the fact that the insects had devoured only the starchy portion of the tubers and had left the resinous material.—Pharm. Zentralh., 1906, v. 47, p. 892.

Philipp Röder, Wien, reports examining 15 samples of jalap which varied from 3.61 to 8.61 per cent of ash and yielded from 5.82 to 16.70 per cent of resin. Four of these samples did not meet the minimum Ph. Austr. VIII requirement of 10 per cent of resin and 5 exceeded the 5 per cent limit for ash.—Pharm. Post, Wien, 1906, v. 39, p. 284.

Evans Sons Lescher and Webb report that they have examined a large number of samples of jalap to determine the content of resin. One sample was as low as 4.2 per cent. The average content was about 7 per cent, twenty lots ranging from 5.26 per cent to 13.3 per cent. They point out that the Ph. Brit. IV quality is now only to be obtained with great difficulty.—Analytical Notes for 1906, 1907, pp. 21, 22.

Francis, John M., reports that 70 per cent of the jalap examined by him was above 8 per cent, while the remaining 30 per cent contained less than 6 per cent of resin. The highest resin content was 10.5 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.

Patch, E. L., reports one lot of jalap which contained 11.43 per cent of resin.—*Ibid.*, v. 54, p. 338.

Hankey, William T., reports examining 8 lots of jalap which ranged from 6.42 to 13.36 per cent of total resins and from 0.92 to 2.35 per cent of resins soluble in ether.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

Ohliger, Willard, did not find a sample that would pass muster.—Proc. Michigan Pharm. Ass., 1906, p. 48.

KAOLINUM.

Francis, John M., advises purchase by sample, as only by experimentation will the pharmacists learn just what is right.—Bull. Pharm. Detroit, 1906, v. 20, p. 56.

A contributor to the "Miscellany" column, calls attention to Stumpf's use of clay internally and externally against various bacteria, the theory being that the bacteria are inclosed in the clay and "buried alive," as it were.—J. Am. M. Ass., 1906, v. 47, p. 2113.

KINO.

Francis, John M., says the official tests are not sufficient to protect the buyer of kino from sophistication and substitution. Much of the kino sold is Australian kino, red gum, or eucalyptus kino * * *, which while similar to the official in physical and therapeutic properties has not, in solution, the tendency to gelatinize, which is such a marked characteristic of the latter. He thinks Marshall's process is worth testing out.—Bull. Pharm. Detroit, 1906, v. 20, p. 56.

The Ph. Brit. Committee of Reference in Pharmacy reports that the solubility of kino is a matter for investigation.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Evans Sons Lescher and Webb, found two samples of kino to be 83 per cent soluble in boiling water.—Analytical Notes for 1906, 1907, p. 23.

Cline, R. R. D., points out that the gelatinizing of kino preparations is probably due to the presence of an enzyme, and suggests obviating this gelatinization by fractional sterilization.—Proc. Texas Pharm. Ass., 1906, p. 16.

Wilbert, M. I., asserts that a sample of tincture of kino made by a process similar to that given in the U. S. P. VIII was still fluid two years after being made, while the control specimens, kept under identically the same conditions, became solid in from three to four months.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 446.

Francis, John M., considers this formula a notable innovation in that the tincture is heated to destroy the ferment or enzyme, which causes gelatinization. He believes all pharmacists and physicians will agree that the tincture of kino is not worth the trouble of making and keeping it. He advises dropping it or substituting a tincture of the cheaper and more stable "red gum" (eucalyptus kino).—Bull. Pharm. Detroit, 1906, v. 20, p. 232.

KRAMERIA.

Philipp Röder, Wien. reports on five samples of krameria, which contained from 1.22 to 8.56 per cent of ash and yielded from 7 to 16.84 per cent of water-soluble extract and from 20.83 to 40.71 per cent of extract soluble in 70 per cent alcohol. The Ph. Austr. VIII prescribes a maximum ash content of 5 per cent and a maximum water-soluble extract of 9 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 284.

LACTUCARIUM.

Francis, John M., refers to that marked characteristic, a musky odor. The commercial drug is sometimes quite soft and mildewed.—Bull. Pharm. Detroit. 1906, v. 20, p. 97.

The "Ergänzungsbuch zum Arzneibuch für das Deutsche Reich" limits the maximum ash content of lactucarium.—Ph. Germ. Suppl., 1906, p. 206.

Eliel, Leo, cautions against too great economy of sand in the making of tincture of lactucarium; plenty of it must be used if it be desired to complete the extraction in a reasonable time. Four to six times the bulk of lactucarium should be used.—Proc. Indiana Pharm. Ass., 1906, p. 70.

Francis, John M., considers that the official syrup of lactucarium is now greatly improved.—Bull. Pharm. Detroit, 1906, v. 20, p. 230.

LAPPA.

Francis, John M., because of its special liability to be infested with worms, recommends that lappa be kept in cans or bottles containing a little chloroform.—Bull. Pharm. Detroit, 1906, v. 20, p. 97.

Fyfe, John William, says that *Arctum lappa* was successfully employed in dropsical affections when other powerful medicines had been ineffectually used. It was deemed an alterative and diuretic of great usefulness.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

LEPTANDRA.

Henkel, Alice, mentions *Veronica virginica* L., also known as *Leptandra virginica* (L.) Nutt., commonly known as leptandra, Culver's root, Culver's physic, blackroot, Bowman's root, tall speedwell, and tall veronica, as found in moist, rich ground in woods, meadows, and thickets from Canada to Alabama and Nebraska.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 73.

LIMONIS CORTEX.

Eberle, E. G., and others favor the use of fresh lemons for making the tincture and believe that this preparation is superior to the formerly used spirit of lemon.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 446.

Thurston found that of 14 samples of extract of lemon only 4 contained the proper amount of lemon oil and all were deficient in alcohol by volume: the specific gravity varied from 0.8279 to 0.9603; official alcohol by volume from 10.66 to 86.66; lemon oil from 0 to 6.8 per cent.—Proc. Ohio Pharm. Ass., 1906, p. 68.

LIMONIS SUCCUS.

Lührig, H., presents a contribution to our knowledge of lemon juice. He prepared and subsequently examined 10 samples of lemon juice, from the available fruit, and presents the results of his analysis in the form of tables for ready reference.—Ztschr. f. Unters. d. Nahr. u. Genussm. 1906, v. 11, pp. 441–447.

Beythien, Bohrisch and Hemple report the results of a number of experiments made to determine the composition of the juice of lemons from various sections. The citric acid content varied from 6.43 to 7.71 per cent.—*Ibid.*, pp. 651–661.

Hensel and Prinke (Ztschr. f. d. ges. Kohlensäureind., 1906, p. 293; from Apoth. Ztg., 1906, p. 440) give the characters of a number of samples of lemon juice and suggest a new process of obtaining the juice with the view of avoiding changes in color, odor, savor, etc. The addition of 6.5 per cent alcohol as a preservative is evidently insufficient.—J. de pharm. et de chim., Par., 1906, v. 24, p. 28.

LINIMENTA.

Evans, John, thinks it advisable to test for the presence of methylated spirits in liniments and commends the Ashby test.—Apothecary, Boston, 1906, v. 18, p. 907.

Francis, John M., thinks that some of the other liniments might well have been dropped instead of compound mustard liniment, which is very popular with certain of the trade and worthy of its good repute.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

LINIMENTUM AMMONIÆ.

Beringer thinks the formula adopted by the pharmacopœia ridiculous; there is no advantage in using the combination of alcohol and oleic acid over the commercial olive oil for the purpose.

Drescher thinks lard oil should be used.—Proc. New Jersey Pharm. Ass., 1906, p. 110.

LINIMENTUM CAMPHORÆ.

Hommell, P. E., thinks that camphorated oil made with cotton-seed oil is undesirable, especially so from a medical standpoint, as it lacks the emollient, penetrating, and other properties which the doctor desires when he exhibits this agent. He thinks the oils of olive and benne are more emollient and demulcent; olive oil, too, is nondrying, while cotton-seed oil is so.—Proc. New Jersey Pharm. Ass., 1906, p. 107.

Alpers, W. C., suggests the use of circulatory displacement in making liniment of camphor and outlines the method employed.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 506.

Evans, John, thinks it necessary to check the amount of camphor in the finished product; this is easily done by heating a known weight (5 gm.) of the sample in a small flat-bottomed porcelain dish over the water bath to constant weight. Loss of weight equals camphor. Another method is by determination of the specific gravity of the olive oil used and of the finished product; every 1 per cent of camphor increases the specific gravity about 0.0005. He asserts that the preparation does not deteriorate by volatilization.—Apothecary, Boston, 1906, v. 18, p. 906.

Utz suggests that a method for estimating the camphor content of this preparation be added.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Liverseege, J. F., records a number of adulterations in connection with camphorated oil. Most of the defective samples were small vials put up by unqualified dealers. Several of the samples contained from 20 to 40 per cent of paraffin oil and only 5 to 7 per cent of camphor.—Year Book of Pharmacy, 1906, p. 269.

LINIMENTUM SAPONIS MOLLIS.

Dunning, H. A. B., asserts that the quickest and most satisfactory method of making liniment of soft soap is to heat the soap for some time on a water bath until quite soft, then turn off the flame and dissolve the soap in the requisite amount of alcohol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 483.

Havenhill, L. D., reviews the history of soap liniment and the various changes in the official formula for this preparation, and presents a modified formula, which he believes is designed to obviate the shortcomings evidenced by the formula now official.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 244, 245.

Haupt, H., discusses the uses of the Ph. Germ., IV, spiritus saponatus, and suggests the use of peanut oil in place of the olive oil directed in the pharmacopœia.—Pharm. Zentralh., 1906, v. 47, pp. 435–438.

LINUM.

Nelson, Burt E., describes and illustrates the structural characteristics of linseed.—Merck's Rep., N. Y., 1906, v. 15, p. 130.

Schürhoff, P., maintains that the Ph. Germ., IV., requirement that linseed be free from starch is not correct, and that starch is present in appreciable quantities in the unripe seed.—Pharm. Ztg., Berl., 1906, v. 51, p. 658.

Rustung, Gullow, (Pharmacia Kristiania, 1906, v. 3, p. 325) reports examining a number of specimens of authentic linseed meal, oil cake, and whole linseed without finding even a trace of starch, and believes that the claim advanced by Schürhoff that ripe linseed contains starch is not correct.—Chem. Repert, Cöthen, 1906, v. 30, p. 449.

Tunmann discusses the findings in connection with a study of ground flaxseed. He calls attention to the frequent occurrence of mites in ground flaxseed, and suggests the exercise of greater care in the preservation of flaxseed.—Pharm. Zentralh., 1906, v. 47, pp. 725–727.

Roger, H., gives certain analytical data concerning the adulteration of linseed cakes, and discusses a method of quantitative microscopical assay, which, while not absolute, he considers sufficiently accurate to be practicable.—Ann. de chim. analyt., Par., 1906, v. 11, pp. 136–142.

A review of the flaxseed market for 1905–6 contains statistics of the receipts, shipments, and monthly range of prices at the three principal markets for flaxseed, and a comparison with former years and an estimate of the total production of seed in the United States.—Oil, Paint and Drug. Rep., 1906, v. 70, Aug. 13, p. 28D.

Patch, E. L., says that 12 barrels of linseed meal especially ordered gave from 34.5 to 37 per cent of oil completely saponifiable. Druggists should not store this product in paper bags, as the paper absorbs a large amount of the oil and the product will assay lower than when purchased.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

The Committee on Drug Adulterations asserts that nearly all the available linseed meal is below 30 per cent of oil content. Samples from the principal sources of supply gave from 23.9 to 28.15 per cent of oil.—*Ibid.*, v. 54, p. 339.

LIQUOR ALUMINI ACETATIS N. F.

Philipp Röder, Wien, outlines a method, first suggested by Divine, for determining the amount of alumina contained in solution of aluminum acetate: Five c. c. of the solution are diluted with water to 120 c. c. and 2 c. c. of a 3 per cent solution of tannin added. The resulting mixture is then heated to boiling, precipitated by the addition of an excess of ammonia, and again boiled to dispel the excess of ammonia. The resulting precipitate is filtered off, washed, dried, heated to redness, and finally weighed. The resulting residue, multiplied by 20, gives the per cent content of aluminum oxide.—Jahresb. d. Pharm., Götting, 1906, 1907, v. 41, p. 186.

LIQUOR AMMONII ACETATIS.

Taylor, S., says the strength appears to have been purely arbitrary, dependent partly upon the volume of gas remaining in the solution and consequently upon the weather. The U. S. P. demands at least 7 per cent of ammonium acetate. Recommendations for its improvement are the neutralization of a definite quantity of acetic acid and the production of a solution of a definite specific gravity.—Pharm. J., Lond., 1906, v. 23, p. 669.

The Ph. Brit. Committee of Reference in Pharmacy report on liquor ammonii acetatis says the concentrated preparation, 1 to 7, should be introduced in place of this, with tests for lead, specific gravity, and an amended test for neutrality.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

LIQUOR ANTISEPTICUS.

Francis, John M., thinks that liquor antisepticus, while undoubtedly as efficient as the commercial products, differs from the best known in flavor, being somewhat stronger and harsher, and may be persistently hazy or develop haziness when cooled.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

Schultze uses a little tincture of baptisia or wild indigo to satisfy the physicians' desire for a tinted preparation.—Proc. Maryland Pharm. Ass., 1906, p. 94.

Dunning thinks it does not compare with the listerine now on the market, which it is supposed to imitate, largely because it has too much spearmint oil in it.—*Ibid.*, p. 96.

Smith, F. A. Upshur, says it is curious to note that liquor antisepticus, U. S. P., is not directed to be kept in amber-colored bottles, though it contains oil of gaultheria, in addition to benzoic acid, eucalyptol, and oils of peppermint and thyme, all of which have to be preserved in this way.—Pharm. J., Lond., 1906, v. 22, p. 33.

The Luxemburg Society of Apothecaries suggests the following for a compound solution of thymol: Thymol, 7; acid benzoic, 21; eucalyptol, 1.8; oil of wintergreen gtt., 20; menthol, 3.5; alcohol, 600; borax, 30; acid boric, 30; distilled water to make 3,000.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 589.

Van Gool presents the following formula for a liquid antiseptic: Acid benzoic, sodium borate, aa. 8; boric acid, 16; thymol, 2.40; eucalyptol, 0.10; oil of gaultheria, 10 drops; oil of peppermint, 6 drops; oil of thyme, 2 drops; alcohol, 190; distilled water to make 1,000.—J. de Pharm. d'Anvers, 1906, v. 62, p. 747.

LIQUOR ANTISEPTICUS ALKALINUS N. F.

Dunning, H. A. B., thinks that liquor antisepticus alkalinus N. F., contains too much glycerin and is lacking in strength.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 486.

LIQUOR ARSENI ET HYDRARGYRI IODIDI.

Taylor, S., thinks that, as the insoluble portion of the salts in this preparation has been shown to be arsenious oxide and not metallic arsenic, it would be better if the directions were to dissolve this relatively insoluble portion and not to filter it off as at present.—Pharm. J., Lond., 1906, v. 23, p. 670.

LIQUOR CALCIS.

Francis, John M., says it is to be remembered that strong lime-water is made by using *cold* water when treating the slaked and washed lime.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

Clark, W. S., discusses the errors likely to arise in the preparation of liquor calcis and figures an apparatus for keeping it in stock.—Chem. & Drug., Lond., 1906, v. 69, pp. 231, 380, 517.

Barnard, H. E., reports that of 166 samples of lime water analyzed, 75, or 45.1 per cent, were below the U. S. P., VIII, standard. A number of the samples were entirely neutral, having no more alkalinity than tap water.—Rep. Indiana Bd. Health, 1906, pp. 370–373.

Cliffe, W. L., reports an examination of 100 samples of lime water. Of this number 31 complied with the requirements of the U. S. P., 16 average between seven-eighths and full strength, 10 averaged between three-fourths and seven-eighths, 14 between one-half and three-fourths, 17 between one-fourth and one-half, and 7 samples below one-fourth.—Proc. Pennsylvania Pharm. Ass., 1906, p. 83.

Collins, C. D., asserts that lime water is one of the most satisfactory and yet harmless palliatives in the treatment of pruritus vulvæ.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 286.

LIQUOR CHLORI COMPOSITUS.

Eberle, E. G., asserts that the compound solution of chlorine, made according to the U. S. P., will not assay 4 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Ehman, J. W., presents the work of Wm. R Shearer, who found it impossible, even under the most favorable conditions, to obtain compound solution of chlorine containing 0.4 per cent Cl as prepared by the U. S. P. formula. He suggests making the requirement 0.1 per cent Cl and diluting the stronger preparation to the necessary extent. A quick assay could be made by determining the amount of the preparation required to oxidize pure ferrous sulphate. Adding the necessary amount of water would then insure a weaker but uniform product.—Am. J. Pharm., Phila., 1906, v. 78, p. 334.

Arny, H. V., considers this preparation a distinct improvement over the chlorine water of the former pharmacopœias, as far as ease in manufacture is concerned, and it should answer most of the therapeutic requirements of its predecessor.—Am. J. Pharm., Phila., 1906, v. 78, p. 10.

LIQUOR COCCINEUS N. F.

Caldwell, Paul, says of cochineal color:

> The potassium carbonate should not be added to the other ingredients and the whole then boiled, but it should be added in small portions from time to time as the solution is boiling. This will prevent the fixtures in the place taking on a cochineal color.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 392.

LIQUOR CRESOLIS COMPOSITUS.

Francis, John M., is convinced that for the present pharmacists will find it almost impossible to obtain cresol which will meet the pharmacopœial requirements, because the demand has been so limited as not to warrant installing the necessary equipment for its production.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

La Wall and Cook call attention to the fact that the formula for this solution as given in the U. S. P. VIII will not give a satisfactory product unless the solution be allowed to stand for about three weeks in order that complete saponification may take place. To overcome this objection they suggest first making a soap and then adding it to the cresol.—Am. J. Pharm., Phila., 1906, v. 78, p. 100.

Boring, E. M., allows the mixture to stand for five weeks at a temperature in excess of room temperature.

Wilbert, M. I., says that the fact that the pharmacopœia requires cresol to answer the test for absence of phenol makes the compound solution an expensive preparation. He thinks the Committee of Revision might have availed themselves of the more satisfactory formula of the Ph. Germ. Many of the preparations of this class which produce milky solutions are made from the crude oil from which phenol has been separated; the milkiness he attributes to the presence of naphthalene.—*Ibid.*, v. 78, pp. 100, 101.

La Wall and Cook's paper appears. (*Ibid.*, pp. 169–172.) They think the amount of soap used in the official solution needlessly large; two-thirds of the amount directed has given equally satisfactory results. They caution against the application of heat after the addition of the cresol, as it is quite volatile and the vapor is inflammable.

Thrush, M. Clayton, thinks it should have been prescribed that the compound solution of cresol be allowed to stand for at least two weeks after making, or that it should be prepared by heating, in order to complete the saponification; otherwise the free cresol present makes it too irritating.—*Ibid.*, v. 78, p. 33.

Caldwell, Paul, points out that the pharmacopœia directs compound solution of cresol to be made by adding the cresol before the soap is formed. He believes the better way is to add it afterwards, as in such case a clear solution results at once. He also advises the addition of 5 per cent of glycerin, so as to make the solution miscible with water to any extent.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

A resin soap to be used in making a saponaceous emulsion of cresol may be prepared by using soda lye, 30° B., 1 gallon; pulverized rosin, 8 pounds. Boil the lye in a kettle, adding the rosin in portions of about a pound at a time, stirring constantly and thoroughly, and keeping the heat just about up to the boiling point until saponification has been effected.—*Ibid.*, v. 50, p. 134.

Utz reviews the several suggestions made to demonstrate the composition of the several cresol solutions and to control the identity of the official cresol.—Pharm. Zentralh., 1906, v. 47, p. 809.

Schneider, Hans (Zeitschr. f. Hygiene u. Infectionskrank, 1906, v. 53, pp. 116–139), discusses the preparation of ortho- meta- and para-sulphonic acids of cresolsulphonic acid, phenolsulphuric acid ester, etc., and their value as disinfectants. In Part II he discusses the unequal value of commercial cresol soap preparations.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 253.

Puppe (Dtsch. Med. Woch., 1906, p. 424) compares different cases of lysol poisoning with varying outcomes and reports the post-mortem findings in two of his own cases.—*Ibid.*, v. 5, p. 205.

Blumenthal, F. (Deut. Med. Wchnschr., Berl. and Leip., v. 32, No. 32), states that about 100 cases of lysol poisoning are treated annually in Berlin.—J. Am. M. Ass., 1906, v. 47, p. 1062.

Buckley, J. P., uses cresol and formalin in the treatment of putrescent pulps.—Dental Cosmos, Phila., 1906, v. 48, pp. 537–544.

LIQUOR FERRI ALBUMINATI.

Lefeldt, Max, suggests modification of the directions for making the solution of albuminate of iron of the Ph. Germ. He cautions against extending the washing of the precipitate over one day and suggests the addition of 2 per cent of sugar to the finished product.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 338.

Beuthner (Schweiz. Wchnschr. f. Chem. u. Pharm.) outlines a process for making a solution of albuminate of iron that is permanent.—Pharm. Zentralh., 1906, v. 47, p. 445.

Laves, E., in a paper on the therapeutic advantage of iron albuminate over other preparations of iron, makes some interesting suggestions concerning the preparation and method of testing solutions of iron albuminate.—Pharm. Ztg., Berl., 1906, v. 51, p. 850.

The Helfenberger Annalen (1905, p. 27) asserts that dry albumen is practically unattainable in a form fitted for the production of a soluble albuminate of iron.—Pharm. Zentralh., 1906, v. 47, p. 832.

LIQUOR FERRI CITRATIS (U. S. P., 1890).

Arny, H. V., thinks it unfortunate that the solution of ferric citrate was omitted from the pharmacopœia, since in the dispensing pharmacy it is invaluable; even the process of manufacture of the ferric citrate is omitted.—Am. J. Pharm., Phila., 1906, v. 78, p. 11.

LIQUOR FERRI ET AMMONII ACETATIS.

Francis, John M., thinks few of the chalybeate tonics are equal to this old remedy, and many physicians could be won over to its regular use if pharmacists would make a little diplomatic campaign.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

Beard, E. G., suggests that Basham's mixture is best made in small quantities, following the U. S. P. exactly, but using acid acetic No. 8 instead of the dilute, and leaving the tincture of iron out entirely. Mix everything, pour into a stoppered bottle; now mark the quantity of tincture of iron which should properly be in, say, a 6 or 8 ounce bottle, and just before dispensing drop the necessary number of drops into the solution.—Proc. Mississippi Pharm. Ass., 1906, p. 42.

Charles, Wm. J., says he can make this preparation so that it will keep six months and still taste fresh if kept properly corked and good ammonium carbonate and full-strength acetic acid be used. The acid must be of 36 per cent and not the 29 per cent, as most commercial varieties are. If the acid be diluted to make dilute acetic acid, U. S. P., according to the formula, there will be trouble unless the work is done on the basis of 29 per cent commercial acid and less water be used.—Bull. Pharm., Detroit, 1906, v. 20, p. 516.

Tyson, James, states that he has never been able to satisfy himself that Basham's mixture is a diuretic except through the water that it contains.—N. York M. J., 1906, v. 83, p. 223.

LIQUOR FERRI PEPTONATI N. F.

Dunning, H. A. B., points out that the solution of peptonate of iron, N. F., has several objectionable features. It is difficult to obtain peptonates at a moderate price that are free from impurities, and the resulting iron peptonate is not readily dissolved by the use of sodium hydroxide.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

Dunning, H. A. B., presents a formula for iron and manganese peptonate with glycerophosphates.—Bull. Pharm., Detroit, 1906, v. 20, pp. 157–159.

LIQUOR FORMALDEHYDI.

Francis, John M., asserts that one can seldom obtain in commerce "solution of formaldehyde, 40 per cent." He explains the causes of deterioration and the ways of obviating them; also discusses the best methods of generating the gas in disinfecting.—Bull. Pharm., Detroit, 1906, v. 20, p. 97.

Hankey, William T., points out that there appears to be some little confusion regarding the percentage strength of solution of formaldehyde, the general usage being to designate the volume per cent while the U. S. P. VIII designates per cent by weight. He also prefers the Legler method of assay, as modified by Smith, and believes that it gives more concordant results than does the U. S. P. method.—Am. Druggist, N. Y., 1906, v. 49, p. 361.

In the Pharmacopœia of Japan a solution containing about 35 per cent of pure formaldehyde is official under the name "formalinum."—Ph. Japon. III, p. 148.

Strickrodt, Albin, discusses the history, production, uses, and chemistry of solution of formaldehyde and its relation to other more or less closely related compounds.—Pharm. Zentralh., 1906, v. 47, pp. 57–61, 77–82, 97–107.

Rosenheim, Otto, discusses the question of how far the Adamkiewicz reaction is due to the presence or formation of formaldehyde in the acetic acid used.—Biochem. J., Liverpool, 1906, v. 1, pp. 233–240.

Verisenat, E., (Bull. Soc. Chim., 33, 1198) calls attention to an extremely sensitive reaction of formaldehyde, which is dependent on the observation that if an albuminoid substance, in aqueous solution or suspension, is treated with weak solution of a nitrite in hydrochloric acid a faint violet-rose to violet-blue color is developed in the presence of mere traces of formaldehyde.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 899.

Grafe, V., (Kl. Arb. d. pflanzenphys. Inst. d. Wiener Univ. Oest. bot. Ztschr., v. 56, pp. 289–291) outlines a new reaction for formaldehyde, in which a solution of diphenylamin (1 per cent) in concentrated sulphuric acid is superposed by the liquid to be tested. With dilute aqueous solutions of formaldehyde there is formed a white precipitate and at the point of contact an emerald green coloration. Other aldehydes produce other and evanescent colors.—Bot. Centralbl., Cassel, 1906, v. 102, p. 599.

Leys, Alexander, asserts that acetaldehyde, in aqueous solutions, does not react with mercuric oxide alone, but does react in the presence of sodium chloride or of sodium sulphite, producing a precipitate that is insoluble in water or in alcohol. Formaldehyde, furfurol, and certain aromatic aldehydes do not react in the same way. (From J. de pharm. et de chim.)—Pharm. Zentralh., 1906, v. 47, p. 633.

An answer to a correspondent outlines the Hehner, Pilhashy, and Rimini tests for formaldehyde.—Merck's Rept., N. Y., 1906, v. 15, p. 115.

Bigelow, W. D., outlines the provisional methods for the determination of formaldehyde that have been adopted by the Association of Official Agricultural Chemists.—Circ. Bur. Chem., U. S. Dept. Agric., 1906, No. 28, pp. 8–10.

Schoorl, N., discusses the several methods for determining the free formic aldehyde in solutions of formaldehyde, and outlines a method depending on the oxidation of formaldehyde by means of solution of hydrogen dioxide in the presence of an alkali and titrating the residual alkali with normal acid, using phenolphthalein as an indicator. (From Pharm. Weekbl., 1906.)—Apoth. Ztg., Berl., 1906, v. 21, p. 986.

Wiebelitz, H., recommends the method proposed by Vanino for the determination of the formaldehyde content of the solution of formaldehyde.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Grossmann and Aufrecht discuss the titrimetric estimation of formic aldehyde and of formic acid by means of potassium permanganate in acid solution. (Ber. d. Chem. Ges., 1906, v. 39, p. 2455.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 652.

Bergell points out that in practice, where a number of formaldehyde titrations are to be made daily, the sulphite method will be found to be much more practicable, giving good results with a minimum expenditure of time.—*Ibid.*, v. 5, p. 652.

Blank and Finkbeiner outline a method for the determination of methyl alcohol, in solutions of formaldehyde, by means of chromic acid.—Ber. d. deutsch. chem. Gesellsch., Berl., 1906, v. 39, pp. 1326–1327.

Leach, Albert E., reports that all but 1 of 54 samples of solution of formaldehyde examined were found to contain from 36 to 40 per cent of formaldehyde. The samples classed as adulterated contained 29.68 per cent of formaldehyde, determined by means of the immersion refractometer.—Rep. Massachusetts Bd. Health, 1906, p. 402.

The Ohio Food Com. finds 27 samples of formaldehyde, out of 31 examined, to be inferior.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Smith, Kline & French Co. report on the examination of 16 samples of formaldehyde, all of which contained between 37 and 40 per cent absolute formaldehyde.—Lab. Rep., S. K. & F., 1906, p. 16.

An abstract (from Pharm. Ztg. li. No. 3, 1906, 30) gives the formula of the Saxon Pharmaceutical District Societies for liquor formaldehydi saponatus.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 641.

Goszling, W., reviews the part played by formaldehyde in the syntheses of medicinal substances and discusses the composition of a number of the derivatives obtained.—Apoth. Ztg., Berl., 1906, v. 21, pp. 132, 133, 152, 153.

An editorial note reviews a monograph published by the Bureau of Chemistry of the Department of Agriculture on formaldehyde and the use of that substance.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 303.

McClintic, Thomas B., discusses the limitations of formaldehyde gas as a disinfectant, with special reference to car sanitation, reports a series of experiments with various methods and a special study of the production of formaldehyde gas by the action of potassium permanganate on solution of formaldehyde.—Bull. No. 27, Hyg. Lab., U. S. P. H. & M. H. S., 1906, p. 112.

Base, Daniel, reports a study of formaldehyde disinfection and the determination of the yield of formaldehyde in various methods of liberating the gas for the disinfection of rooms.—J. Am. Chem. Soc., 1906, v. 28, pp. 964–993.

He also discusses the conditions necessary to accomplish successful disinfection with formaldehyde gas, among these a temperature of 68° to 77° F. and an atmosphere nearly saturated with moisture.—Proc. Maryland Pharm. Ass., 1906, pp. 45–49.

Higley, H. A., (Med. Rec., N. Y., Oct. 20) calls attention to the use of formaldehyde as a disinfecting agent and to the fact that its penetrating power is practically nil; hence it affects only the surfaces with which it comes in contact. He investigated different forms of apparatus for generating the gas.—J. Am. M. Ass., 1906, v. 47, p. 1512.

Evans, H. D., is reported to have stated that good disinfection can be obtained by using 500 c. c. of formaldehyde solution to which calcium carbide had been added for each 1,000 cubic feet of space to be disinfected.—*Ibid.*, v. 47, p. 2110.

Walcott, Henry P., is reported to have said that 5 ounces of formalin with 15 ounces of water will suffice to disinfect 1,000 cubic feet of space in two hours.—*Ibid.*, v. 47, p. 2031.

Eichengrün, A., describes a method for disinfecting by means of paraform and an alkaline superoxide.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, part 2, pp. 1412–1415.

Kister and Trautmann (Gesundheitsingenieur, 1906, v. 29, No. 6) describe an apparatus by means of which they are able to disinfect materials that would be injured by high temperatures. By means of a vacuum they reduce the boiling point of an aqueous solution of formic aldehyde to 80° C., and at this temperature, the authors assert, no injury is done to furs, leather goods, or glued wood.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 254.

Rosenberg, Paul, discusses the value of formaldehyde in internal therapeutics and the results of experimental research on the toxic action of formaldehyde.—Therapist, Lond., 1906, v. 16, pp. 115, 116, 134.

Perdrix, L., discussing the conditions under which formaldehyde undergoes polymerization, says that from the point of view of disinfection, the solutions of formol generate methanal only on evaporation of the solvent; the excess of water, therefore, is, for the sterilization of germs, rather an obstacle than an adjuvant. The results of his experiments have a practical interest which merits attention.—Compt. rend. Soc. de biol., Par., 1906, v. 61, pp. 65, 66.

The same author describes an apparatus for the rapid and dry disinfection of solid objects. He also discusses the action of methanal on microbic germs at high temperature.—*Ibid.*, v. 61, pp. 67–70.

Bennette, J. T., (Dent. Rec., Lond., 1905) discusses the use of formaldehyde in dental therapeutics. He recommends 2 to 3 per cent solutions, 1 per cent in mouth washes, and 10 per cent for sterilizing instruments.—Dental Cosmos, Phila., 1906, v. 48, p. 114.

Buckley, J. P., uses a mixture of cresol and formalin in the treatment of putrescent pulps.—*Ibid.*, v. 48, pp. 537–544.

Dorr, P. P., uses solidified formaldehyde with gratifying results. (Abstr. from Dental Brief, April, 1906.)—*Ibid.*, v. 48, p. 614.

Additional references on the use of solution of formaldehyde will be found in the Index Medicus and the J. Am. M. Ass.

LIQUOR MAGNESII CITRATIS.

Nagle, F. S., discusses the solution of magnesium citrate, presents a formula, and outlines the method of making a solution which he believes to be more agreeable, because less sweet, than the official.—Proc. Pennsylvania Pharm. Ass., 1906, p. 248.

Beard, E. G., suggests a concentrated preparation to be kept in stock, from which the solution may be prepared as needed.—Proc. Mississippi Pharm. Ass., 1906, p. 42.

Whitsett, L. M., suggests using boiling distilled water in the extemporaneous preparation of solution of magnesium citrate. For stock solution he suggests sterilization: first sterilizing the bottle separately, then with the contained solution.—Proc. Texas Pharm. Ass., 1906, p. 30.

"Apothecary" presents a method of preparing and sterilizing solution of magnesium citrate.—Bull. Pharm., Detroit, 1906, v. 20, p. 165.

Shotia, Chas. W., asserts that solution of magnesium citrate may be preserved for weeks, without precipitation, by placing the potassium bicarbonate in the bottle, pouring on the required amount of syrup, and finally the remaining portion of the solution, and allowing to stand in an upright position without mixing.—Western Druggist, 1906, v. 28, p. 479.

LIQUOR PEPSINI AROMATICUS N. F.

Caldwell, Paul, believes that the aromatic solution of pepsin is a more palatable "essence of pepsin" than the formula under that title produces. He suggests, however, that the quantity of acid should be reduced at least 40 per cent.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

LIQUOR PLUMBI SUBACETATIS.

Ehman, J. W., reports that W. S. Thompson experimented with the cold process for the preparation of solution of lead subacetate, which he states is used by many pharmacists. The process consists simply in macerating lead oxide in a solution of lead acetate during a period of two weeks or more and decanting the clear solution. The best result obtained was a preparation assaying only 20.712 per cent lead acetate after macerating but twenty-four hours. Other samples macerated a much longer time gave still lower results.—Am. J. Pharm., Phila., 1906, v. 78, p. 416.

Schimpf, Henry W., thinks the assay process entirely too cumbersome for use by pharmacists in assaying a solution in which a trace, more or less, of the active ingredient would be of no moment.—*Ibid.*, v. 78, p. 24.

Blackburn, Albert Engles, reports a case of acute poisoning following the use, locally, of lead water and laudanum.—J. Am. M. Ass., Chicago, 1906, v. 46, p. 954.

LIQUOR POTASSII ARSENITIS.

Brown, Linwood A., reports on 33 samples of Fowler's solution. The strength of most of the samples was found to be between 90 and 100 per cent of that of the U. S. P. VIII, the maximum variation being from 72.39 to 104.3 per cent.—Rep. North Dakota Agric. Exper. Sta., 1906, Part II, pp. 153–155.

Maysse, P., weighs 1 gm. each of pure arsenous acid and pure carbonate of potassium, introduces into an assay tube, mixes the two powders by agitation, adds 4 or 5 drops of distilled water, heats to solution, which requires only a minute or two, turns into a graduate and makes up to 100 according to the Codex formula. He thus avoids the prolonged boiling of the Codex process and can prepare a very small quantity at a time.—Bull. des. sc. pharmacol, Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 106.

Schindlemeiser, J., reports some experiments with the official and modifications of the official solution of potassium arsenite and expresses the belief that this solution is much more stable than is generally thought.—Apoth. Ztg., Berl., 1906, v. 21, p. 902.

Bedall, C., calls attention to the gradual change which takes place in the solution of potassium arsenite and suggests that pharmacists test this preparation repeatedly and that it be replaced by a fresh solution as soon as an appreciable change has taken place.—Apoth. Ztg., Berl., 1906, v. 21, p. 852.

Lefeldt, Max., points out that the titration of the solution of potassium arsenite with iodine solution determines only the amount of arsenic trioxide and not the total arsenic. The total amount of arsenic should be determined or the presence of arsenate should be prohibited and a test added for this contamination.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 339.

Rosenthaler points out that the solution of potassium arsenite is frequently taken exception to by revisors because of the decomposition of the arsenous acid with formation of arsenic acid. He suggests the addition to the pharmacopœia of a test that will demonstrate the total arsenic content of the solution.—Pharm. Zentralh., 1906, v. 47, p. 850.

Dunn, T. F. Joseph, reports the results of four cases of pneumonia treated with Fowler's solution in private practice, all recovering, and six cases treated in the hospital of which but one ended fatally.—N. York M. J., 1906, v. 84, pp. 1084–1086.

LIQUOR SODÆ CHLORINATÆ.

Cowley, R. C., found that in the Ph. Brit. formula for liquor sodæ chlorinatæ the proportion of sodium carbonate might with advantage be increased to double that of the bleaching powder, as the quantity ordered in the present pharmacopœia is too small to precipitate all the lime; the volume should be increased as in the U. S. P.—Chem. & Drug., Lond., 1906, v. 69, p. 758. (See also a further note by "Able Scholar," *ibid.*, p. 803.)

LIQUOR SODII PHOSPHATIS COMPOSITUS.

Francis, John M., says the Committee of Revision has followed in the lead of the manufacturing pharmacists, in this instance, through whose efforts concentrated solution of sodium phosphate has attained a large consumption of late years. * * * A good quality of sodium is essential.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

Arny, H. V., thinks this "a rather belated recognition of" an old friend, exploited far more largely ten years since than it is to-day.—Am. J. Pharm., Phila., 1906, v. 78, p. 10.

Dunning, H. A. B., asserts that the compound solution of sodium phosphate, U. S. P., when made strictly according to pharmacopœial directions, deposits crystals on standing. If the amount of citric acid is increased to 200 gm. for each 1,000 c. c. of finished preparation the solution is permanent. The U. S. P. directions to triturate the salts are tedious and superfluous, as solution may readily be effected at a low temperature on a water bath.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

Eliel, Leo, finds the U. S. P. formula unsatisfactory. The solution when first made is apparently perfect, but after standing for a few days crystals of sodium phosphate will be plentiful on bottom of container. A better working formula is desirable.—Proc. Indiana Pharm. Ass., 1906, p. 69.

In the discussion on his paper, Eliel asserted that the manufacturers do one of two things, or both; they either do not put into the product the amount of sodium phosphate which the label calls for, or they add phosphoric acid, which the U. S. P. does not call for.—*Ibid.*, p. 72.

A sample, the label of which claimed 70 grains of sodium phosphate to the drachm, proved on rough analysis to contain but 35 grains.—*Ibid.*, p. 98.

Robinson, Frank P., presents a formula for a palatable concentrated solution of sodium phosphate, containing tincture of fresh lemon peel and phosphoric acid.—Bull. Pharm., Detroit, 1906, v. 20, p. 155.

LITHII BROMIDUM.

Caspari, Chas. E., reports 6 samples examined. Three contained less lithium bromide than the U. S. P. demands, 3 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Francis, John M., notes that a slightly greater latitude as regards purity is allowed in connection with lithium salts.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

LITHII CARBONAS.

The Ph. Brit. Committee of Reference in Pharmacy report on lithium carbonate says the analytical data actually work out to 99.5 per cent, and not 98.5 per cent; this standard is difficult to attain. A volumetric test, as in the U. S. P., would be better.—Chem. and Drug., Lond., 1906, v. 69, p. 864.

Caspari, Chas. E., reports 5 samples of lithium carbonate examined—2 U. S. P., 1 contained excess of other alkalis, and 2 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Smith, Kline & French Co. report that all of 4 samples of lithium carbonate examined were of excellent quality.—Lab. Rep., S. K. & F., 1906, p. 18.

LITHII CITRAS.

The Ph. Brit. Committee of Reference in Pharmacy report on lithium citrate says the loss of weight stated to occur at 115.5° C. is incorrect. The last portions of water are removed only at about 140° C. The formula should be $Li_3C_6H_5O_7.5H_2O$, which loses 24 per cent at 95–100° C.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

The report of the Committee on Drug Adulteration says that lithium citrate dried at 100° C. gave from 85 to 89 per cent lithium citrate by the pharmacopœial test. It is claimed that a higher degree of heat should be used to make the salt anhydrous; not less than 120° C.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

Caspari, Chas. E., reports 3 samples examined. Two contained metallic impurities, 1 free alkali.—Proc. Missouri Pharm. Ass., 1906, p. 102.

LITHII SALICYLAS.

Caspari, Chas. E., reports 7 samples of lithium salicylate examined—4 U. S. P., 1 contained excess of other alkalis, and 2 metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

LOBELIA.

Henkel, Alice, mentions *Lobelia inflata* L., commonly known as lobelia, Indian tobacco, gagroot, vomitwort, and bladderpod, as being found in dry soil, fields, old pastures, and along roadsides from Canada to Georgia, Nebraska, and Arkansas.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 44.

Naylor, W. A. H., reviews the chemistry of lobelia and suggests that until the results of further research provide the data on which can be founded a common agreement it would be prudent to refrain from standardizing the official tincture by a process based on its alkaloidal strength.—Yearbook of Pharmacy, 1906, p. 214.

Francis, John M., considers the adoption of the acetic menstrua for fluid extracts of lobelia, sanguinaria and squill to be a grievous mistake. Nothing gained on the score of economy and probably nothing in efficiency of the preparation. No method of assay or valuation of lobelia is given. In the case of digitalis and squill, the acetic fluids are very much inferior to the corresponding alcoholic preparations, when tested on animals, and in the case of sanguinaria repeated attempts have shown very deficient extraction of the alkaloids when the official menstruum was used. * * * We believe that the ninth revision will discard acetic menstrua.—Bull. Pharm., Detroit, 1906, v. 20, p. 10.

Felter says specific lobelia is the remedy for the soft, open, full and doughy pulse, with not overactive velocity. There may be but little or a high temperature. As an arterial sedative it occupies a place between aconite and veratrum, and proves especially valuable in the circulatory disturbances of the exanthemata and of the acute respiratory diseases.—Eclectic Med. J., Cincin., 1906, v. 66, p. 204.

Fyfe, John Williams, quotes Wooster Beach to the effect that—

> Lobelia pukes freely, but it is very exhausting to the system, and when given alone sometimes causes alarming appearances, although the patient soon recovers from its effects. I sometimes combine it with ipecac and bloodroot, equal parts, which makes an excellent emetic in all cases in which its use is required.—*Ibid*, v. 66, p. 318.

LUPULINUM.

The Ph. Brit. Committee of Reference in Pharmacy report on lupulin says:

> Presumably this drug will be omitted, as it is practically never used. The ash figure, 10 per cent, is high enough if the drug is retained.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caesar & Loretz assert that the Ph. Ndl. IV requirement that lupulin have an ash content not exceeding 6 per cent is impractical. They point out that the naturally sieved lupulin has an ash content that varies from 14 to 20 per cent, and that it is only by the use of ingenious mechanical appliances that the ash content can be reduced to 10 per cent.—Geschäfts-Ber. v. Caesar & Loretz, 1906, p. 36.

G. Hell & Co., in Troppau, assert that lupulin is being offered which is decidedly inferior in quality. Five samples examined varied in ash content from 11.5 to 25 per cent. Only one out of six samples submitted complied with the requirements of the Ph. Austr.—Pharm. Post, Wien., 1906, v. 39, p. 181.

Patch, E. L., reports on a sample of lupulin that was 65 per cent soluble in alcohol, 29 per cent insoluble, 6 per cent moisture, and contained 13 per cent ash.—Proc. Am. Pharm. Ass., 1906, v. 54. p. 339.

McMillen combines lupulin and hydrastis, using equal amounts in bulk. The hydrastis keeps the lupulin from packing and getting too solid to dispense. A No. 1 capsule filled makes an average dose. My specific indication is digestive wrongs in the small intestines, with loss of appetite and disturbed sleep. . . . Lupulin most strongly acts as a soother to the portal circulation and relieves irritation of the abdominal viscera; sleep becomes natural because of the relief of nervous tension. The combination is a good one, and in most all functional derangements within the abdominal cavity it will give relief.—Eclectic Med. J., Cincin., 1906, v. 66, p. 161.

Stern, H., (Med. Rec., N. Y., Sept. 22) reports that he has found lupulin of especial value in functional disturbances of the stomach, and it may be employed where there is an anatomic basis for the disturbances, its protracted use causing no undesirable after effects. He also thinks it may be valuable in enteric fever and dysentery.—J. Am. M. Ass., 1906, v. 47, p. 1134.

LYCOPODIUM.

Henkel, Alice, mentions *Lycopodium clavatum* L., otherwise known as lycopodium, club-moss, and stag's horn, as growing in dry situations in woods from Canada to North Carolina, Michigan, and Washington.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 44.

Underwood and Lloyd present an extensive study of the tropical American lycopodiums.—Bull. Torrey Bot. Club, 1906, v. 33, pp. 101–124.

Patch, E. L., reports that three samples of lycopodium gave 2 per cent of ash and a slight coloration with iodine. Microscopically no impurities were detected.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

Gane, E. H., points out that several substitutes for lycopodium are offered under fancy names. Some are ferruginous earths mixed with true lycopodium, some dextrin and pine pollen. Some are adulterated with resinous compounds prepared by the action of anhydrous ammonia upon wet resin.—*Ibid.*, v. 54, p. 339.

Smith, Kline & French Co. report on the examination of four samples of lycopodium, which yielded on ignition from 1.5 to 2.3 per cent of ash.—Lab. Rep., S., K. & F., 1906, p. 18.

Evans Sons Lescher and Webb report two cases of adulteration of lycopodium. The first, which consisted of finely powdered moss, about 30 per cent, was removable by sifting, but the other, consisting of rotten wood apparently, was hopeless. A sample of "substitute" submitted for inspection consisted of starch, pollen, and spores.—Analytical Notes for 1906, 1907, p. 23.

G. Hell & Co., in Troppau, report that the ash content of five samples of lycopodium varied from 1.28 to 1.80 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 181.

Gehe & Co. (Pharm. Ztg. li, No. 36, 1906, 402; from Gehe & Co.; Frühjarsb. 1906) call attention to a number of adulterations of lycopodium recently observed. One sample was composed exclusively of pine pollen, another of maize strach, which had probably been subjected to a toasting process, and then colored with methyl orange.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 725.

Gallois, Ch., describes an adulterant of lycopodium that is said to be difficult to detect by simple inspection. The material is partially soluble in alcohol, ether, and chloroform and is said to be prepared by the action of ammonia on a dry Austrian resin.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 242–244.

MAGMA MAGNESIÆ N. F.

Caldwell, Paul, recommends heating and pouring the magnesium sulphate solution into the solution of sodium hydroxide in preparing magnesia magma. He also recommends beating or churning the resulting magma so as to have it "stand up" better.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

MAGNESII CARBONAS.

Davis, W. A., presents an exhaustive paper on the magnesium carbonates. He says the possibility that most, if not all, of the basic carbonates are mixtures of several substances does not seem to have occurred to anyone hitherto. The only hint to be found in the literature that such is the case would appear to be the description given in the Ph. Brit. of magnesia alba as consisting of "amorphous particles with numerous slender prisms intermixed."—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 788–798.

The Ph. Brit. Committee of Reference in Pharmacy report on magnesium carbonate points out that the composition varies and can not be represented by a definite formula.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Wiebelitz, H., asserts that in the test for alkali carbonates in magnesium carbonate the solution should be directed to be filtered hot, as magnesium carbonate is less soluble in hot than in cold water. He discusses the tests for iron and asserts that a sample that will yield a clear, colorless solution, 1–10, with diluted hydrochloric acid is usually free from even traces of iron. He also believes that the Ph. Germ. test for lime salts should be made less rigorous.—Pharm. Ztg. Berl., 1906, v. 51, p. 1004.

Ehman, J. W., reports that G. S. Dubois examined six samples of official magnesium carbonate and found loss on ignition ranging from 38.45 per cent to 45.2 per cent, average 41.77 per cent. Carbon dioxide ranging from 33.77 per cent, 37.2 per cent, average 35.89 per cent. The sample giving the smallest percentage of residue and carbon dioxide was most nearly free from impurities, showing only a faint trace of iron.—Am. J. Pharm., Phila., 1906, v. 78, p. 416.

Caspari, Chas. E., reports five samples examined; all contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Ohliger, Willard, found a sample of crude magnesium carbonate which contained an excess of iron and a trace of calcium and was soluble in dilute acids only on heating.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Dieterich, Karl, reports the presence of an excess of chloride and sulphate in magnesium carbonate.—Helfenberger Annalen, 1905, 1906, v. 18, p. 89.

MAGNESII OXIDUM.

The Ph. Brit. Committee of Reference in Pharmacy report on magnesia points out that some allowance should be made for loss on ignition (water and carbonic acid absorbed).—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Grimbert proposes to replace the solution of hypoiodate of sodium, proposed by Schlagdenhaufen for the determination of magnesia, by the successive addition of iodide of potassium and hypochlorate of soda. The reaction is sensitive to 1:2,000 without valuing the precipitation of magnesia in the form of ammonio-magnesian phosphate.—J. de pharm. et de chim. Par., 1906, v. 23, pp. 237–239.

Bellier, J., thinks that while Grimbert's modification is well enough in the presence of appreciable quantities of magnesium salts it is not as sensitive as the Schlagdenhaufen reaction where there are but traces present.—*Ibid.*, v. 23, pp. 378–381.

Dieterich, Karl, reports on three samples of magnesium oxide. Two samples contained carbonate, and all three contained sulphate and traces of iron.—Helfenberger Annalen, 1905, 1906, v. 18, p. 89.

Philipp Röder, Wien, asserts that magnesium oxide free or nearly free from carbonate is difficult to obtain and suggests that the pharmacopœia permit the presence of carbonate but direct a maximum content.—Pharm. Zentralh., 1906, v. 47, p. 522.

Hankey, William T., has found it difficult to secure a sample of magnesium oxide that will gelatinize when one part is mixed with

15 parts of water; as a rule this article also exceeds the limit for iron.—Am. Druggist, N. Y., 1906. v. 49, p. 362.

Patch, E. L., reports magnesium oxide not white in color, contaminated with iron, magnesium carbonate and calcium, assayed 82.9 per cent MgO.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 339.

MAGNESII SULPHAS.

Hankey, William T., asserts that commercial magnesium sulphate complies with all of the U. S. P. VIII requirements with the possible exception of the limit for iron. He doubts the advisability of paying several hundred per cent more for a strictly U. S. P. article.—Am. Druggist, N. Y., 1906, v. 49, p. 362.

Moszler, Guatao, discusses the estimation of sodium sulphate in magnesium sulphate and asserts that all preparations of magnesium sulphate evidence a minute quantity of sodium sulphate. He suggests that the sodium content of magnesium sulphate should be limited to the equivalent of 0.5 per cent crystalline sodium sulphate, or 0.221 per cent of the anhydrous substance.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, pp. 53–54, 67–69.

Smith, F. A. Upshur, points out that magnesium sulphate and all salts containing water of crystallization and hygroscopic as well as deliquescent substances generally should be directed to be kept in well-closed vessels and asserts that this precaution is more honored in the breach than in the observance as regards ordinary dry crystals and powders.—Pharm. J., Lond., 1906, v. 22, p. 84.

Gane, E. H., points out that careless drying is the cause of dirt and foreign matter in dried magnesium sulphate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

Caspari, Chas. E., reports that one sample of magnesium sulphate contained arsenic, chloride, and metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 103.

Baird, J. W., reports three samples examined in 1904, one adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

G. Hell & Co., in Troppau, report that 5 out of 18 samples of magnesium sulphate were refused because of excessive amount of chlorides and of iron.—Pharm. Post. Wien, 1906, v. 39, p. 181.

Cernovodeanu and Henri find that the addition of salts of magnesium in very small quantity augments the hæmolytic power of certain serums to the globules of different animals, but does not provoke hæmolysis of the globules of the same animal. The serum heated to 56° can not be activated by the addition of salts of magnesium.—J. de pharm. et de chim., Par. 1906, v. 23, p. 462.

Haubold and Meltzer record a series of experiments on animals and discuss the practicability of the use of magnesium sulphate as an anæsthetic in human beings. They report several cases and conclude that magnesium sulphate in intraspinal injection proved to be as efficient an anæsthetic in human beings as it was found to be in animals.—J. Am. M. Ass., 1906, v. 46, pp. 647–650.

Meltzer and Auer conclude that intraspinal injections of magnesium sulphate, in doses which do not affect the respiratory center or other vital function, are capable of abolishing completely all clonic convulsions and tonic contractions in cases of human tetanus and experimental tetanus in monkeys. The relaxing effects of the injections may last twenty-four hours or longer. In experimental tetanus in monkeys early intraspinal injections of magnesium salts are capable of retarding the progress and development of the tetanic symptoms.—J. Exper. M., N. Y., 1906, v. 8, pp. 692–706.

Wiki, B., thinks that Meltzer and Auer have been led into an error by the immobility of their intoxicated animals, an immobility which they attribute to a general anæsthesia, but which is in reality the effect of a curarization. His experiment, he declares, demonstrates at once the curarizing action of magnesium and its innocuity toward the sensory nerve apparatus. All the details of the experiences of Meltzer and Auer are perfectly explained by the paralysis of the motor plates. On the contrary, the anæsthetic action of the salts of magnesium should be called in question.—Compt. rend. Soc. de biol., Par., 1906, v. 60, p. 1008.

Blake, J. A., (Surg. Gyn. and Obstet., Chicago., May) summarizes the results of Meltzer, Meyer, Haubold, and himself with magnesium sulphate in inducing spinal anæsthesia.—J. Am. M. Ass., 1906, v. 46, p. 1886.

Logan, Samuel, details results (unfavorable) in the treatment of two cases of tetanus with magnesium sulphate.—*Ibid.*, v. 46, pp. 1502–1506.

Watkins, discussing the use of magnesia sulphate, says:

> We should always prepare our patients for surgical operations by cleansing with soap and water externally, and with mag. sulph. internally, thus ridding the body of all infectious material.—Eclectic Med. J., Cincin., 1906, v. 66, p. 567.

For additional references on the use of magnesium sulphate see the Index Medicus and the J. Am. M. Ass.

MAGNESII SULPHAS EFFERVESCENS.

Francis, John M., notes that in preparing such salts a moist citric acid, or one with full content of water of crystallization, is absolutely essential to produce a fine-appearing granulation.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

Arny, H. V., thinks this scarcely an improvement on the citrate, though it may be easier of manufacture. The change in method of granulating he considers a distinct advance.—Am. J. Pharm., Phila., 1906, v. 78, p. 11.

MALTUM.

Francis, John M., says the average malt prepared for brewers' use will seldom ever meet the pharmacopœial requirements or produce a malt extract of high diastasic power; the malting process is not carried on long enough and is usually at too high a temperature. Barley grown or sprouted six or seven days gives the best results. The practical test, omitted by the pharmacopœia, is to macerate a drachm of crushed malt for half an hour in warm water and test this infusion on warm starch paste. One grain of prime extract of malt will digest starch paste equivalent to 4 grains of raw starch in ten minutes, so that it will not strike a blue color with a drop of very dilute solution of iodine.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

Léger, E., describes the method of isolating hordenine and the characters of its salts and derivatives. Clinical results are reported by Camus to the Academy of Sciences.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 177–181.

This alkaloid is isomeric with ephedrine, but is a tertiary base, melts at 177.8°, is without action on polarized light, and crystallizes in orthorombic prisms.—*Ibid.*, v. 23, p. 211.

Camus says that hordenine sulphate is slightly toxic; when injected or ingested in large dose gives rise to cortical and bulbar symptoms. Death is from paralysis of respiration. Recovery complete, rapid, and without loss of weight.—*Ibid.*, v. 23, p. 218.

Has no hæmolysing action, retards more or less the coagulation of the blood; for equal weights the retardation is the same as that produced by sodium chloride.—*Ibid.*, v. 23, p. 219.

Léger submits a structural formula.—*Ibid.*, v. 24, p. 323.

Fränkel and Hamburg report on their experiments to isolate pure diastase by separating the substances not possessing diastasic action. (from Hofmeister's Beiträge, 1906, v. 8, pp. 389–398).—Biochem. Centralb., Leipz., 1906–7, v. 5, p. 604.

Harrison and Gair outline the qualities that malt extract should possess and record the results of a systematic examination of a number of commercial samples. Total solids, maltose, proteids, and diastase.—Year Book of Pharmacy, 1906, pp. 279–284.

H. R. describes the production of extract of malt as observed by him in one of the larger establishments in Germany.—Pharm. Ztg., Berl., 1906, v. 51, p. 86.

Ohliger, Willard, reports a sample of diastase of malt which had a starch-converting power of 1:15 in ten minutes, while the manufacturers claim 1:150. Another brand was found capable of converting but its own weight of starch in thirty minutes.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Maquenne and Roux discuss the autoexcitation of malt, the optimum in malt autoexcitants, autoexcitation in relation to amylopectine, origin of the dextrins of saccharification.—Comp. rend. Acad. des Sc. Par., 1906, v. 142, pp. 1386–1392. (See also J. de pharm. et de chim., Par., 1906, v. 24, pp. 123–126, 187.)

Camus, L., concludes that hordenine has incontestable antiseptic properties, *in vitro*, but, as its effects *in vivo* are somewhat distressing, it is not to be recommended for this purpose in intestinal affections. He thinks, however, that it possesses other properties which entitle it to the consideration of the therapeutist, such as its action on the cardio-vascular apparatus, the digestive apparatus, and the secretions. On these grounds it is to be recommended in all affections in which malt preparations have proved useful and should prove more uniformly active.—Arch. internat. de pharmacod. et de thérap., 1906, v. 16, pp. 43–206.

Additional title references in Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des soc. sav.), p. 67.

McMillen says a good indication for liquid malt extracts is a sense of fullness, with heat in the abdomen, from one to several hours after eating—a feeling of imperfect digestion. The patient often wakes at night and is restless, tosses about in bed, with the sense of heat and fullness. A single dose of one or two ounces will often give relief. This remedy should not be repeated day after day, but limited to a single or a few doses at a time, as a special, not a general, remedy.—Eclectic Med. J., Cincin., 1906, v. 66, p. 161.

MANGANI DIOXIDUM PRÆCIPITATUM.

Hankey, William T., asserts that precipitated manganese dioxide is not a regular article of commerce, and when obtainable the price is out of all proportion to its value.—Am. Druggist, N. Y., 1906, v. 49, p. 362.

MANNA.

Hooper, David, mentions a new source for manna, an exudation from the tree *Schrebera swietenoides* Roxb., allied to the ash trees which afford the commercial manna of Europe. The exudation dissolves in five times its own weight of water, and yields to boiling alcohol a crystalline constituent having the properties of mannite or mannitol.—Pharm. J., Lond., 1906, v. 23, p. 258.

Dieterich, Karl, reports on 18 samples of manna. The ash content varied from 0.07 to 5 per cent and the contained moisture from 4.58 to 13.15 per cent.—Helfenberger Annalen, 1905, 1906, v. 18, p. 96.

MARRUBIUM.

Henkel, Alice, mentions *Marrubium vulgare* L., commonly known as marrubium, and hoarhound, as having been naturalized from Europe, and growing in dry, sandy soil, in fields and waste places, from Maine southward to Texas and westward to California and Oregon.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 45.

Schneider, Albert, points out that the whites and Indians use a decoction of the leaves of *Marrubium vulgare* L. for coughs and colds and to check diarrhœa.—Merck's Rept., N. Y., 1906, v. 15, p. 96.

MATRICARIA.

Schneider, Albert, points out that a decoction of *Matricaria discoida* D. C. is much used by the Indians in colic, stomach, and bowel complaints, especially in children. Tonic and diaphoretic.—Merck's Rep., N. Y., 1906, v. 15, p. 96.

Philipp Röder, Wien, points out that the ash content, a maximum of 13 per cent, of the Ph. Austr. VIII will readily be complied with. The minimum extractive soluble in 70 per cent of alcohol is fixed at 15 per cent.—Pharm. Ztg., Berl., 1906, v. 51, p. 278.

The Helfenberger Annalen (for 1905, p. 113) records some experiments to determine the extract content of chamomile flowers.—Pharm. Zentralh., 1906, v. 47, p. 854.

Chiron, Paul, (L'Art Méd.) recommends chamomilla when the left side is affected, there is excessive sensibility and irritability of fiber, and the patient acts as if out of his mind.—Abstr. Hahneman. Month., Phila., 1906, v. 41, p. 878.

MEL ROSÆ.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the monograph for honey be revised completely, adding tests for sugars.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Hérissy, H., says the mel rosæ of Ph. Ndl., IV, contains both sugar and honey and the percolate is obtained by lixiviation of the roses with water and without the addition of alcohol.—J. de pharm. et de chim., Par., 1906, v. 23, p. 480.

MENTHA PIPERITA.

Henkel, Alice, mentions *Mentha piperita* L., commonly known as peppermint, as having been naturalized from Europe, and occurring in damp places from Nova Scotia to Minnesota, south to Florida and

Tennessee. Principally cultivated in Michigan and New York.—Bul. Bur. Plant Ind. U. S. Dept. Agric., 1906, No. 89, p. 46.

An editorial notes that *Mentha piperita* is mentioned in the Icelandic Pharmacopœia of the thirteenth century.—Chem. & Drug., Lond., 1906, v. 69, p. 969.

An abstract from the American Agriculturist discusses the peppermint crop and the probable shortage in 1906.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 549.

Henkel, Alice, discusses the cultivation of peppermint, giving figures of the "runners," the leaves, and flowering top, and a peppermint still.—Spatula, Boston, 1906, v. 12, pp. 331–335, 415–417.

Weigel, G., reviews the current literature on the cultivation of peppermint.—Pharm. Zentralh., 1906, v. 47, p. 890.

Roure Bertrand Fils, (Bulletin, Oct. 1905, pp. 1–18) describe a peculiar form of peppermint, known by the name of menthebasilique, which occurs in the plants cultivated around Grasse. The structural changes which they describe are brought about by a mite which invades the branches at the time when they are on the point of issuing from the ground.—Pharm. J., Lond., 1906, v. 22, p. 706.

Utech, P. H., asserts that if the peppermint herb that is directed in the formula for spirit of peppermint be allowed to macerate in water for several hours before being added to the spirit the resulting color will be a more permanent and a deeper green.—Proc. Pennsylvania Pharm. Ass., 1906, p. 80.

Taylor, S., does not agree that all the aromatic waters should be prepared direct from the oils, but he finds that this water is eminently successful if prepared by percolating wool containing the oil with hot water.—Pharm. J., Lond., 1906, v. 23, p. 669.

MENTHA VIRIDIS.

Henkel, Alice, mentions *Mentha spicata* L., also known as *Mentha viridis* L., commonly known as spearmint, as having been naturalized from Europe, and growing in moist fields and waste places from Nova Scotia to Utah, south to Florida and Kansas. Also cultivated.—Bul. Bur. Plant Ind. U. S. Dept. Agric., 1906, No. 89, p. 46.

Utech, P. H., asserts that the modification for spirit of peppermint recommended by him, macerating the required herb with water for several hours, is also of advantage in connection with spirit of spearmint.—Proc. Pennsylvania Pharm. Ass., 1906, p. 81.

Fyfe, John William, says that Mentha viridis constituted the most important drug in a preparation which Beach said he had discovered by accident to be remarkably efficacious in suppression of urine.—Eclectic Med. J., Cincin., 1906, v. 66, p. 322.

MENTHOL.

Riedel's Berichte (Berl., 1906, p. 24) asserts that menthol, recrystallized from ether, melts at 44.5° C.

Utz asserts that it requires 44.5° C. to melt menthol.—Apoth. Ztg. Berl., 1906, v. 21, p. 930.

Schimmel & Co. present figures relating to the shipments of menthol from Japan, also indicating the destination of the bulk of the product for the five years from 1900 to 1904, inclusive.—Semi-Ann. Rep., 1906, Apr.–May, pp. 53, 54.

Schimmel & Co. assert that the use of menthol for medicinal and cosmetic purposes is constantly increasing. They present a table showing the total value of menthol shipments from Japan in the years 1900 to 1904, inclusive.—*Ibid.*, Apr.–May, p. 90.

Gawalowski, A., describes a number of menthol derivatives, their composition, chemistry, and uses.—Pharm. Post, Wien, 1906, v. 39, pp. 361, 362.

Matzel, R. (Arch. internat. de pharmacod. et de thérap., 1905, v. 15, p. 331), asserts that menthol is not toxic to mice which inhale the vapor of the substance. Menthone, on the other hand, causes deep stupefaction.—Abstr. in Biochem., Centralbl., Leipz., 1906–7, v. 5, p. 138.

Jung, Ed., suggests that for the internal administration of menthol it be dissolved in a fixed oil and emulsified with or without the addition of glycerin.—Pharm. Zentralh., 1906, v. 47, p. 542.

An editorial quotes Apolant (Deutsche med. Wchnschr., 1905, No. 44; Berl. klin. Wchnschr., Feb. 12) recommending menthol as a preventive for the nausea that is apt to follow the ingestion of tapeworm remedies.—N. York M. J., 1906, v. 83, p. 618.

Ormsby, O. S., mentions menthol and carbolic acid as the two chief local antipruritics.—J. Am. M. Ass., 1906, v. 46, p. 1600.

Zellerbaum, George, treats sensitive dentine by dissolving a few crystals of menthol in the cavity with a drop of absolute alcohol and drying out with compressed air.—Dental Cosmos, Phila., 1906, v. 48, p. 115.

Buckley, J. P., (Dent. Rev.) recommends highly a prescription consisting of 20 grains of menthol in one drachm of chloroform and half an ounce of ether.—*Ibid.*, v. 48, p. 792.

METHYLIS SALICYLAS.

Francis, John M., says that much of the synthetic oil of wintergreen is very impure. The pharmacopœial specifications are ample to insure pure goods. The inferior grades will become especially noticeable in tooth pastes after a few months ageing.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

An abstract from Pharm. Ztg., 1906, p. 323, gives a method of preparing methylsalicylic ether, together with its characters.—J. de pharm. et de chim., Par., 1906, v. 24, p. 115.

METHYLTHIONINÆ HYDROCHLORIDUM.

Francis, John M., notes that a very large proportion of the methylene blue in the market is wholly unfit for medicinal use, as it contains arsenic or zinc salts or both. It should never be purchased without a guaranty, and the last two tests of the pharmacopœia (for zinc and arsenic) should always be applied.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

Sahm and Mittelbach point out that the coloring power of methylene blue when adulterated is lessened in proportion to the amount of adulterant present, and propose to utilize this fact by determining the coloring power on cellulose.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 410, 411.

An editorial calls attention to the article of L. F. Dmitrenko (Med. Woch., Nov. 5), in which he reports the results of his use of methylene blue as a reagent for diagnosing typhoid fever from the urine. He finds the test with methylene blue no simpler than is the diazo reaction, and it is not easy to distinguish the exact shade which results. The results are not trustworthy.—N. York M. J., 1906, v. 84, p. 1236.

Gautrelet and Gravellat conclude that subcutaneous injections of a half cubic centimeter of methylene blue in a solution of 5 per cent per kilo of animal act on (1) the hepatic functions, (2) nutrition, (3) kidneys.—Compt. rend. Soc. de biol. Par., 1906, v. 60, pp. 550–553.

For a number of other references see Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, p. 166.

Kendall used methylene blue for intravitam staining.—J. Am. M. Ass., 1906, v. 46, p. 1153.

Jacobi, A., states that he has used methylthionine hydrochloride internally in the treatment of cancer. While he has not succeeded in curing any of these, he believes it has performed a great service in prolonging the lives and making more comfortable many suffering with inoperable cancer.—*Ibid.*, v. 47, p. 1545.

MISTURA FERRI COMPOSITA.

Knight, W. A., proposes a modification and a method of preparation of the official substitute for the famous antihectic mixture of Griffith.—Chem. & Drug., Lond., 1906, v. 68, p. 26.

MISTURA GLYCYRRHIZÆ COMPOSITA.

Cook, E. Fullerton, reports that Frances R. Bell found that the difficulties encountered with Brown Mixture are due to the use of commercial powdered extract of licorice, instead of the pure extract of the U. S. P., one sample of which proved to be soluble only to the extent of 40 per cent. The U. S. P. formula, followed exactly, is the best yet proposed.—Am. J. Pharm. Phila., 1906, v. 78, p. 418.

MISTURA PECTORALIS, STOKES N. F.

The editor of "Notes and Queries" discusses the possibility of the precipitation of the active constituents of squill and the gradual deposit of morphine from Stokes's mixture.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 129.

Caldwell, Paul, says of Stokes' Expectorant Mixture N. F.:

> This otherwise unsightly mixture may be made to possess a proper place among modern pharmaceuticals by the following process: Take a solution of the ammonium carbonate in water and add the fluid extracts. To this solution add 5 per cent of the finished product, of alcohol, and a like amount of glycerin. Next add the camphorated tincture of opium and filter the whole through magnesium carbonate, returning the filtrate to the filter until it passes entirely miscible with water; then add the syrup.—*Ibid.*, v. 50, p. 159.

MORPHINA.

Pschorr, R., reviews the history of morphine and the work done to determine the constitution of this alkaloid.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 74–79.

Faltis, Franz, discusses the constitution of morphine and of other opium alkaloids and their relation to berberine and corydaline.—Pharm. Post, Wien, 1906, v. 39, pp. 497–499, 509–511.

Kwisda, A., reviews the newer work that has been done on the constitution of morphine.—Ztschr. d. allg. oesterr. Apoth.-Ver., 1906, v. 44, pp. 91, 92.

Sc. reviews the literature relating to the constitution of morphine.—Pharm. Zentralh., 1906, v. 47, pp. 908, 909.

Gordin, H. M., reviews the literature relating to the progress made in connection with the chemistry of morphine during the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 243–251, 274–280.

The editor of "Notes and Queries" estimates the consumption of morphine in the United States, based upon custom-house figures, as follows: 1903, morphine, 790,833 ounces; manufactured opium (smoking, etc.), 182,629 pounds imported; 1904, morphine, 876,842 ounces; manufactured opium, 164,611.13 pounds, and quotes an investigation by A. P. Grinnell of one month's sales in 69 Vermont towns amounting to about 420 ounces of morphine sulphate.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 130.

Gordin, H. M., outlines a method for the separation of morphine from its solution in glycerin.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 374–376.

Reichard, C., outlines a modification of the formaldehyde reaction for morphine. He suggests the use of stannous chloride in place of the sulphuric acid, and asserts that the resulting violet color will be permanent.—Pharm. Zentralh., 1906, v. 16, pp. 247–249.

Mai and Rath discuss the colorimetric estimation of minute quantities of morphine. They were able to get the most satisfactory results from the use of a mixture of a small quantity of formaldehyde solution with sulphuric acid, Marquis's reagent, which gives an intense violet color with morphine.—Arch. d. pharm. Berl., 1906, v. 244, pp. 300, 301.

Radulescu, D., (Bull. Soc. Scient. d. Bucuresci.) outlines what he believes to be a characteristic color reaction for morphine. To an aqueous solution of morphine is added a crystal of sodium nitrite with sufficient acid to liberate the nitrous acid. Before effervescence has ceased, an excess of solution of potassium hydroxide is added. In the presence of morphine a pale rose to ruby red tint will be developed, according to the amount present.—Pharm. J., Lond., 1906, v. 22, p. 501.

Georges and Gascard outline a colorimetric process for the detection of morphine in toxicologic work.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 513–516.

Francis, John M., notes that morphine acetate loses a portion of the acetic acid with age and becomes less soluble. This can of course be easily corrected by the use of a little acid in dispensing.—Bull. Pharm., Detroit, 1906, v. 20, p. 98.

The Ph. Brit. Committee of Reference in Pharmacy report on morphine hydrochloride, says the solubility in water is 1 in 25, and 1 gram dissolves in 69 c. c. of alcohol (90 per cent). In the precipitation test the salt should be dissolved in 50 c. c. of warm morphinated water (not 250 c. c.) and the precipitated morphine should weigh 1.5 to 1.51 gm.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Lowe, C. B., points out that the average dose in the U. S. P. VIII for morphine sulphate is one-fourth grain, while the average dose of tincture of opium is given as being 8 minims, equaling a morphine strength of one-tenth grain, whereas 20 minims would have been equal to one-fourth grain.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 101, 102.

Garceau, Edgar, warns against the use of morphine to relieve the pain from injections of corrosive sublimate in the treatment of tuberculosis of the urinary tract in women if it can be avoided.—J. Am. M. Ass., 1906, v. 47, p. 1441.

Hare, Francis, states that the relief afforded by morphine in asthma is entirely consistent with the theory of bronchial constriction as well as with the vasomotor theory in his article; in the latter case morphine may be supposed to act as a paralyzer of the vasomotor system.—N. York M. J., 1906, v. 83, p. 703.

Le Boutillier (Ann. Surg., Brooklyn, July) advises the subcutaneous injection of morphine before the anæsthesia has passed when there is a probability that there would be much pain following the operation, the morphine being repeated often enough to keep the patient comfortable.—J. Am. M. Ass., 1906, v. 47, p. 461.

Gonnermann, M., reviews the literature relating to the behavior of morphine to various enzymes and intestinal bacteria and records some experiments on the influence of animal and plant enzymes on morphine. The animal enzymes are practically without influence on morphine.—Apoth. Ztg. Berl., 1906, v. 21, p. 998.

Felter, H. W., commenting on C. E. Frazier's use of atropine in post-partum hæmorrhage, adds a note on the value of morphine and atropine in profuse hæmorrhages generally.—Eclectic Med. J., Cincin., 1906, v. 66, p. 283.

Wells, G. Harlan, finds morphine an indispensable remedy in severe cases of cardiac weakness associated with the distressing dyspnœa and insomnia which so often accompany extreme degrees of cardiac dilatation. The first dose should be small and given hypodermically. It is contraindicated in fatty degeneration and where advanced renal lesion exists. The best results from its use are obtained in mitral disease.—Hahneman Month., Phila., 1906, v. 41, p. 262.

Additional references on the use of morphine will be found in the Index Medicus and the J. Am. M. Ass.

NONOFFICIAL COMPOUNDS.

An abstract from a German patent specification outlines the production of acetyl derivatives of morphine.—Chem. Repert, Cöthen, 1906, v. 30, p. 338.

The Ph. Austr., VIII, in a footnote, points out that "Morphinum diacetylicum" occurs in trade as "heroin."

Magnanimi, R. (Studi Sassaresi, V. 4, pp. 30–41), reports experiments on the toxic properties of some of the derivatives of morphine (dionin, heroin, peronin).—Jahresb. u. Tier. Chem. for 1906, Wiesb., 1907, v. 36, p. 794.

See also under Diacetyl-morphine.

MOSCHUS.

Schimmel & Co., review a report by Alexander Hosie, consul-general at Chengtu, who gives some interesting information on the musk trade. They also report an exhaustive study of the composition of musk, and report separating a ketone, to which they have given the name "muskone." From an analysis of muskone they have calculated its composition to be $C_{16}H_{30}O$ or $C_{15}H_{28}O$.—Semi-Ann. Rep. 1906, Apr.–May, pp. 93–96. See also J. f. prakt. Chem. 1906, v. 73, pp. 488–493.

They present a table showing the shipments of musk from Shanghai during the first half year of 1906 compared with the shipments from the same port during the years 1898 to 1905, inclusive.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 97.

Gehe & Co. discuss the economic conditions prevailing in the market for musk and give the export of musk to the several consuming countries for the years 1898 to 1905, inclusive.—Handels-Ber. Gehe & Co., 1906, p. 37.

Eliel, Leo, says it is impossible to exhaust musk in the manner directed in the U. S. P. and obtain a 5 per cent tincture. He suggests that the tincture be not filtered, be thoroughly shaken before dispensing, and dispensed with a "shake" label.—Proc. Indiana Pharm. Ass., 1906, p. 69.

Hérissey, H., asserts that tr. moschi is the sole 2 per cent tincture of the Ph. Ndl. IV.—J. de pharm. et de chim. Par., 1906, v. 23, p. 482.

MYRISTICA.

Smith, Kline & French Co. report the following data which they obtained from examination of ground nutmegs: Ash, 2.2 per cent; ash soluble in water, 1.5 per cent; ash insoluble in hydrochloric acid, 0.01 per cent; ether extractive (nonvolatile), 33.32 per cent; crude fiber, 4 per cent.—Lab. Rep., S., K. & F., 1906, p. 35.

Hamond, P. W., describes a case of poisoning as a result of taking a whole nutmeg for menstrual "irregularity." Recovery complete after administration of strychnine, whisky, and external heat.—Brit. Med. J., Lond., 1906, v. 2, p. 778.

MYRRHA.

Holmes, E. M., discusses the origin of myrrh and the identity of the myrrh tree. He points out the reasons why myrrh can not be the product either of *C. playfarii*, of *C. abyssinica*, or *C. schimperi*, or of *C. myrrha* of Engler, and recounts the evidence why *Balsamodendron myrrha* Nees (non *Commiphora myrrha* Engler) should be considered as being the true myrrh plant. The article is illustrated by a number of cuts.—Pharm. J. Lond., 1906, v. 22, pp. 254–257.

Francis, John M., notes that the pharmacopœia gives no specifications for the rejection of inferior grades of myrrh. He finds the commercial grades yield from 43 to 59 per cent of alcohol soluble matter and should average about 50 per cent. The powdered myrrh generally procurable, however, yields but 30 to 38 per cent, due to loss from drying or from the addition of absorbent material to make a stable powder.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Naylor, W. A. H., says the point to which greater attention should be directed is the percentage of volatile oil. An examination should be made of a large number of samples carefully verified by an expert, including the following data: Ash, solubility in 90 per cent alcohol, saponification number and volatile oil, with the view of ascertaining the feasibility of arriving at percentages indicative of samples of good quality commercially obtainable, and that would exclude within reasonable limits the more commonly occurring adulterants.—Pharm. J., Lond., 1906, v. 23, p. 77.

Lewinsohn, Kurt, discusses the history of the distilled oil of myrrh and records an investigation on the chemical properties and the composition of this oil.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 412–435.

Alcock, F. H., reports examining a sample of myrrh and suggests that the pharmacopœia include a lower limit for the alcohol soluble matter which should be present in the drug.—Pharm. J., Lond., 1906, v. 20, p. 407.

Weigel, G., points out that the Ph. Ndl. requires that myrrh contain from 40 to 70 per cent of alcohol soluble material and not more than 5 per cent of ash.—Pharm. Zentralh., 1906, v. 47, p. 419.

Frerichs, G., points out that myrrh should contain not more than 6 per cent of ash.—Apoth. Ztg., Berl., 1906, v. 21, p. 938.

The Ph. Brit. Committee of Reference in Pharmacy report on myrrh says the ash limit should be 5 per cent. Limit substances insoluble in alcohol and revise color test.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., reports myrrh containing much foreign matter and cheap acacia.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Dieterich, Karl, reports examining two samples of powdered myrrh which complied with the requirements of the Ph. Germ. IV with the exception of ash content, 12.28 and 11.46 per cent, respectively.—Helfenberger Annalen, 1905, 1906, v. 18, p. 52.

Beysen, Kurt, suggests that the Ph. Germ. require that in the making of tincture of myrrh the drug be comminuted with the aid of sand or talcum and asserts that a good fresh specimen of myrrh can not be powdered without the addition of some absorbent.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 332.

Stiles, M. H., asserts that tincture of myrrh may be efficiently and very conveniently made by percolation, in place of maceration, as directed by the pharmacopœia. He outlines a method for percolating which consists essentially of adding the alcohol and the dry powder in small portions alternately until all of the myrrh has been added, then percolate in the usual manner until exhausted.—Pharm. J., Lond., 1906, v. 22, p. 467.

NAPHTHALENUM.

Decker, Adolph, states that naphthalene is used in the form of vapor in the treatment of whooping cough.—N. York M. J., 1906, v. 83, p. 767.

Gair, C. J. Dickinson, outlines a method for the estimation of naphthalene in coal gas.—Oil, Paint and Drug Rep., 1906, Jan. 29, p. 42.

Thomann, J., (Schweiz. Wschr. f. Chem. u. Pharm. XLIV, No. 9, 1906, 131) outlines a method for the detection of naphthalene in foods.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 858.

Lutz, Ad., (trans. Sociedade Scientifica, S. Paulo, 1906) reports three cases of chronic poisoning from the inhalation of naphthalene fumes.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 700.

Switzer, L. B., has found a mixture of equal parts of powdered sulphur, powdered naphthalene, and insect powder dusted over the floor of his kennels useful in ridding his dogs of fleas; he thinks the mixture would be useful against chicken lice and perhaps also on cattle.—Bull. Pharm., Detroit, 1906, v. 20, p. 173.

NUX VOMICA.

The Ph. Brit. Committee of Reference in Pharmacy report on nux vomica says the Brussels Conference standard is 2.5 per cent of total alkaloid. Revise the assay process, especially if strychnine is to be determined separately. The U. S. P. process is quite incorrect. The powder should be described microscopically.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Grier, J., suggests that the Ph. Brit. limit the source of nux vomica to the "Bombay" variety and asserts that in this variety strychnine and brucine are present in about equal proportion.—Pharm. J., Lond., 1906, v. 22, p. 238.

Nelson, Burt E., illustrates and describes the structural characteristics found in powdered nux vomica.—Merck's Rep., N. Y., 1906, v. 15, p. 130.

Philipp Röder, Wien, proposes to limit the ash content of nux vomica to not more than 3.5 per cent and to require a 70 per cent alcohol extract content of 12 per cent. Also outlines a method of assay for total alkaloids.—Pharm. Zentralh., 1906, v. 47, p. 523.

Spiegel, L., discusses the chemistry of the strychnos alkaloids.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 159.

Herder, M., discusses the action of various reagents on the alkaloids of nux vomica and the demonstration, by microchemical means, of these alkaloids in various parts of the plant, *Strychnos nux vomica.*—Arch. d. Pharm. Berl., 1906, v. 244, pp. 129–130.

England, Joseph W., is not prepared to accept the statement that strychnine is the only principle of medicinal value in tincture of nux vomica. He points out that if this were true a hydro-alcoholic solution of strychnine should replace the tincture of nux vomica and the best evidence that it is not so is to be found in the continued and widespread use of the tincture.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 429.

Puckner, W. A., reviews some of the recent literature relating to the assay of nux vomica and points out that while manifestly it was attempted to prepare directions which one but little versed in analytical practice might follow, the results accomplished in this direction are far from satisfactory.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 269.

Dohme, A. R. L., reports that seven chemists operating on the same sample, by the same process found from 0.13 to 0.17 per cent of alkaloid in tincture of nux vomica and from 6.40 to 9.90 per cent in extract of nux vomica.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Kebler, L. F., reports the results of cooperative work on the part of analysts in the assay of nux vomica. Three methods were used, or with the determination of the total alkaloids by the U. S. P. method, four methods, three for total alkaloids and one for strychnine. The strychnine determinations varied from 1.05 to 1.42 per cent while the total alkaloid found by the three methods varied from 2.67 to 3.29 per cent.—Proc. Ass. Off. Agric. Chem., 23d Ann. Conv., pp. 139–141. (Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 105.)

Webster and Pursel review the efforts made to isolate strychnine from the total alkaloids in nux vomica, record their own experiments, and suggest a modification for the official directions.—Am. Druggist, N. Y., 1906, v. 49, p. 363.

Fromme, G., points out that in the available literature there is no satisfactory explanation of the reason why there should be such an evident difference in the yield of alkaloids in nux vomica, by a gravimetric and a titrimetric method. In the same sample of nux vomica he found, using the Ph. Germ. IV titration method, 3.80 per cent of total alkaloids; Keller's gravimetric method, 3.39 per cent; and Keller's method with titration, 2.71 per cent. He records a number of experiments made to determine the reason for this variation, and while his work is not completed he believes that the saponification of the fixed oil, by the alkali used, is an important factor.—Geschäfts-Ber. v. Caesar & Loretz in Halle a. S., 1906, pp. 58–68.

Caesar & Loretz outline their method for the estimation of total alkaloids in nux vomica.—*Ibid.*, p. 118.

Francis, John M., considers the U. S. P. VIII assay process for nux vomica a very poor substitute for the one abolished. He thinks it is generally conceded that no process for the assay of nux vomica preparations, which is based upon the separation of the strychnine from brucine, is sufficiently correct to possess any advantage over the process formerly official, namely, the estimation of total alkaloids.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 453.

Herting, Otto, points out that the pharmacopœia might well have included a gravimetric estimation of either total alkaloids or strychnine in nux vomica and outlines a process evolved by Léger for the former and Keller's process for the latter.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 2.

Farr & Wright present their conclusions in regard to the U. S. P., VIII, assay process for strychnine in nux vomica and outline their modification of the process.—Pharm. J. Lond., 1906, v. 22, p. 274.

Harrison, F., records his experience with the nitric acid process for determining strychnine in nux vomica, and asserts that this method gives excellent results regardless of the ratio between the alkaloids.—*Ibid.*, v. 22, p. 305.

Farr & Wright discuss the total alkaloids in nux vomica, strychnine in nux vomica, assay of nux vomica, ratio of alkaloids to extractive, experiments on menstrua, liquid extract, alkaloidal standards for nux vomica, preparation of the standardized extract, assay of the powdered extract, microscopic recognition.—*Ibid.*, v. 23, pp. 84–86.

For discussion see *ibid.*, p. 115. E. W. Mann says that the U. S. P. process, calling specifically for previously cooled acids, had in his hands yielded absolutely worthless results. Farr & Wright should take greater credit for their modification.

See also Year Book of Pharmacy, 1906, pp. 226–229.

Dott, D. B., commends the Farr & Wright modification of the nitric acid method and thinks there can be little doubt that it will supersede the present official process. It is probably not necessary to determine the amount of total alkaloids, but should it be considered desirable to do so that may easily be done without a separate analysis.—Pharm. J. Lond., 1906, v. 23, p. 99.

An editorial questions if literature gains, or if practical pharmacy is advanced, by such detailed records of the adventitious parts of a subject as are embodied in Farr & Wright's paper.—Chem. & Drug., Lond., 1906, v. 69, p. 129.

Evans Sons Lescher and Webb point out that the Ph. Brit. IV, method for the assay of nux vomica is very tedious and involves a great waste of time, and suggests that some adaptation of Keller's process appears to be the most satisfactory solution of the problem. They outline the method that they have used for some years.—Analytical Notes for 1906–7, pp. 24–25.

Gane, E. H., found one sample of nux vomica to assay 1.47 per cent of strychnine and asserts that much of the available nux vomica is above the U. S. P. VIII standard.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Patch, E. L., found nux vomica to assay 1.27 and 1.22 per cent of strychnine and 2.67 and 3.4 per cent of total alkaloids, respectively.—*Ibid*, v. 54, p. 340.

Vanderkleed, Charles E., examined seven lots of powdered nux vomica which assayed an average of 1.1 per cent of strychnine. Only one sample of the ground drug exceeded the required 1.25 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Ohliger, Willard, finds nux vomica usually below standard in strychnine content.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Smith, Kline & French Co. report on the examination of two samples of nux vomica. They contained 2.46 per cent and 2.4 per cent of total alkaloids, respectively.—Lab. Rep., S. K. & F., 1906, p. 18.

Philipp Röder, Wien, examined five samples of nux vomica and found from 1.34 to 2.93 per cent of ash, from 1.03 to 2.82 per cent of alkaloid, and from 9.43 to 13.94 per cent of extract soluble in 70 per cent of alcohol. The Ph. Austr. VIII requires 2.5 per cent of total alkaloid, 12 per cent of extract, and not exceeding 3 per cent of ash.—Pharm. Post, Wien, 1906, v. 39, p. 296.

Moerk, Frank X., points out that the extract of nux vomica is four times the strength of the drug and that the fluid extract represents only 80 per cent of the active constituents of nux vomica in place of 100 per cent or c. c. for gramme, as is generally supposed. Tincture of nux vomica, made from the extract, contains alkaloid to the extent of 8 per cent of the drug.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Francis, John M., criticizes the pharmacopœial methods for preparations of nux vomica and has often wondered how they had been retained through the various revisions.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 430.

Beysen, Kurt, suggests that the Ph. Germ. require that the partially concentrated extractive of nux vomica be allowed to stand for several days, filtered, and then freed from oil by means of petroleum ether. The resulting material is then evaporated to dryness.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 328.

Taylor, S., mentions the necessity of freeing all preparations of nux vomica from fat, and recommends the use of paraffin.—Pharm. J., Lond., 1906, v. 23, p. 669.

Alcock, F. H., in discussing a paper by Farr and Wright, proposed carbon tetrachloride as a solvent for the fat in nux vomica. This solvent, he asserts, is cheap, non-inflammable, very volatile, and when reasonably pure has no objectionable odor.—Year Book of Pharmacy, 1906, p. 240.

Lefeldt, Max, suggests that the oil be removed by a preliminary treatment with petroleum benzin in the making of Extractum Strychni of the Ph. Germ.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 336.

Remington, Jos. P., asserts that the fixed oil of nux vomica contains an appreciable quantity of strychnine and if the tincture is made by extracting the drug with benzin the full alkaloidal strength will not be obtained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 430.

Francis, John M., calls attention to the discrepancy in strychnine content of the several preparations of nux vomica, the difficulty lying, he declares, mainly in the fact that a new assay has been adopted, and because the tincture is prepared from the extract and not from the drug or fluid extract. He appeals for the preparation of the tincture by dilution of the fluid extract; the extract is a pharmaceutical failure and a manufacturing expense.—Bull. Pharm., Detroit, 1906, v. 20, p. 11.

Philipp Röder, Wien, suggests that the water content of solid extract of nux vomica should not exceed 20 per cent and that the ash content should not exceed 3 per cent of the water-free substance. He points out that stronger alcohol produces an extract richer in alkaloids, while weaker alcohol increases the amount of extractive.—Pharm. Zentralh., 1906, v. 47, p. 482.

Dott, D. B., asserts that nux vomica, when in a properly prepared coarse powder, gives up its alkaloids as readily to 60 per cent as to 70 per cent alcohol, and with the distinctive advantage that less oil is extracted by the weaker spirit.—Year Book of Pharmacy, 1906, p. 300.

Farr and Wright discuss the ratio of alkaloids to extractive and report experiments on menstrua for extract and liquid extract of nux vomica, the alkaloidal standards for nux vomica, preparation of the standardized extract, assay of the powdered extract, microscopic recognition of the powdered extract.—*Ibid.*, pp. 229–238.

Gordin, H. M., recommends that the extract be weighed directly into the separating funnel. Before the removal of the last trace of chloroform from the final residue containing the strychnine a few drops of amyl alcohol should be added and the liquid evaporated to dryness by blowing air over the surface of the vessel, thus effectively preventing decrepitation. The evaporation of the alcohol from the fluid extract is unnecessary. The method can be made much more simple by shaking out directly 10 or 5 cc. of the fluid extract with immiscible solvents in the presence of alkali.—Am. J. Pharm. Phila., v. 78, pp. 456, 457.

Dieterich, Karl, reports examining a number of samples of extract of nux vomica which were found to contain from 21.44 to 28.58 per cent of moisture, from 1.10 to 1.45 per cent of ash, and from 15.52 to 20.16 per cent of total alkaloids.—Helfenberger Annalen, 1905, 1906, v. 18, p. 163.

Philipp Röder, Wien, outlines a method for the estimation of total alkaloids in extract of nux vomica, and reports an examination of five samples which varied from 13.13 to 16.02 per cent of total alkaloids.—Pharm. Post, Wien, 1906, v. 39, p. 263.

Moerk, Frank X., asserts that the statements on page 571 [U. S. P. VIII], referring to fluid extract of nux vomica, do not correspond with the statement in the text of the pharmacopœia itself.—Proc. Pennsylvania Pharm. Ass., 1906, p. 160.

Lyons, A. B., calls attention to the fact that the standard for fluid extract of nux vomica is very low in comparison with that of the drug, but approves it, nevertheless, considering the difficulty in completely exhausting the drug. He reports that 11 of the 12 replies received indicated that the U. S. P. standard for fluid extract of nux vomica is satisfactory and readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 437–440.

The Ph. Brit. Committee of Reference in Pharmacy report on liquid extract of nux vomica recommends modification of the process to insure absence of fat. Revise assay process.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

England, Joseph W., discusses the tincture of nux vomica of the U. S. P. VIII, compares the official preparation with the similar preparation formerly official, and suggests that tincture of nux vomica be directed to be made from an assayed powdered fat-free nux vomica.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 428–430.

Eberle, E. G., asserts that tincture of nux vomica should be made from the fluid extract, if not made from the drug.—*Ibid.*, v. 54. p. 450.

Lyons, A. B., suggests preparing the U. S. P. tincture from the fluid extract of nux vomica.—*Ibid.*, v. 54, p. 430.

Hill, J. Rutherford, in discussing a paper by Farr and Wright, pointed out that Dey in a paper read at Edinburgh showed that nux vomica powder could be easily and completely exhausted of alkaloids by simple percolation, and he suggested that such a tincture might be introduced into the British Pharmacopœia.—Year Book of Pharmacy, 1906, p. 241.

Philipp Röder, Wien, outlines a method of assay for tincture of nux vomica, similar to that suggested for extract of belladonna, and reports examining five samples of the tincture which varied from 0.200 to 0.261 per cent of total alkaloid. The Ph. Austr. VIII requires 0.25 per cent of alkaloid.—Pharm. Post, Wien, 1906, v. 39, p. 298.

Brunker, J. E., reports that of 153 samples of tincture of nux vomica supplied to the Irish Medical Charities, 13 were found defective.—Pharm. J., Lond., 1906, v. 23, p. 99.

The Ph. Brit. Committee of Reference in Pharmacy concludes that the assay process for tincture of nux vomica requires revision.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Lowe, C. B., points out that the dose of tincture of nux vomica, 8 minims, seems rather low.—Proc. Pennsylvania Pharm. Ass., 1906, p. 102.

Steele, J. Dutton, quotes and confirms Musser (Trans. Assoc. Amer. Phys., 1905, p. 193) that nux vomica is used in gastric hyperacidity when due to sensory neurosis, despite its well-known property of increasing gastric secretion.—J. Am. M. Ass., 1906, v. 47, p. 499.

Leming, William, (Modern Eclecticism) uses nux vomica where there is general atonicity, with deficient or incoördinate motor action; when the tongue is broad, pale and relaxed, and the tissues flabby.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, pp. 441.

Wells, G. Harlan, discusses the value of nux vomica in various disorders and in palpitation, etc., from overindulgence in alcoholic liquors and tobacco.—Hahneman. Month., Phila., 1906, v. 41, p. 261.

Collins, C. D., says that nux vomica is indicated in pruritus during pregnancy with jaundice and morning sickness with burning and itching all over. Urticaria like lesions with great itching, worse at night. Great debility of the general forces and oversensitive condition of the skin.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 287.

OLEATA.

Francis, John M., advises that in the making of oleates of alkaloids the oleic acid and alkaloids be heated until perfect solution results and then filtered hot.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

OLEATUM HYDRARGYRI.

The Ph. Brit. Committee of Reference in Pharmacy believes that oleate of mercury is better made by direct combination of the mercuric oxide and the oleic acid.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Taylor, S., says the oleate of mercury has been adversely criticised by Naylor, who recommends the use of an increased amount of soap and the omission of the oleic acid, which is useless. Solution of the oxide in acid, as of old, he considers superior to precipitation.—Pharm. J., Lond., 1906, v. 23, p. 669.

OLEORESINÆ.

Francis, John M., is not prepared to concede that oleoresins extracted with acetone are in all respects the same as when prepared by the use of ether. He modifies his earlier statements as to the properties of acetone; using a purified and dehydrated acetone with thoroughly dried drugs there is very little extractive which is insoluble in sulphuric ether: with commercial acetone and commercial drugs, however, there is quite an appreciable amount, greater with aspidium and capsicum than with lupulin and pepper. This he attributes to the differing solvent powers of acetone more or less concentrated and acetone diluted by the water normally found in drugs.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

OLEORESINA ASPIDII.

Francis, John M., says that if the precaution is not taken to discard the heavy extract which separates *immediately on evaporation of the acetone* (sometimes amounting to 25 per cent of the total yield), the yield from male fern will be much too great. He has not been able to demonstrate the presence of filicic acid in this heavy extract, though the identity tests for this substance are exceedingly unsatisfactory.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

OLEORESINA CUBEBÆ.

Francis, John M., thinks cubeb might well have been included in the class of oleoresins extracted by acetone, as the drug yields but little [to?] alcohol after it has been thoroughly extracted by acetone. Alcohol is open to the further objection that its boiling point is so high that a considerable loss of the volatile substance from the cubeb occurs when the solvent is evaporated.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

OLEUM.

OLEA PINGUA.

Philipp Röder, Wien, points out that the Ph. Austr. VIII requires the saponification number, in connection with fixed oils, without considering the components' acid number and ester number. The acid number is indicated in but two instances: Wax and oil of theobroma.—Pharm. Zentralh., 1906, v. 47, p. 481.

The Ph. Belg. III, under the general title "Oleum Officinale," describes as medicinal oil any nondrying oil that is adapted for consumption and has little or no color, odor, or taste. It should not be rancid and should not become turbid within twenty-four hours at 10° C. The pharmacopœia specifically permits the use of olive oil, almond oil, sesame oil, peanut oil, cotton seed oil, nut oil, or maize oil. The container should be labeled with the name of the oil which it actually contains.

Sherrard calls attention to the assay processes for fixed oils; he considers the iodine absorption values very accurate, but he asserts the saponification equivalents are not.—Proc. Indiana Pharm. Ass., 1906, p. 73.

Nicorescu, Joan, (Rev., farm. No. 8, 1906, pp. 236–240) describes the medicinal oils, their preparation, preservation, formation of fatty acids, and falsification. The presence of alkaloids is recognized by treating with a solution of tartaric acid.—Abstr. in Bull. des sc. pharmacol. Par., 1906, v. 13, p. 336.

Marcille, R., discusses the reactions of Bellier (benzol solution of resorcin and nitric acid), of Bishop (action of fresh oil of sesame and hydrochloric acid), and of Wiedmann (acetone solution of phloroglucin with two or three drops of concentrated sulphuric acid) and criticises the work of Hans Kreis. He considers that the reaction of Bishop is not characteristic of seed oils alone, but is produced in a general way with oxidized fatty matters.—Ann. de chim. analyt. Par., 1906, v. 11, pp. 51–53.

Kreis, Hans, replies that Marcille has fallen into a twofold error in that the reaction of Bishop has to do with old sesame oil, and Marcille has confounded his (Kreis's) phloroglucin reaction with a very slight modification which Wiedmann made in the modus operandi.—*Ibid.*, v. 11, p. 143.

Marcille says that he knew the work of Kreis only through the translation which appeared in the Rev. internat. des falsif., which was probably incomplete or erroneous.—*Ibid.*, v. 11, p. 333.

Kühn and Halfpaap discuss the application, use, and shortcomings of the Welman reaction for vegetable oils, and point out that the valuable feature of this reaction is applicability as a preliminary test for the presence of vegetable oils.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 449–455.

Sidersky, D., (Indus. Lait. Par., 31, 1906, No. 48, pp. 775–776) presents in tabular form constants for 28 fats and oils of animal and vegetable origin calculated from compiled data.—Exp. Sta. Rec., 1906, v. 18, p. 609.

Tolman, L. M., as associate referee on fats and oils, of the Association of Official Agricultural Chemists, outlines the methods for conducting the cold test and the cloud test for fatty oils.—Circ. Bur. Chem., U. S. Dept. Agric., 1906, No. 27, pp. 6.

Fish, Erwin L., gives five tables showing his results with the color reaction of vegetable oils, color reaction of animal oils, nitric-acid color test, and nitric and sulphuric acid color test.—Proc. New York Pharm. Ass., 1906, pp. 203–205.

The Secretary of Agriculture has adopted standards for edible vegetable oils and fats (circular No. 19).—Oil, Paint, and Drug Rep., 1906, v. 69, Apr. 23, p. 50.

Francis, John M., thinks the descriptions, assays, and specifications for oils, especially the "volatile oils," are a tremendous improvement upon those of preceding revisions of our pharmacopœia, and also upon those of any pharmacopœia.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Schimmel & Co. have examined the differences existing between the specific gravities of essential oils at 15° and at 25° C., and report that they have found these differences to be quite considerable. They present their results in tabulated form and call particular attention to the results, which do not agree with the limits of value given in the U. S. P. VIII.—Semi-Ann. Rep., 1906, Apr.–May, p. 70.

They point out that with a few exceptions the requirements of the Ph. Austr. VIII, for essential oils, may be characterized as being "up to date." They present a detailed review of the several requirements.—*Ibid.*, Apr.–May, pp. 77–81.

They also discuss at some length the several requirements for volatile oils included in the Ph. Hisp. VII.—*Ibid.*, Apr.–May, pp. 81–86.

They review the specifications of the Ph. Ndl. IV for essential oils and assert that the particulars given are on the whole correct, and that of errors of any importance there are but few.—*Ibid.*, Oct.–Nov., p. 84.

Weigel, G., points out that in some instances where the optical rotation is indicative of the purity or the identity of an essential oil it has been included in the Ph. Ndl. IV.—Pharm Zentralh., 1906, v. 47, p. 375.

He points out that the requirements made by the Ph. Hisp. VII for essential oils are usually meager and inadequate, and, in some instances, even false and therefore misleading.—*Ibid.*, v. 47, p. 577.

He also points out the requirements of the Ph. Austr. VIII for volatile oils.—*Ibid.*, v. 47, p. 686.

Wiebelitz, H., suggests that a special article on volatile oils giving a general description of the general properties and the tests for this class of substances would be an advantage.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Beckstroem, R., suggests that the Ph. Germ. delete oleum anisi, carvi, and caryophyllorum, as these are already replaced by anetholum, carvonum, and eugenolum, and the oils are not identical with the several substances that are official. Where the optical activity of an oil is characteristic, or where it would be of advantage for analytical purposes, he believes it should be added to the official description.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 326, 327.

La Wall, Charles H., expresses the opinion that some of the tests as, for example, those for esters under essential oils, are too complicated for practical purposes.—Am. J. Pharm., Phila., 1906, v. 78, p. 99.

The Ph. Brit. Committee of Reference in Pharmacy report on oils says that in all statements of solubility the temperature is most important, and pointed attention should be called to it.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Schimmel & Co. point out that they have repeatedly warned against attaching too great value to color reactions in the terpene chemistry and that despite this warning new reactions are recommended again and again which even at the outset appear of little value. They discuss a test recently proposed by C. Reichard for terpineol and point out that as other terpene compounds react the same as terpineol, a practical utilization of this reaction is out of the question.—Semi-Ann. Rep. Apr.–May, 1906, p. 91.

Rochussen, F., reviews the advances made in the field of the terpenes and volatile oils. The article includes quite an extensive bibliography.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 185–189.

Wallach, O., presents a contribution to the knowledge of terpenes and ethereal oils, in the course of which he discusses some new combinations of β-Terpineol.—Ann. d. Chem., Leipz., 1906, v. 345, pp. 127–154.

Some further contributions on terpenes and essential oils.—*Ibid.*, v. 346, pp. 220–285, v. 347, pp. 316–346, and v. 350, pp. 141–179.

Hanson and Babcock present a study of some of the conifer oils, including spruce, hemlock, red pine, and juniper.—J. Am. Chem. Soc., 1906, v. 28, pp. 1198–1201.

Umney, John C., gives a tabulated statement of the world's production of perfumery products, under the different countries, in which are included the oils of lavender, lemon, orange, sandalwood, cinnamon, etc.—Pharm. J., Lond., 1906, v. 23, p. 378.

The Secretary of Agriculture has promulgated a series of official standards for flavoring extracts and the volatile oils used in the making of them (Bulletin No. 19).—Oil, Paint and Drug. Rep. 1906, v. 69, Apr. 23, p. 50.

Brüning, H., (Pharmakol. u. physiol.-chem. Inst. Rostock; Centralbl. f. inn. Med. 1906, pp. 337) reports an exhaustive study of the bactericidal or retarding influences exercised by volatile oils in cow's milk. The general results are presented in the form of a table.—Abstr. Biochem. Centralbl., Leipz., 1906–07, v. 5, p. 402.

Matzel, Richard, presents a contribution to our knowledge of the pharmacology of the volatile oils.—Abstr. *Ibid.*, v. 5, p. 346.

Kobert, Karl, presents a report on systematic experiments on the antiseptic action of essential oils and their constitutents. He describes the method that was employed and presents a synopsis of his results in the form of tables.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 155–161.

An editorial reviews the work on the determination of the antiseptic value of volatile oils and calls particular attention to the work done by Kobert.—Pharm. Ztg., Berl., 1906, v. 51, p. 945.

OLEUM ADIPIS.

Smith, Kline & French Co. report that the sp. gr. of a sample of lard oil examined was 0.914 at 25° C., free acid, slight trace only, and cotton-seed oil, negative.—Lab. Rep. S. K. & F., 1906, p. 18.

OLEUM ÆTHEREUM.

Francis, John M., asserts that the pharmacopœial specifications are not sufficiently elaborate to protect the purchaser. The product is so notoriously bad that he doubts the wisdom of retaining it in the pharmacopœia.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Patch, E. L., points out that the U. S. P. ethereal oil is entirely different from any of the oils of wine in the market which are sold to the pharmacist as ethereal oil.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

OLEUM AMYGDALÆ AMARÆ.

Schimmel & Co. doubt the usefulness of the official assay for benzaldehyde, are inclined to believe that the content of hydrocyanic acid required can not always be guaranteed, and point out that the specific gravity for oil of bitter almond given is for a temperature of 15° C., and that at 25° the figures should be from 1.038 to 1.063. They also assert that occasionally a feeble optical activity has been observed.—Semi-Ann. Rep., 1906, Apr.–May, p. 72.

Francis, John M., points out that the specifications for oil of bitter almond and those for benzaldehyde being the same, the pharmacist might just as well specify the synthetic benzaldehyde in ordering.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Patch, E. L., points out that the suggestion sometimes made that oil of bitter almond and benzaldehyde are identical products is misleading and in error. Benzaldehyde must not contain any hydrocyanic acid, while the natural oil is required to contain from 2 to 4 per cent. The latter alone should be used in all official medicinal preparations, but should not be used for a flavoring for food. He found 1.49, 1.78, and 2.3 per cent of hydrocyanic acid in three lots of oil of bitter almond.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

OLEUM AMYGDALÆ EXPRESSUM.

Francis, John M., thinks "this is one of the cases where you order one thing and get another." While it may be possible to get a genuine oil of expressed sweet almond, that of commerce is expressed largely from the seeds of plums, apricots, etc. As the resulting oil meets every requirement there is no valid reason why it should not be done, save that we should know what we are buying. California is not only shipping hundreds of tons of apricot kernels to Europe yearly, but is also turning out a fine grade of "oil of sweet almond."—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Schimmel & Co. state that the use of almond oil for cosmetics (cold cream, etc.) appears to have fallen off, owing to the large number of vaseline and lanolin products; the competition of adulterated oils, which are offered at incredible prices, also renders the sale of the genuine article more difficult.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 8.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of almond says that the iodine value (95 to 100) and saponification value (190 to 200) should be stated. The U. S. P. oleic-acid test should be experimented on.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Smith, Kline & French Co. report on the examination of one sample of almond oil which had a specific gravity of 0.918 at 15° C., an acid number of 2.3, and a saponification number of 195.5. This sample was expressed from sweet-almond kernels.—Lab. Rep. S. K. & F., 1906, p. 14.

Patch, E. L., asserts that oil of sweet almonds is to be had. When quality is not specified, peach-kernel oil is usually supplied.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Liverseege, J. F., in a review of past analyses of drugs officially bought in Birmingham, quotes some analytical data obtained and points out that of 20 samples examined only 3 were found to be largely or entirely apricot-kernel oil.—Year Book of Pharmacy, 1906, p. 269.

OLEUM ANISI.

Schimmel & Co. assert that the upper limit of the specific gravity requirement should be 0.988, otherwise the oils richest in anethol, and consequently the most valuable anise oils, could not be used.—Semi-Ann. Rep., 1906, Apr.–May, p. 70.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of anise says the minimum melting point should be 15° C., and solubility 1 in 3 volumes of 90 per cent alcohol.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Schimmel & Co. assert that it is desirable to determine the specific gravity of oil of anise at 20° C., as at 15° solidification takes place; the limits of value remain the same as at 15°. Anise oil dissolves in from 2 to 3 volumes of 90 per cent alcohol.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 85.

Brandel, I. W., quotes Haensel's Berichte and asserts that Levant anise seed yields 2 per cent of rectified oil having a specific gravity of 0.9789 at 15° C., an optical rotation of —0° 49′, a congealing point of +17°, and soluble in 8.5 parts of 80 per cent alcohol. Russian seeds yield a much larger percentage of oil, with a slightly higher specific gravity and lower congealing point.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 113.

Nelson, Burt E., figures and describes the microscopical appearance of powdered star anise.—Merck's Rep., N. Y., 1906, v. 15, p. 322.

Schimmel & Co. assert that the solidifying point of pure oil of star anise lies above +14° and that solidification must, if necessary, be started by inoculation with a small crystal of anethol. Star anise oil dissolves in from 1.5 to 3 volumes of 90 per cent alcohol.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 95.

Eberhardt, Ph., reports a new method for the extraction of oil of anise and makes a recommendation as to the production of oil which he thinks will greatly increase the annual production.—Compt. rend. Acad. des Sc., Par., 1906, v. 142, pp. 407, 408.

(See also J. de pharm. et de chim., Par., 1906, v. 23, p. 357.)

An abstract discusses the oil of star anise and asserts that a pure oil of star anise seed has a congealing point of +18° C., while the oil from the leaves and twigs frequently does not congeal even at +18° C. Fractional distillation shows that the latter contains appreciable fractions of anise aldehyde.—Pharm. Prax., 1906, v. 5, p. 151.

Francis, John M., has found not more than 10 per cent of the samples of anise oil adulterated. He thinks the most important tests of the pharmacopœia are those of optical rotation (unfortunately not available to most pharmacists), specific gravity, solubility, and congealing point.—Bull. Pharm., Detroit, 1906, v. 20, p. 99.

Fernan, Albert, reports finding a sample of Russian oil of anise which was evidently contaminated with oil of fennel.—Ztschr. d. allg. oestrr. Apoth.-Ver., Wien, 1906, v. 44, p. 79.

Schimmel & Co. point out that anethol, which is included in some of the foreign pharmacopœias in place of oil of anise, may also be made from oil of fennel and from oil of star anise and that the anethol is the same in every case.—Semi-Ann. Rep., 1906, Apr.–May, p. 78. (See also p. 7.)

They assert that the melting point of anethol lies between 22° and 23° and the solidifying point between 21° and 22°. For dissolving 1 volume of anethol 2 to 3 volumes of 90 per cent alcohol are required.—*Ibid.*, Oct.–Nov., p. 85. (See also p. 9.)

Gane, E. H., reports on a sample of oil of anise with optical rotation +0.250, insoluble in 5 volumes of 90 per cent alcohol and did not congeal at 10° C.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Evans Sons Lescher and Webb found that of 13 samples of anise seed oil examined, only 1 was questionable.—Analytical Notes, for 1906, E. L. & W., Lond., 1907, p. 5.

OLEUM AURANTII CORTICIS.

Schimmel & Co. point out that the color of oil of orange is yellow to yellow-brown. The optical rotation +95° at 25° C. calculated for 20° C. is +96°. They have observed as lowest value at 20° C. +95° 30′.—Semi-Ann. Rep., 1906, Apr.–May, p. 76.

Heinrich Haensel calls attention to a very good quality of oil of orange which is being sent on the market from Spain. The color is somewhat redder and on the whole darker than that of Italian oil, but the odor and flavor are very good. At 16° C. the specific gravity of the Spanish oil was found to be 0.849 and of the Italian oil 0.848.—Half Yearly Reports, Apr., 1906, pp. 21–23.

Schimmel & Co. have fixed the following values for orange oil in place of those given in Gildemeister and Hoffman's work, "The Volatile Oils." Sweet orange oil has a specific gravity at 15° C. 0.848 to 0.853, optical rotation at 20°, +95° to +98°, the optical rotation of the first 10 per cent of the distillate not or but little lower than the optical rotation of the original oil; residue on evaporation 2 to 4 per cent. The altered behavior of the oil as compared with that formerly observed they attribute to the fact that the selection of the fruit and the expression of the oil used to take place with less care than at present.—Semi-Ann. Rep., 1906, Oct.–Nov., p. 34.

Evans Sons, Lescher and Webb report on the examination of 3 samples of bitter orange oil ranging in specific gravity from 0.853 to 0.856, and rotation from +86° 42′ to +88° 30′; also on the examination of four samples of sweet orange oil ranging in specific gravity from 0.849 to 0.853, and in rotation from +92° to +96° 6′.—Analytical Notes, for 1906, E. L. & W., Lond., 1907, p. 26.

OLEUM BETULÆ.

Henkel, Alice, mentions *Betula lenta* L., also known as sweet birch, black birch, and cherry birch, as being found from Newfoundland to Ontario, south to Florida and Tennessee.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 15.

Foster, Harold Day, describes the preparation of oil of birch and gives some interesting data regarding the yield, the amount produced, and the price obtained for the product.—Pharm. Era., N. Y., 1906, v. 35, pp. 188, 189.

Brandel, I. W., reviews some of the recent literature relating to oil of birch, and related compounds.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 379.

See Oleum Gaultheriæ.

OLEUM CADINUM.

Pepin, Camille, discusses the production of oil of cade and outlines some tests for identity and purity for true oil of cade.

In the discussion before the Pharmaceutical Society, Carette asked that the acid content be determined, as skin specialists attributed accidents caused by certain oils to adulteration with acid containing oils.—J. de pharm. et de chim., Par., 1906, v. 23, p. 589.

Pepin, Camille, discusses oil of cade, its preparations, and its distinctive characters.—*Ibid.*, v. 24, pp. 49–58.

Also a study of the properties and reactions.—*Ibid.*, v. 24, pp. 248, 258.

Schimmel & Co. review the article by Pepin and outline his test.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 13.

Evans Sons Lescher and Webb report on the examination of 9 samples of cade oil, the sp. gr. of which varied from 0.960 to 1.029. Five were soluble and 4 only partially soluble in 90 per cent alcohol, and the solubility in acetic acid varied from 0.10 per cent to 1.20 per cent.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 10.

Smith, Kline & French Co. report the results of the examination of three samples of oil of cade in which the sp. gr. ranged from 0.988 to 1.01. Each was soluble in all parts of alcohol. They think that most of the oil of cade of commerce is made from pine tar or coal tar.—Lab. Rep. S., K. & F., 1906, p. 44.

OLEUM CAJUPUTI.

Schimmel & Co. assert that they have convinced themselves, by estimation of mixtures of a known cineol content, that the U. S. P. VIII assay method for cineol in oil of cajuput does not always give reliable results. They also suggest that 0.913 should be given as the lower limit of specific gravity and report that they have observed rotations up to $-2° 40'$ with pure distillates.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 72.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of cajuput says if retained, which is doubtful, a revised test will be necessary. The cineol should be not less than 50 per cent by the phosphoric-acid process.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Brandel, I. W., reviews some of the literature relating to oil of cajuput, its properties, and the properties of several varieties of the oil.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 88.

Schimmel & Co. review the economic conditions prevailing and give a list of shipments of oil from Macassar during the first months of 1906.—Semi-Ann. Rep. 1906, Oct.–Nov., p. 13.

Caspari, Chas. E., reports 3 samples examined; all contained copper.—Proc. Missouri Pharm. Ass., 1906, p. 104.

Evans Sons Lescher and Webb report on 8 lots of cajuput oil which yielded from 45 to 56 per cent of cineol by the phosphoric-acid method; the specific gravity and rotation of these came within the generally accepted limits, and only 2 samples were abnormal and only became pasty with phosphoric acid.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 11.

Smith, Kline & French Co. report on the examination of 3 samples of oil of cajuput. The sp. gr. ranged from 0.913 to 0.922 at 25° C., the optical rotation from −2° 15′ to −3° 50′, and the cineol content from 33 to 45 per cent. These samples were soluble in all parts alcohol and 1 part 80 per cent alcohol. The cineol content in two was below the U. S. P. standard. Lab. Rep. S., K. & F., 1906, p. 21.

OLEUM CARI.

Schimmel & Co. point out that the specific gravity of oil of caraway (as originally given, 0.905 to 0.915) applies to a temperature of 15° C., and that for 25° C. it should read 0.899 to 0.909.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 72.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of caraway says at least 40 per cent should distill over 200° C., and optical rotation +74° to +78°.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Brandel, I. W., quotes Sadtler, who asserts that the carvone content of oil of caraway can be determined, titrimetrically, with the normal sulphite method.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 113.

Gehe & Co. discuss the probable crop of caraway seed in Holland and point out the acreage as well as the yield of seed for the years 1901 to 1905, inclusive.—Handels-Ber. Gehe & Co., 1906, p. 30.

Schimmel & Co. discuss the production of oil of caraway, the area cultivated with caraway in Holland during the years 1905 to 1906, inclusive, the condition of the fields, the average yield per acre, and the exports during the years 1900 to 1905, inclusive.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 21, 22.

Smith, Kline & French Co. report on the examination of 3 samples of oil of caraway, in which the sp. gr. ranged from 0.905 to 0.913 at 25° C., and the optical rotation from +78° 43′ to +80° 36′. They were soluble in all parts of alcohol and in 8 parts of 80 per cent alcohol.—Lab. Rep. S., K. & F., 1906, p. 22.

OLEUM CARYOPHYLLI.

Schimmel & Co. assert that as clove oils with as low an eugenol content as 80 per cent are admitted, the lower limit of the specific gravity should be reduced to 1.033.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 73.

Brandel, I. W., reviews some of the literature relating to oil of cloves, its properties and constituents.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 87, 88.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of cloves says it should contain at least 80 per cent of eugenol by the potassium-hydroxide test. The solubility in 70 per cent alcohol should be stated.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., assayed four lots of oil of cloves, which varied from 83 to 86 per cent of eugenol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

Baird, J. W., reports three samples examined in 1904, one adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

OLEUM CHENOPODII.

Henkel, Alice, mentions *Chenopodium anthelminticum* L., commonly known as chenopodium, wormseed, and Jerusalem oak, as being naturalized from Europe, and found in waste places from southern New York to Wisconsin, south to Florida and Mexico.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 20.

The Bureau of Plant Industry reports that at Ebenezer, S. C., the commercial test of American wormseed (*Chenopodium anthelminticum*) resulted in an income comparing very favorably with that from standard crops in like conditions.—Ann. Rep. U. S. Dept. Agric., for 1906, p. 206.

Schimmel & Co. point out that the U. S. P. VIII quite correctly requires only approximate values for oil of chenopodium, as this oil is extremely variable owing to its content of a constituent which decomposes very readily; this also changes the specific gravity. They report having observed good commercial oils with a rotation up to 6°.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.-May, p. 72.

Brüning, H., discusses the use of oil of chenopodium as a vermifuge and reports experiments on animals and with various substances to determine its narcotic, albumen precipitating, antibacterial, and anthelmintic properties.—Ztschr. f. expt., Path. u. Therap., 1906, v. 3, pp. 564–587.

OLEUM CINNAMOMI.

Lyons, A. B., is quoted to the effect that the name "oil of cinnamon" has been retained for what is really oil of cassia, the justification of this being found in the fact that the oil is universally known by that name, while oil of Ceylon cinnamon, although of finer flavor, is practically unknown.—Bull Pharm. Detroit, 1906, v. 20, p. 38.

Schimmel & Co. point out that only the rectified oil of cassia will meet the requirements of the U. S. P. VIII, and that the upper limit of specific gravity should be 1.059.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 72.

Patch, E. L., says that oil of cassia can be found assaying the full amount of cinnamic aldehyde. All of the natural oil examined by him contained lead, coming from the lead container in which it was imported.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

Vanderkleed, Charles E., reports that many samples of cassia oil respond to the U. S. P. test for rosin, one was adulterated with petroleum.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Baird, J. W., reports seven samples examined in 1904, four adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

OLEUM CINNAMOMI ZEYLONICUM.

Schimmel & Co. give the following as being characteristic of Ceylon oil of cinnamon: Color, bright yellow; specific gravity at 15° C. 1.023 to 1.040, optical rotation slightly to the left, to $-1°$; aldehyde content between 65 and 76 per cent; soluble in 2 to 3 and more volumes of 70 per cent alcohol.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 90.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of cinnamon says alter details of the aldehyde assay and give minimum as 68 per cent.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

An unsigned critique of the Ph. Ndl. IV notes the requirement of 55 to 75 per cent of cinnamic aldehyde.—*Ibid.*, v. 68, p. 828.

Evans Sons Lescher and Webb report on the examination of several samples of cinnamon oil, and point out that the oils of commerce are still found to contain abnormal amounts of cinnamic aldehyde. They append a table showing the specific gravity, rotation, and eugenol and aldehyde content of 10 samples examined.—Analytical Notes, 1906, E., L. & W., Lond., 1907. p. 13.

The Ph. Brit. Committee of Reference in Pharmacy says assay process for cinnamon water is not required.—Chem. & Drug., Lond., 1906, v. 69, p. 862.

OLEUM COPAIBÆ.

Schimmel & Co. assert that the upper limit of specific gravity for authentic oil of copaiba may be run up to 0.915 at 25° C. They also point out that 1 volume of oil of copaiba requires from 5 to 10 volumes of 95 per cent alcohol for solution.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 73.

Brandel, I. W., reviews some of the literature relating to oil of copaiba, its preparation, properties, and composition.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 41.

Schimmel & Co. review the recent literature relating to oil of copaiba.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 28.

The Ph. Brit. Committee of Reference in Pharmacy points out that the description for oil of copaiba needs revision.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Smith, Kline & French Co. report on the examination of 2 samples of oil of copaiba having specific gravities of 0.901 and 0.896, and optical rotations of —19° 12′ and —17° 12′, respectively. They were both soluble in 8 parts of alcohol.—Lab. Rep., S., K. & F., 1906, p. 23.

OLEUM CORIANDRI.

Brandel, I. W., quotes Pancoast, who asserts that authentic specimens of oil of coriander had a specific gravity of from 0.869 to 0.872 and a dextrorotatory power of +10° 30′. A commercial sample quoted as " superior," at three times the price of ordinary oil, had a specific gravity of 0.873 and a dextrorotatory power of +12° 17′.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 112.

Schimmel & Co. point out that owing to its high price oil of coriander is frequently adulterated. They report on a sample, which had a specific gravity at 15° C. of 0.8752; rotation, +33° 29′; saponification number 5.5; and was insoluble in 70 per cent alcohol.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 28.

Evans Sons Lescher and Webb report that six samples of coriander oil from four reliable sources had specific gravity of from 0.871 to 0.875, and rotation of from +6° 30′ to +10° 44′, and that all were soluble in 3 volumes of 70 per cent alcohol.—Analytical Notes, for 1906, E., L. & W., Lond., 1907, p. 16.

Smith, Kline & French Co. report on the examination of 2 samples of oil of coriander having specific gravities of 0.901 and 0.869 at 15° C. One sample was not soluble in 10 parts of 70 per cent alcohol.—Lab. Rep., S., K. & F., 1906, p. 23.

OLEUM CUBEBÆ.

The Ph. Brit. Committee of Reference in Pharmacy points out that the optical rotation for oil of cubeb should be —30° to —40°.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

OLEUM ERIGERONTIS.

Henkel, Alice, mentions *Erigeron canadensis* L., also known as *Leptilon canadense* (L.) Britton, commonly known as Canada fleabane, horseweed, colt's tail, prideweed, and bitterweed, as being found in fields and meadows, along roadsides, and waste places almost throughout North America.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 28.

Rabak, Frank, discusses the properties of an oil obtained from fresh *Erigeron canadensis* and points out that our knowledge of this oil is exceedingly meager, but that for careful study commercial oil will not suffice.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 326.

Smith, Kline & French Co. report on the examination of 1 sample of oil of erigeron. The optical rotation was abnormal, being +69° 7′.—Lab. Rep., S., K. & F., 1906, p. 23.

OLEUM EUCALYPTI.

Schimmel & Co. point out that oil of eucalyptus has, occasionally, also a greenish shade. With regard to the cineol estimation they refer to their statement in connection with cajuput oil.—Semi-Ann. Rep., 1906, Apr.–May, p. 73.

Evans, John, says a due proportion of cineol is determined by observing the behavior of the oil when stirred with half of its volume of phosphoric acid (sp. gr. 1.75). Phellandrene is detected by the addition of glacial acetic acid and sodium nitrite, formation of a mass of insoluble crystals of phellandrene nitrite.—Apothecary, Boston, 1906, v. 18, p. 908.

McCrae, J. (Transvaal Agricultural Journal, v. 4, pp. 26–28) reviews the production of oil of eucalyptus and the mode of preparation. He points out that the Australian oil industry has progressed through taking care to produce a uniform quality of oil of eucalyptus.—Bot. Centralbl., Cassel, 1906, v. 101, p. 383.

Jackson, R. C., records a comparative study in the production of oil of eucalyptus from *Eucalyptus oleosa* and *Eucalyptus globulus*. He finds that the leaves of *E. oleosa* contain comparatively more oil than the leaves of *E. globulus*. Also records a study of the composition and properties of the oil. (From Amer. Soap. Journ.)—Chem. Report, Cöthen, 1906, v. 30, p. 37.

Baker and Smith discuss the characteristics of an oil of *Eucalyptus calophylla* and also of the oil of *Eucalyptus diversicolor*. (Oil and Color m. Journ., 1906, v. 29, p. 1795.)—*Ibid.*, v. 30, p. 266.

Schimmel & Co. direct attention to an article by H. G. Smith, (Jo. and Proc. of the Royal Soc. of N. S. Wales) in which he gives the indices of refraction and a few other properties of 118 authentic eucalyptus oils which, with few exceptions, had been distilled at the Technological Museum of Sydney from leaves of which the botanical origin had been determined by Baker.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 34.

Brandel, I. W., reviews some of the more recent literature relating to oil of eucalyptus, its properties, and composition.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 89.

Schimmel & Co. review some of the recent literature relating to oil of eucalyptus.—Semi-Ann. Rep., 1906, Oct.–Nov., pp. 35–38.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of eucalyptus says: Introduce assay process indicating not less than 55 per cent of eucalyptol. Specific gravity should be raised to 0.910.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Vanderkleed, Charles E., points out that of many samples of oil of eucalyptus examined but 2 assayed below the required 50 per cent of cineol: one sample only 22.5 per cent and one 43.6 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Patch, E. L., reports that a select oil, having a specific gravity of 0.916 at 25° C., assayed 65 per cent of cineol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

Ohliger, Willard, reports that a 50-lb. lot contained no cineol at all; the odor resembled that of a mixture of oils of rosemary and thyme. Other samples ran high in cineol, containing 60 to 65 per cent.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Evans Sons, Lescher and Webb, report on the examinations of amygdalina, citriodora, and globulus eucalyptus oils. Of 22 samples of the latter, the lowest recorded cineol content was 52 per cent, whilst the highest reached 79 per cent, the average being 68 per cent.—Analytical Notes, 1906, E., L. & W., Lond., 1907, p. 18.

A case of poisoning by oil of eucalyptus.—Pharm. J., Lond., 1906, v. 22, p. 651.

Eucalyptus as a poison (Chem. & Drug., Lond., 1906, v. 68, p. 2).—*Ibid.*, p. 17.

Smith, F. A. Upshur, reports a chemical examination of an oil of eucalyptus an overdose of which caused death. The oil is reported to have been an excellent sample of the cineol class that complied in every way with the official requirements.—Pharm. J., Lond., 1906, v. 22, p. 662.

OLEUM FŒNICULI.

Schimmel & Co. assert that oil of fennel with a satisfactory anethol content solidifies at +6° C. By abstracting a portion of the anethol the oil can be materially cheapened. They report examining an oil which only solidified at +1.7° C., and from which, consequently, the bulk of the anethol had been abstracted. Solidification must in case of need be introduced by inoculation with a small crystal of anethol. The lowest limit of the solidification point might suitably be +4°, as in commercial products it is usually found between +4° and +6° C.—Semi-Ann. Rep., 1906, Apr.–May, pp. 36, 74.

They point out that the specific gravity of oil of fennel is often as high as 0.977 at 15° C. (0.971 at 25° C.), though not heavier.—*Ibid.*, 1906, Oct.–Nov., p. 91.

They believe that in place of the Ph. Ndl. IV requirement for the separation and dissolving of crystals in oil of fennel a definite solidification point should be required.—*Ibid.*, Oct.–Nov., p. 86.

Brandel, I. W., reviews some of the recent literature relating to oil of fennel.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 113.

Schimmel & Co. report distilling a large quantity of Galician fennel to determine the composition of the low-boiling portions of fennel oil. In addition to pinene and dipentine, they have demonstrated the presence of camphene and *a*-phellandrene. Cymene, however, could not be detected.—Semi-Ann. Rep., 1906, Apr.–May, pp. 36–39.

Evans Sons Lescher and Webb, found the specific gravity of 3 samples of fennel oil of foreign distillation to be from 0.967 to 0.982, the rotation to be from +13° 54′ to +20° 30′, and the congealing point to be from about 0° C. to about 4° C.—Analytical Notes, 1906, E., L. & W., Lond., 1907, p. 19.

Caspari, Chas. E., reports 6 samples examined; 3 U. S. P.; 3 contained oil of fireweed.—Proc. Missouri Pharm. Ass., 1906, p. 103.

OLEUM GAULTHERIÆ.

Henkel, Alice, mentions *Gaultheria procumbens* L., commonly known as wintergreen, checkerberry, mountain-tea, teaberry, and deerberry, as being found in sandy soils in cool, damp woods, especially under evergreen trees, in Canada and the northeastern United States.—Bul. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 32.

Schneider, Albert, points out that the fruit of *Gaultheria myrsinitis* Hook. is much relished by the Indians as a food, likewise the fruit of *Gaultheria shallon* Pursh., but that it was not ascertained whether they were used for their medicinal effects. He states that they are closely related to the medicinal *Gaultheria procumbens.*—Merck's Rep., N. Y., 1906, p. 95.

Schimmel & Co. assert that natural oil of wintergreen is obtained from two different plants, *Gaultheria procumbens* L. and *Betula lenta* L. The two oils are of absolutely equal value.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 95.

Foster, Harold Day, presents an illustrated account of the production of oil of wintergreen, and points out that the production of duction of oil of wintergreen, and points out that the production of the oil from *Gaultheria procumbens* Linn. has been largely discontinued, owing to the great cost of gathering the plant in sufficient amounts. Almost all of the "natural oil" now on the market is obtained from the sweet birch.—Pharm. Era, N. Y., 1906, v. 35, pp. 188, 189.

The pharmacopœia makes the one distinction between Ol. gaultheriæ and Ol. betulæ, that the former is optically active up to −1°. Francis, John M., doubts the correctness of this statement, which he was unable to verify with oils which he had reason to believe were genuine. He states that while the two oils have the same constitution, the oil of gaultheria of commerce is oil of black birch.—Bull. Pharm. Detroit, 1906, v. 20, p. 141.

Lakey, R. H., quotes a correspondent, who asserts that oil of wintergreen from wintergreen leaves is obtainable, but the supply is small and the demand is small. The article actually supplied when oil distilled from wintergreen leaves is ordered is an oil of birch.—Proc. Pennsylvania Pharm. Ass., 1906, p. 117.

Schimmel & Co., assert that oil of wintergreen is frequently found to have a reddish color, owing to traces of iron.—Semi-Ann. Rep., 1906, Apr.–May, p. 77.

Price and Engle (Am. J. Med. Sci.) report a fatal case of poisoning by oil of wintergreen in a 2-year-old child.—Jahresb. u. Tier. Chem., 1906, Wiesb., 1907, v. 36, p. 795.

OLEUM GOSSYPII SEMINIS.

Francis, John M., comments on the difficulty of obtaining a fine grade of sweet, bleached cotton seed oil and on the lack of knowledge of its value in pharmacy and of the variation in quality of the various brands. He advises the purchaser to specify "winter white" or bleached oil and to criticise the color and odor very sharply.—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

Schwartz, David, describes the cotton seed oil industry of the South, the method of making the oil, and the uses to which it is put.—J. Am. Chem. Soc., 1906, v. 28, pp. 430–433.

An editorial reviews the economic conditions prevailing in the cotton seed oil market and presents a table giving high and low quotations for this oil during the past three years.—Oil, Paint, and Drug Rep., 1906, v. 70, Nov. 26, p. 7.

Kühn and Bengen make a contribution to the knowledge of the Halpen reaction for cotton seed oil, discuss the varying conditions under which the reaction fails, and point out that in the examination of land suspected of being adulterated with cotton seed oil it is advisable to use the phytostearin acetate test.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 145–153.

Petlow, N. (Ztschr. öffentl. Chem., 13, 1907, No. 2, pp. 21–25), reports studies of the Halphen and Becchi reactions, and asserts that the two reactions are believed not to be dependent upon the same substance, but that the two tests are considered necessary in determining the presence of cotton seed oil, inasmuch as certain samples do not respond equally well to both tests.—Exper. Sta. Rec., 1906, v. 18, p. 709.

Smith, Kline & French Co. report the results of the examination of 10 samples of cotton seed oil.—Lab. Rep. S., K. & F., 1906, p. 16.

OLEUM HEDEOMÆ.

Henkel, Alice, mentions *Hedeoma pulegioides* (L.) Pers., commonly known as hedeoma, American pennyroyal, tickweed, and squawmint, as growing in barren woods and dry fields, Nova Scotia to Minnesota, south to Nebraska and Florida.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 35.

OLEUM HYOSCYAMI COMPOSITUM N. F.

Kreytschy, Ottakar, suggests an improved method for the preparation of oil of hyoscyamus. The formula is given.—Pharm. Ztg., Berl., 1906, v. 51, p. 17.

Lefeldt, Max, suggests that an "Oleum Hyoscyami" Ph. Germ., much richer in alkaloids may be obtained by mixing 100 gm. of the coarsely ground hyoscyamus leaves with 75 gm. of alcohol and 3 gm. of aqua ammonia. Allow to stand for twenty-four hours in a closely covered vessel, then mix with 1,000 gm. of olive oil, with repeated stirring, until the alcohol and the ammonia have been completely dissipated.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 340.

Philipp Röder, Wien, outlines a method of assay for Oleum Hyoscyami (for which 500 gm. of the preparation are required) and reports the examination of three samples which contained 0.0028, 0.0198, and 0.0245 per cent of alkaloid, respectively.—Pharm. Post, Wien, 1906, v. 39, p. 283.

OLEUM JUNIPERI.

Henkel, Alice, mentions *Juniperus communis* L., commonly known as juniper, as being common on dry, sterile hills from Canada south to New Jersey, west to Nebraska, and in the Rocky Mountains to New Mexico.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 40.

Kubart, Bruno, (Sitzungsber, Kais. Akad. Wiss. Wien) discusses the morphology of the female flower of *Juniperus communis* L. and also points out some of the relations existing between the various Coniferæ.—Bot. Jahrb. Engler, 1906, v. 37, pp. 45, 46.

Francis, John M., thinks our revisers have labored under serious disadvantages in attempting to outline specifications for juniper oil; much of that sold in the United States will not meet the pharmacopœial requirements. The tests given will not protect the purchaser, who must rely upon the probity of his dealer.—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

Hanson and Babcock report some observations on the oil of *Juniperus communis.* The oil was obtained in a yield of 0.18 per cent and a second distillation of 0.15 per cent. The specific gravity of the oil was 0.8531 at 20° and was of a light yellow color and characteristic juniper odor.—J. Am. Chem. Soc., 1906, v. 28, p. 1201.

Schimmel & Co. point out that oil of juniper berries is frequently lighter; a lowest limit of 0.854 would be more suitable. The specification of solubility is mostly only answered by quite fresh distillates; even when kept in a rational manner the solubility of oil of juniper berries diminishes rapidly.—Semi-Ann. Rep., 1906, Apr.–May, p. 74.

Evans Sons Lescher and Webb report the examination of a sample of juniper berry oil which had a specific gravity considerably higher than the Ph. Brit. IV limit. Seven samples of foreign origin are reported on which had specific gravity of from 0.861 to 0.869, and rotation of from —2° 10′ to —16° 30′; only one of these samples was soluble in 4 volumes of 95 per cent alcohol.—Analytical Notes, 1906, E., L. & W., Lond., 1907, p. 22.

Smith, Kline & French Co. report the results of the examination of 14 samples of oil of juniper berries in which the sp. gr. ranged from 0.8585 to 0.8703 at 15° C., the optical rotation from —0° 55′ to —12° 28′, and 8 were insoluble in 95 per cent alcohol, the other 6 soluble. They point out that it is said that oil of juniper berries is adulterated with Hungarian oil, which is a by-product in the manufacture of gin.—Lab. Rep., S., K. & F., 1906, p. 43.

OLEUM LAVENDULÆ FLORUM.

Schimmel & Co. quote A. Baudot, who asserts that so far back as 1371 the Duchess of Burgundy had lavender stalks planted in the garden of the Castle of Rouvres and attempted at the same time the cultivation of lavender by sowing out seed.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 42.

Umney, John C., illustrates and describes the distillation of lavender.—Brit. & Col. Drug., Lond., 1906, v. 50, p. 255.

Birckenstock, A., (Monit Scient. 1906, v. 20, pp. 352–356) states that some specimens of lavender oil, obtained from the French and Italian Alps, showed a sp. gr. of 0.878 to 0.8829, optical rotation, —8° to —9°; they contained about 50 per cent of *l*-linalool and 20–30 per cent of linalyl acetate.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 495.

Schimmel & Co. discuss some of the economic conditions prevailing in connection with oil of lavender and review the more recent literature.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 42–45. (See also Apr.–May, p. 42.)

Lackey, R. H., quotes a correspondent who asserts that there is a demand for "cheap" oil of garden lavender, which is another word for "adulterated" oil. We supply this grade of oil on demand and mark it "Compounded."—Proc. Pennsylvania Pharm. Ass., 1906, p. 117.

Bennett, C. T., reports ethyl citrate to be the latest ester used as an adulterant of lavender oil.—Chem. & Drug., Lond., 1906, v. 69, p. 691.

See also a note by Charles Alex. Hill calling attention to the futility of guarantees given in respect of commodities, such as this oil, that they are "Ph. Brit."—*Ibid.*, v. 69, p. 732.

Caspari, Chas. E., reports three samples examined—2 U. S. P., 1 too low in ester content (21 per cent).—Proc. Missouri Pharm. Ass., 1906, p. 103.

Gane, E. H., reports that three lots of oil of lavender had a specific gravity of from 0.870 to 0.890 and were not up to the U. S. P. limit of solubility.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

OLEUM LIMONIS.

Coumbe, C. W., (Ice Cream Trade J.) discussing in a very general way the production of lemon oil, attributes the great variations to differences in soil, location, and temperature, rather than to adulteration.—Spatula, Boston, 1906, v. 12, pp. 817–819.

A second article by the same author on lemon and orange oils and substitutes.—*Ibid.*, v. 12, pp. 889–891.

Francis, John M., thinks the introduction of an exact method of valuation by assay is a most welcome improvement, as it does not seem possible to control oil of lemon, nor that of sweet orange peel, by physical constants, solubility, etc. Much of the oil of lemon sold will not meet the assay requirements.—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

Schimmel & Co. assert that they have tested the assay for citral as given in the U. S. P. VIII, and have come to the conclusion that really exact determinations are not possible by this method, which they therefore characterize as unreliable. They also criticise the limit of optical rotation, as originally given, and point out that according to their experience the difference in the angle of rotation of the distillate from pure oils frequently amounts to 5°.—Semi-Ann. Rep., 1906, Apr.–May, p. 74.

They assert that the specific gravity of oil of lemon fluctuates between 0.857 and 0.861 at 15° C. The highest permissible rotation is +65. The vegetable wax-like constituents in oil of lemon generally prevent the formation of a clear solution with alcohol.—*Ibid.*, Oct.–Nov., p. 86.

Chace, Edward MacKay, outlines a method for the determination of citral in lemon oils and extracts which depends on the recoloration of a solution of fuchsin in sulphurous acid, the essential point in using the method being to keep the temperature of the reagents and the comparison tubes down to at least 15° C.—J. Am. Chem. Soc., 1906, v. 28, pp. 1472–1476.

Heinrich Haensel enumerates the following classes of bodies as having been discovered in oil of lemon: (1) Hydrocarbons: pinene, limonene, phellandrene, and a sesquiterpene. (2) Alcohols: geraniol, terpineol, melting at 34° C., and linalool. (3) Esters: geranyl acetate, anthranillic acid methyl ester, linalyl acetate. (4) Aldehydes: octyl and nonyl aldehydes, citral, and citronellal. (5) Ketones: methylheptenone. (6) Lactones: 1. 4 dimethyloxy coumarin. The bearers of the aroma of the oil are more particularly contained in classes 2, 3, 4, and 5.—Half-Yearly Rep., Oct., 1906, pp. 11–13.

Brandel, I. W., reviews some of the literature relating to oil of lemon, its preparation, composition, and examination.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 44, 45.

Caspari, Chas. E., reports one sample examined; contained only 2 per cent citral.—Proc. Missouri Pharm. Ass., 1906, p. 104.

Baird, J. W., reports 35 samples examined in 1904, 30 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Blome, W. H., reports that of two samples of oil of lemon one contained 1.88 per cent of citral and the other none at all.—Proc. Michigan Pharm. Ass., 1906, p. 107.

Matzel, R., (Arch. internat. de pharmacod. et de thérap., 1906, v. 5, p. 331) asserts that citral, an ethereal oil with an open chain has, on inhalation, a paralysant action.—Abstr. Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 138.

OLEUM LINI.

Thaysen, H., discusses the congealing point and the specific gravity of linseed oil. He concludes that the congealing point, —20° C., given by most pharmacopœias is too low and should be changed to —16° C. He also calls attention to the remarkable specific gravity required in the U. S. P. VIII, 0.925 to 0.935 at 25° C., which is lower than the requirements of other pharmacopœias at 15° C., as a linseed oil with a specific gravity of 0.9313 at 15° C. showed a specific gravity of 0.9274 at 25° C. A sample of linseed oil made by cold compression from select linseed had a specific gravity of 0.9323 at 15° C. and congealed at —17° C.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, pp. 277–279.

Thoms and Fendler present a study of linseed oil with particular reference to the unsaponifiable matter.—Chem. Ztg., Cöthen, 1906, v. 30, p. 832.

An editorial reproduces the high and low quotations for linseed oil that have been quoted during the several months of the years

1903 to 1906, inclusive.—Oil, Paint and Drug. Rep., 1906, v. 70, Nov. 26, p. 7.

Loomis, Henry M., presents some notes regarding adulteration of linseed oil and outlines several tests for the detection of mineral oils.—Chem. Eng., 1906, Phila., 1907, v. 5, pp. 205–206.

Thomson and Dunlop have determined the iodine value of linseed oil and of related oils by Wijs' method and record their results with this and other constants of the several oils.—Analyst, Lond., 1906, v. 31, p. 282.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the monograph for linseed oil be revised, introducing iodine and saponification values.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Smith, Kline & French Co. report the results of the examination of 10 samples of linseed oil.—Lab. Rep., S. K. & F., 1906, p. 18.

OLEUM MENTHÆ PIPERITÆ.

Henkel, Alice, discusses the production of oil of peppermint, the source, and the countries where grown.—Western Druggist, 1906, v. 28, pp. 130–134.

Schimmel & Co. discuss the original requirements for oil of peppermint at some length and point out that the Michigan oil rotates between —18° and —29°. They also assert that oil of peppermint is not always colorless, but sometimes is distinctly yellowish or greenish yellow.—Semi-Ann. Rep., 1906, Apr.–May, p. 75.

They point out that the specific gravity for oil of peppermint in the Ph. Ndl. IV, 0.900 to 0.920, at 15° C., admits both the American and English oils.—*Ibid.*, Oct.–Nov., p. 87.

Francis, John M., thinks that the requirement that oil of peppermint shall be a " colorless liquid " is wholly unnecessary and adds to the expense, if it be intended thereby to exclude the yellowish domestic oil, which is obtainable in fine quality and at a less price. Many Michigan and New York farmers, who produce a limited quantity of very fine oil of peppermint, are not familiar with the expedient of washing with water acidulated with tartaric acid, which works wonders with the dark oil. This oil improves with age for some time, and even the very best when quite fresh has a characteristic " weedy " odor.—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 449.

Gane, E. H., points out that the U. S. P. requirement of not less than 8 per cent of ester is too rigid and excludes the finest grades of oil that contain 4 to 6 per cent. Presumably the object of the test is to exclude the Japanese oil, which runs from 3 to 6 per cent, but it also excludes the finest Mitcham and Saxony oils.—*Ibid.*, v. 54, p. 342.

The Ph. Brit. Committee of Reference in Pharmacy report on oil of peppermint says: Foreign oils, other than Japanese, which is excluded by the description, should be official, and free and combined menthol determined.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Brandel, I. W., reviews some of the more recent literature relating to oil of peppermint of French, English, and Japanese origin.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 118.

Schindelmeiser, J., discusses the physical and chemical properties of Russian oil of peppermint.—Apoth. Ztg., Berl., 1906, v. 21, pp. 927–928.

An editorial, commenting on some American oil of peppermint not of first quality, notes that one of the causes of superiority of English oil of peppermint is the incessant weeding and hoeing of the crops. On some of the American farms great care is also taken; but there is no doubt that many crops are allowed to grow without this needful precaution, and the result is noticeable at once in the flavor of the distillate.—Chem. & Drug., Lond., 1906, v. 69, p. 897.

An editorial gives tabulated statements of the peppermint crops in Japan, exports and total value thereof of menthol and peppermint oil for the years 1902–1906.—*Ibid.*, v. 69, p. 717.

Gehe & Co. discuss economic conditions prevailing in the market for American and Japanese oil of peppermint, including a consideration of the production, export, and price of the oil.—Handels-Ber., Gehe & Co., 1906, p. 41.

An editorial discusses the economic conditions and the probable shortage in the yield of oil of peppermint and gives the highest and lowest prices for oil of peppermint for the years 1873 to 1906, inclusive.—Oil, Paint and Drug. Rep., 1906, v. 69, Apr. 16, p. 7.

Schimmel & Co., discuss some of the economic conditions prevailing in regard to oil of peppermint.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 50; Oct.–Nov., pp. 52–59.

Patch, E. L., reports on six lots of oil of peppermint which contained from 24.86 to 60 per cent of total menthol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 342.

Baird, J. W., reports three samples examined in 1904, one adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

See also under Mentha Piperita.

OLEUM MENTHÆ VIRIDIS.

Schimmel & Co. report on two samples of Russian oil of spearmint, the specific gravity and optical rotation of which are lower than the American and German distillates. They conclude that the Russian oil can scarcely be regarded as a substitute for the American oil of spearmint.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., p. 73.

Smith, Kline & French Co. report on the examination of two samples of oil of spearmint having specific gravity of —34° 30′.—Lab. Rep. S. K. & F., 1906, p. 24.

See also under Mentha Viridis.

OLEUM MORRHUÆ.

Schelenz, Hermann, discusses the etymology of *Gadus morrhua* and the introduction of the oil as a medicine.—Pharm. Zentralh., 1906, v. 47, pp. 165, 166.

An unsigned article presents some interesting data relating to the history of cod-liver oil in Newfoundland.—Oil, Paint and Drug Rep., 1906, Jan. 22, p. 39.

Tolman, L. M., presents the results of an exhaustive study of American cod liver oils and points out that the standards of the U. S. P. VIII, which are satisfactory for the Norwegian oils, are not applicable to the American oils. The latter are liable to show more variation and the U. S. P. nitric acid test is liable to give misleading results with many pure cod liver oils of American origin.—J. Am. Chem. Soc., 1906, v. 28, pp. 388–395.

Weigel, G., comments on the condition of the cod liver oil market and reviews the tests and reactions that are in use.—Pharm. Zentralh., 1906, v. 47, p. 890.

Wiebelitz, H., suggests that in place of using litmus paper as suggested in the pharmacopœia, the use of one-tenth normal potassium hydroxide solution is preferable for determining the limit of acidity.—Pharm. Ztg. Berl., 1906, v. 51, p. 1004.

Vreven, S., (Anal. de Pharm., 1906–7) describes a new color reaction of cod liver oil by treating with a mixture of ether and alcohol and a subsequent addition of fuming nitric acid.—Apoth. Ztg., Berl., 1906, v. 21, p. 352.

Bull, Henrick, (Chem. Ber., 1906, v. 39, pp. 3570–3576) reports experiments in the separation of the fatty acids of cod liver oil by fractional vacuum distillation.—Biochem. Centralbl. Leipz., 1906–7, vol. 5, p. 881.

Madsen, Fred. V., discusses the examination of cod liver oil and the determination of the several constants required.—Arch. f. Pharm. og Chem., Copenhagen, 1906, v. 13, pp. 7–9, 17–22, 34–38, 49–55.

Thomson and Dunlop have shown that the refractive index has no independent value as a test of the purity of cod liver oil, and now describe experiments to show that it throws no additional light on the effect of oxidation.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 272.

An editorial discusses the article by Thomson and Dunlop and calls attention to the differences in the iodine number of cod liver oil and seal oil as recorded by a number of observers.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 46.

Evans Sons Lescher and Webb report the results of several tests with the oleo-refractometer of samples of cod liver oil and point out that during times of great scarcity the refractive figure fluctuates in commercial oils between wide limits—Analytical Notes, for 1906, E. L. & W., Lond., 1907, p. 15.

Smith, F. A. Upshur, reports a comparative test of the keeping qualities of cod liver oil in white and dark amber bottles. After eighteen months the oil in the white bottle was found to be bleached and rancid, while the oil in the amber bottle had retained both the color and the characteristic odor of cod liver oil.—Pharm. J., Lond., 1906, v. 22, p. 84.

An editorial discusses the probable production of cod liver oil for 1906, and presents a table showing the yield and the price of Norwegian oil for the past twelve years.—Oil, Paint, and Drug. Rep., 1906, v. 69, May 21, p. 7.

For a review of the cod liver oil situation at the end of the catch, see *Ibid.*, v. 70, July 2, p. 7.

Gehe & Co. discuss the production of cod liver oil in Lofoten and Finnmarken, and give tables showing the number of fish caught and the amount of oil produced during the years 1901 to 1905, inclusive.—Handels-Ber., 1906, pp. 39–41.

Munn, W. A., of St. Johns, Newfoundland, writes that the past season has been a very quiet one, and reports the quantity of oil produced in the years 1902 to 1905, inclusive.—Chem. & Drug., Lond., 1906, v. 68, p. 31.

Stein, V., (Oesterr. Apoth. Ztg.) suggests that a cod liver oil prepared by the merchants of Iceland promises to be even more desirable than the oil made in Norway. He finds the following constants: Specific gravity at 15° C., 0.923; iodine number, 137.5; saponification number, 183; free acid (as oleic acid), 0.33 per cent. On cooling to 0° C. the oil remained clear.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 137.

Kreis, Hans, reports on a number of samples of fish oils obtained from Bergen, Norway. The study includes the determination of the specific gravity, refraction number, iodine number, and acid number of the several oils and their behavior with a number of reagents.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 721–725.

Caspari, Chas. E., reports 17 samples examined: Nine U. S. P., eight contained other fish oils.—Proc. Missouri Pharm. Ass., 1906, p. 104.

Baird, J. W., reports 29 samples examined in 1904, seven adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Fernan, Albert, asserts that not one of the 8 samples of cod liver oil examined reacted to the Kremel test with fuming nitric acid.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, p. 80.

Dieterich, Karl, reports examining 18 samples of cod liver oil. The saponification number varied from 181.10 to 205.12, and the iodine number from 129.9 to 148. Nine of the 18 samples were objected to.—Helfenberger Annalen, 1905–6, v. 18, p. 74.

A contributor to the "Pharmacology" column calls attention to the fraud and deception practiced in connection with so-called "fat-free cod liver oil" preparations which contain no oil.—J. Am. M. Ass., 1906, v. 47, p. 1207.

Ritter, John, calls attention to the fact that many preparations which are said to represent the value of a given amount of cod liver oil, do not in reality contain any cod liver oil.—*Ibid.*, v. 47, p. 684.

Van den Burg, William H., says the old fashioned remedy, cod liver oil, is still applicable to many cases who can digest and assimilate fat. It occupies the place of a nutriment rather than a remedy.—Trans. Am. Inst. Homœop., 1906, 62d sess., p. 397.

OLEUM MYRISTICÆ.

Spaeth, Edward, suggests that nutmegs be required to be uninjured and to contain not more than 3.5 per cent of ash, or 0.5 per cent insoluble in hydrochloric acid.—Südd. Apoth. Ztg., 1906, v. 46, p. 168.

Labroy, O., reports that the quality of nutmeg is so improved by grafting that instead of yielding 110 to 120 to the pound the trees bear nuts so heavy that 60 are sufficient to make the same weight.—J. d'agric. trop. Par., 1906, v. 6, p. 15.

Rusby, H. H., has seen nutmegs that were poor, wormy, and worthless.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Schimmel & Co. point out that the upper limit for the specific gravity of oil of nutmeg should be 0.930 at 15° C. (0.924 at 25°).—Semi-Ann. Rep., Schimmel & Co., 1906, Oct.–Nov., p. 91.

Smith, Kline & French Co. report on the examination of one sample of oil of nutmeg which was within the U. S. P. limitations.—Lab. Rep., S. K. & F., 1906, p. 24.

OLEUM OLIVÆ.

The Ph. Brit. Committee of Reference in Pharmacy points out that the monograph for olive oil requires complete revision.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Degrully, L., (Ann. Ecole Nat. Agric., Montpellier, n. ser., 6, 1906, No. 2, pp. 90–160, figs. 15) presents an extensive account of the propagation and culture of olives.—Exper. Sta. Rec., 1906, v. 18, p. 443.

Lefeldt, Max., suggests that the Ph. Germ. require the determination of the acid number of olive oil, which, he says, should not exceed 3.7 per cent. Outlines a method for making the determination.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 340.

Bell, J. Carter, believes that additional tests should be provided so as to insure the purity of olive oil.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 549.

Thomson and Dunlop record a number of experiments conducted to determine the several constants of olive oil and present a series of iodine values determined by the Wijs method.—Analyst, Lond., 1906, v. 31, pp. 281–284.

Blarez, Ch., outlines a method for demonstrating small quantities of peanut oil in olive oil.—Bull. Soc. d. pharm. de Bordeaux, 1906, v. 46, pp. 295, 296.

Utz suggests that, in addition to cotton seed oil, olive oil be tested for contamination with sesame and peanut oils.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Spaeth, Edward, asserts that in testing olive oil for contamination with sesame oil it should be remembered that a pure olive oil may give a moderate red coloration with furfurol and hydrochloric acid.—Südd. Apoth. Ztg., 1906, v. 46, p. 136.

An extract (from Industria quimica, 1905, p. 634) says that olive oil extracted with carbon disulphide always contains sulphur or one of its compounds, which, by saponification, is transformed partially into hyposulphite. The abstract gives the method of detecting these compounds.—Abstr. in Ann. de chim. analyt., Par., 1906, v. 11, p. 193. (Claimed by Halphen, *Ibid.*, v. 11, p. 223.)

Passerini, Nap., (Staz. sperim, agr. ital., v. 28, p. 1033; from Apoth. Ztg., 1906, p. 698) concludes that copper is found naturally in olive oil and that the proportion is not increased by the action of boiling with copper.—J. de pharm. et de chim., Par., 1906, v. 24, p. 321.

Dieterich, Karl, reports on a total of 49 samples of olive oil, from various sources, and notes the variation in the iodine number, the acid number, and the results of the elaidin test.—Helfenberger, Annalen, 1905, 1906, v. 18, pp. 77–79.

Evans Sons Lescher and Webb have examined 40 samples of olive oil from various districts which have afforded the usual constants. Several of the cheaper qualities of Bari oil gave the Baudouin reaction for sesame oil when used in the ordinary way, but negative results were obtained, working on the fatty acids. One or two lots of green oil contained large amounts of free fatty acid which ranged from 12 to 18 per cent.—Analytical Notes, for 1906–7, E. L. & W., Lond., 1907, p. 25.

Barnard, H. E., reports that of 188 samples of olive oil examined, 56, or 29.8 per cent, were adulterated. Many of the druggists' samples of olive oil have been found to be pure cotton seed oil, otherwise known to the trade as "sweet oil."—Rep. Indiana Bd. Health, 1906, pp. 294–297.

Rickle and Kurtz report on 3 samples obtained in bulk in the open market; all 3 responded to the test for cotton seed oil and 1 to that for sesame oil as well.—Proc. Indiana Pharm. Ass., 1906, p. 119.

Leach, Albert E., reports that 3 samples of olive oil were found which contained a large mixture of sesame oil, 4 samples contained an admixture of cotton seed oil, and 14 samples, sold as olive oil, were found to be cotton seed oil.—Rep. Massachusetts Bd. Health, 1906, p. 400.

Gane, E. H., reports finding 6 samples containing cotton seed oil and 3 samples containing peanut oil.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 342.

La Wall, C. H., examined 64 samples of olive oil; 31 were pure, 28 contained cotton seed oil, and 5 sesame oil.—*Ibid.*, v. 54, p. 342.

Baird, J. W., reports 30 samples examined in 1904, 3 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Caspari, Chas. E., reports 10 samples examined; 9 U. S. P.; 1 contained cotton seed oil, and 5 sesame oil.—*Ibid.*, v. 54, p. 342. p. 104.

Blome, W. H., found 2 samples consisting largely or entirely of cotton seed oil.—Proc. Michigan Pharm. Ass., 1906, p. 104.

Thurston notes that olive oil is being adulterated with cotton seed and peanut oils. About one-third of the samples examined were found to be adulterated. He quotes Lewkowitsch's warning as to the ingenuity of the adulterators in using a mixture of several oils.—Proc. Ohio Pharm. Ass., 1906, p. 70.

An editorial quotes the results of the analyses of A. McGill, of the Canadian inland revenue department. Out of 108 samples purchased 66 were genuine olive oil, 2 doubtful, 24 were cotton seed oil sold as salad oil, and 16 the same sold as olive oil. The analytical results are summarized.—Chem. & Drug., Lond., 1906, v. 68, p. 646.

An abstract discusses the advantages of the olive oil solutions of alkaloids for use as collyria. Among the advantages claimed for oil solutions the abstract asserts that they are readily applied, their tolerance is remarkable, their action is more rapid, more intense, and more prolonged than aqueous solutions.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 56–58.

Lambert, Alexander, outlines Cohnheim's method of treating gastric ulcer with olive oil.—J. Am. M. Ass., 1906, v. 47, p. 847.

OLEUM PICIS LIQUIDÆ.

Patch, E. L., points out that oil of tar varies in physical properties. The pharmacopœia indicates the light oil of tar. Considerable of the heavy oil of tar having a specific gravity of 1.04 and over, very thick and dark colored, is being marketed in place of the light oil.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.

OLEUM PIMENTÆ.

Schimmel & Co. point out that the lower limit for specific gravity of oil of pimenta is still too high, and should be 1.018.—Semi-Ann. Rep., 1906, Apr.–May, p. 75.

The Ph. Brit. Committee of Reference in Pharmacy would require 65 per cent of eugenol in oil of pimenta by potash method.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Brandel, I. W., presents a review of some of the literature relating to oil of pimenta, its properties and composition.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 86.

Smith, Kline & French Co. report on the examination of 3 samples of oil of pimenta, all of which were within the U. S. P. limitations.—Lab. Rep., S. K. & F., 1906, p. 24.

OLEUM ROSÆ.

Lloyd, John Uri, describes a visit to the country where attar of roses is distilled, in the valley of roses at the foot of Mount Olympus; also describes the method of growing and collecting roses, and the making of the oil.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 351–352.

Wolf, J. C., discusses the preparation of attar of rose and its adulteration with geranium oil.—Proc. Maryland Pharm. Ass., 1906, pp. 66–69.

An editorial discusses the marketing of oil of rose in Bulgaria and presents figures showing the origin of the oil and the amount produced. The total yield for 1906 is given as 3,761 kilos.—Oil, Paint, and Drug Rep., 1906, v. 70, July 16, p. 7.

London Essence Co.'s report, March, 1906, states that an otto of rose, distilled in a special manner in Bulgaria, was found to contain a large amount of phenylethyl alcohol. Its characteristics were: Sp. gr. (30°/15°), 0.884; optical rotation, −2°; congealing point, 18.5° C.; m. pt., 19° C.; content of stearoptene (m. pt. 35.5°), 9 per cent; ester value, 81.6; alcohol value, 236.4; iodine value, 157.2. The otto appears in no way inferior to those free from phenylethyl alcohol.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 495.

A review of the export of attar of roses from Bulgaria.—*Ibid.*, v. 25, p. 952.

Brandel, I. W., reviews some of the literature relating to oil of rose, its production, properties, and composition.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 15–16, 39–40.

Schimmel & Co. assert that the U. S. P. VIII upper limit for specific gravity of oil of rose is too low and should be 0.867, at 25° C. The upper limit for the congealing point, they believe, might be 23.5° C., and they assert that they have observed pure oils with saponification numbers ranging from 8.5 to 19.—Semi-Ann. Rep., 1906, Apr.–May, p. 75.

They point out that the limits for the specific gravity of oil of rose, at 30° C., are 0.849–0.862.—*Ibid.*, Oct.–Nov., p. 87.

Parry, Ernest J., says from the experience of many years' crops and from samples taken from all over the rose-gathering areas he is convinced that a pure otto of rose never (that is, when distilled in normal Bulgarian fashion) has a specific gravity over about 0.855. It usually falls between the limits 0.850 and 0.853 at 30° C., and anything over this is at once suspicious.—Chem. & Drug., Lond., 1906, v. 69, p. 230.

Francis, John M., says it is well to remember that while the finer brands of synthetic otto of rose are splendidly fitted to be used with the natural oil they are not by any means fit substitutes, and he who forgets this will come to grief with his cherished cream or lotion.—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

Schimmel & Co. discuss the production of oil of rose in Bulgaria, and the efforts that are being made to increase the cultivation and the yield of oil of rose and to control adulteration.—Semi-Ann. Rep., Schimmel & Co., 1906, Oct.–Nov., pp. 65–67.

Simmons, W. H., reports meeting with two samples of oil of rose contaminated with ethyl alcohol. As in both cases only a very small quantity of alcohol was present, he is inclined to believe that it was an accidental rather than an intentional contamination.—Chem. & Drug., Lond., 1906, v. 68, p. 20.

OLEUM ROSMARINI.

Schimmel & Co. point out that they have met with good oil of rosemary with an ester content as low as 1.2 per cent and a total content of borneol down to about 10 per cent.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 75.

Gane, E. H., asserts that the pharmacopœial requirements are too high, as evidenced by the fact that no oil of U. S. P. standard is obtainable in the New York market. Reports on 5 samples which were found to contain from 2 to 2.6 per cent of ester and from 8 to 12.6 per cent of total borneol.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 342.

Brandel, I. W., reviews some of the more recent literature relating to oil of rosemary.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 116.

Parry and Bennett discuss the cause of lævorotatory action of the Spanish rosemary oil, and give the result of experiments which prove beyond a doubt that a lævorotatory oil is consistent with purity. They also mention the parts of the plant used, when gathered, etc.—Chem. & Drug., 1906, v. 68, p. 671.

See also the poetical version, *Ibid.*, v. 68, p. 694.

Parry has examined a number of other authentic specimens which were found to have optical rotations of +12° to +18°, so that it is evident that the figures for this oil are in need of great revision.—*Ibid.*, v. 69, p. 137.

Birckenstock, A., (Monit. Scient., 1906, v. 20, pp. 352–356) states that French oil of rosemary is generally considered pure only when the head fraction (10 per cent) is dextro-rotatory. It is shown, however, that when rosemary is distilled at the beginning of the season (April–June) the first 10 per cent of the oil distilling over is always lævorotatory.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 495.

Schimmel & Co. discuss some of the economic conditions prevailing in connection with oil of rosemary and review the recent literature.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 67–70.

Blome, W. H., assayed two samples, 2.15 per cent of ester calculated as bornyl acetate and 8.84 per cent total borneol; 10.56 per cent ester and 15.34 per cent borneol.—Proc. Michigan Pharm. Ass., 1906, p. 107.

Caspari, Chas. E., reports one sample examined: Contained too little borneol and bornyl acetate.—Proc. Missouri Pharm. Ass., 1906, p. 104.

OLEUM RICINI.

The Ph. Brit. Committee of Reference in Pharmacy report on oleum ricini says: Revise the monograph completely, introducing saponification and iodine values and excluding or revising the sulphuric acid test.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Peckolt, Th., mentions several varieties of *Ricinus communis* (Müll. Arg.) that have been developed in Brazil. For the preparation of the oil *Ricinus brasilienis* and *Ricinus microcarpus* are chiefly used. The oil is largely used for lubricating and for burning, in addition to its use in medicine.—Ber. d. deut. pharm. Gesellsch., 1906, v. 16, pp. 34–36.

Halenke and Kling (Landw. Vers. Stat., 64, 1906, No. 1, pp. 51, 86, figs. 13) summarize the available data regarding the histology of castor-bean seed, the composition of the seeds and by-products, castor-bean products as adulterants, and other questions.—Exper. Sta. Rec., 1906, v. 18, p. 168.

Liebreich, O., discusses the history and uses of castor oil and reports on a sample of Caucasian oil that was at least 8 years old. He found the specific gravity to be 0.9632 at 17.5° C., the iodine number 84.3, the saponification number 173.7, and the acid number 3.6.—Therap. Monatsh. Berl., 1906, v. 20, p. 444.

Spiegel, L., discusses the chemistry of ricin and quotes Maquenne and Philippe as giving the melting point 201.5 and the formula $C_8H_8N_2O_2$.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 164.

Dieterich, Karl, reports on 14 samples of castor oil. The iodine number was found to vary from 82.47 to 86.28; the acid number varied from 1.68 to 5.04. Five of the 14 samples were objected to as not complying with the requirements.—Helfenberger Annalen, 1905, 1906, v. 18, p. 80.

Baird, J. W., reports 37 samples examined in 1904, 2 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Cline, R. R. D., suggests washing castor oil to free it from the objectionable odor and taste. He uses 2 or 3 per cent solution of common table salt, repeating until the oil is practically free from odor. He suggests treating the oil with exsiccated calcium sulphate to absorb the retained water.—Texas Pharm. Ass., 1906, p. 17.

Moore, J. B., presents suggestions for disguising the taste of castor oil and discusses the methods of preparing agreeable mixtures containing this oil.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 237–242.

An answer to a correspondent presents several formulas for mixtures of castor oil and also a number of references to previous publications on the same subject.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 135.

An editorial calls attention to the use of the well-known "sarsaparilla method" of disguising castor oil, and states that anisette has been found useful for this purpose.—N. York M. J., 1906, v. 84, p. 138.

Bierbaum, K., (Dessertation Giessen, 1906) questions the very poisonous character which *Ricinus communis* has hitherto been supposed to possess. He gave as much as 100 gm. per day to a horse without any ill effect. He is now studying the differences of resistance in animals of the same kind.—Abstr. in Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, p. 211.

Watkins says ricinus is the remedy when we desire a movement of the bowels not followed by diarrhœa.—Eclectic Med. J., Cincin., 1906, v. 66, p. 595.

OLEUM SABINÆ.

Schimmel & Co. point out that there exist considerable differences between the savin oils of German and British origin on the one hand and the French distillate on the other, and refer to a report by Umney and Bennett, who assert that the difference is due to the oils being derived from different species of Juniperus.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, pp. 61–62.

Francis, John M., thinks that if the specifications, which he says are based upon the best grades of German oil, fairly represent all genuine oils of savin a large proportion of the product sold is sophisticated.—Bull. Pharm., Detroit, 1906, v. 20, p. 141. (See also Proc. Am. Pharm. Ass., 1906, v. 54, pp. 449.)

Vanderkleed, Charles E, reports finding one sample of oil of savin considerably adulterated with oil of turpentine.—Proc. Pennsylvania Pharm. Ass., 1906, p. 124.

He reports one lot of oil of savin adulterated with oil of turpentine.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 342.

Caspari, Chas. E., reports one sample examined; contained oil of turpentine.—Proc. Missouri Pharm. Ass., 1906, p. 104.

Smith, Kline & French Co. report the following results of their examination of a sample of English oil of savin: Sp. gr. at 15° C., 0.908; optical rotation, +68° 15′; solubility in 95 per cent alcohol, all parts; saponification number, 125.—Lab. Rep., S. K. & F., 1906, p. 43.

Matzel, R. (Arch. internat. de pharmacod. et de thérap., 1905, v. 15, p. 331), says that sabinol produces in the mouse a demonstrable lesion of the spinal cord.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 138.

OLEUM SANTALI.

Schimmel & Co. present the official statement relating to the amount of sandalwood offered for sale at auctions in the several districts of India. They also call attention to a report on the "spike" disease in the Mysore district.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 61.

According to *Indian Forester*, the Maharaja of Mysore has announced a reward of 10,000 rupees to anyone who will discover the cause of "spike" disease among sandal trees and suggest a thorough and effective, and at the same time a cheap and easily applicable, remedy for its eradication.—Exper. Sta. Rec., 1906, v. 18, p. 1178.

Schimmel & Co. discuss the original requirements of the U. S. P. VIII for oil of santal and point out that according to recent investigations the formula $C_{15}H_{24}O$ is undoubtedly more correct for santalol than is the more widely used formula $C_{15}H_{26}O$, and that on the more correct formula the U. S. P. VIII assay process would correspond to a minimum of 89.2 per cent of santalol.—Semi-Ann. Rept. Schimmel & Co., 1906, Apr.–May, p. 76.

They point out that the santalol content of oil of sandalwood, in the Ph. Belg., III, is based on the correct chemical formula, $C_{15}H_{24}O$.—*Ibid.*, Oct.–Nov., p. 92.

Francis, John M., notes that other authorities, notably Gildemeister and Hoffman, place the santalol content higher—from 93 to 98 per cent (U. S. P. VIII, 90 per cent).—Bull. Pharm., Detroit, 1906, v. 20, p. 141.

Lefeldt, Max., asserts that the Ph. Germ. requirement that oil of santal dissolve in five parts of 70 per cent alcohol at 20° C. is too severe.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 340.

Evans Sons Lescher and Webb criticise the Ph. Brit. IV requirements for sandalwood oil, and discuss the general characteristics of this oil.—Analytical Notes, 1906, E. L. & W., Lond., 1907, pp. 28–29.

The Ph. Brit. Committee of Reference in Pharmacy suggests that a santalol figure (possibly 94 per cent) should be included for oil of santal.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Dohme and Englehardt discuss the pharmacopœial requirements for oil of santal and report experiments made with oil of santal distilled from the different brands of sandalwood obtained at a recent auction in the Mysore district of India. They conclude that the requirements for a good oil of santal should be specific gravity from 0.965 to 0.980 at 25° C., percentage of santalol at least 91 to 92. Perfect solubility in, at most, five volumes of 70 per cent alcohol at 25° C.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 460.

Francis, John M., reports on ten samples of oil of sandal purchased in the open market, all assayed over 90 per cent santalol.—*Ibid.*, v. 54, p. 342.

Patch, E. L., examined eight lots of oil of sandal; all corresponded to the U. S. P. requirements.—*Ibid.*, p. 343.

Graham, Willard, reports finding a sample of oil of sandalwood which contained only 73 per cent of santalol.—Proc. Pennsylvania Pharm. Ass., 1906, p. 155.

Caspari, Chas. E., reports three samples examined, two U. S. P., one contained too little santalol (80 per cent).—Proc. Missouri Pharm. Ass., 1906, p. 103.

Blome, W. H., assayed three samples, 68.3, 30.47, 90.13 per cent of alcohol, calculated as santalol.—Proc. Michigan Pharm. Ass., 1906, p. 107.

Parry, Ernest J., reports on a sample of oil of santal of German origin which was adulterated with a West Indian sandalwood oil, rendered soluble by fractionation, and also of a higher santalol value than the normal.—Chem. & Drug., Lond., 1906, v. 68, p. 211.

He further reports on the oil contained in capsules.—*Ibid.*, v. 68, p. 951.

Schindler and Siebert (Deutsche. Med. Wchnschr., v. 32, No. 27) comment on gonosan and other extensively advertised drugs for the internal treatment of gonorrhœa, which they state are dangerous as tending to supplant local treatment. They state that tests have shown that gonosan has no effect on the gonococci.—J. Am. M. Ass., 1906, v. 47, p. 726.

OLEUM SASSAFRAS.

Schimmel & Co. report examining an authentic sample of oil of sassafras, distilled by themselves from the root bark of *Sassafrass officinale* Nees. They found, in agreement with their previous observations, that 1 to 2 volumes of 90 per cent alcohol are necessary to dissolve 1 volume of oil of sassafras, although there are oils which are soluble in every proportion in 90 per cent alcohol. The remaining properties of the distillate they found to be: Specific gravity, 1.075, at 15° C.; optical rotation, at 15° C., +2° 14′; ester number, 1.9. The yield of oil amounted to 3.25 per cent.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 61.

Schimmel & Co. suggest that for the lower limit of specific gravity for oil of sassafras 1.063, at 25° C., would be more suitable.—*Ibid.*, Apr.–May, p. 76.

Francis, John M., says that much of the so-called "sassafras oil" sold is spurious and really consists wholly or largely of camphor oil. As oil of sassafras owes its virtues almost wholly to safrol, he considers it advisable to purchase safrol direct and use it for the oil.—Bull. Pharm., Detroit, 1906, v. 20, p. 142. (See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.)

Caspari, Charles E., reports 3 samples examined; 2 U. S. P., 1 too low specific gravity.—Proc. Missouri Pharm. Ass., 1906, p. 103.

Smith, Kline & French Co. report on the examination of 15 samples of oil of sassafras in which the optical rotation ranged from —2° to —4°.—Lab. Rep., S., K. & F., 1906, p. 24.

OLEUM SINAPIS VOLATILE.

Schimmel & Co. assert that the lower limit of specific gravity for volatile oil of mustard is too high, and should be 1.008.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 75.

They assert that they have observed in their own distillate of oil of mustard a specific gravity of 1.014 at 15° C.—*Ibid.*, Oct.–Nov., p. 87.

Francis, John M., thinks that volatile oil of mustard, because of its exceedingly unpleasant character, usually escapes examination.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Fernan, Albert, points out that a sample of oil of mustard having a specific gravity of 1.018 on testing, according to Ph. Germ. IV, indicated 90.23 per cent and, according to Fischer-Hartwig, 101.6 per cent. It is evident that the cold method gives low while the hot method gives unduly high results.—Ztschr. d. allg. oestrr. Apoth.-Ver., Wien, 1906, v. 44, p. 80.

Schimmel & Co. discuss the work done by R. Firbas, on the quantitative estimation of mustard oil and point out that mustard oil determinations carried out exactly in accordance with the instructions of the Ph. Germ. IV, without heating, give results which were about 8 per cent too low, and according to these no mustard oil would satisfy the requirements of the pharmacopœia. They outline a method of procedure which they believe to be satisfactory.—Semi-Ann. Rep., Schimmel & Co., 1906, Apr.–May, p. 45.

Brandel, I. W., reviews some of the literature relating to oil of mustard, its estimation, and its properties.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 14–15.

OLEUM TEREBINTHINÆ.

Weigel, G., reviews the current literature on oil of turpentine and points out the possible new sources of supply.—Pharm. Zentralh., 1906, v. 47, pp. 866, 867.

Francis, John M., calls attention to a turpentine oil distilled from sawdust, pine roots, chips, and other refuse of the lumber mills; so far little is known as to its characteristics. * * * It will be safer to let the painters try it out first.—Bull. Pharm., Detroit, 1906, v. 20, p. 142. (See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.)

Lorenz, H. W. F., reviews some of the processes now in use for obtaining products from wood and outlines a method for obtaining products from pine wood, particularly wood turpentine, by means of a vacuum process.—Oil, Paint and Drug Rep., 1906, Mar. 26, p. 38.

Schimmel & Co. assert that it would be more correct to fix 0.858 as the lowest limit for the specific gravity of oil of turpentine. They also point out that the U. S. P. VIII lower limit for the specific gravity of rectified oil of turpentine applies to a temperature of 15° C.; for 25° C. it is 0.853.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 77.

Brandel, I. W., reviews some of the recent literature relating to American oil of turpentine and to some of the foreign oils of the same type.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 318–320.

Schimmel & Co. review some of the recent literature relating to oil of turpentine, its composition and possible derivatives.—Semi-Ann. Rep. Schimmel & Co., 1906, Oct.–Nov., pp. 75–79.

Herty, Charles H., discusses the composition of oil of turpentine and the chemistry of some of its constituents.—Chem. Eng., Phila., 1906–7, v. 5, p. 233.

Sundvik, E., points out the distinctive features of so-called "oil of turpentine" obtained by dry distillation, the differences existing between this and the product obtained by distillation with steam, and enumerates some of the contaminating substances.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 701.

Wiebelitz, H., points out that it will be necessary to include tests to differentiate other resin and pine wood oils from oil of turpentine.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Vaubel, Wilh., makes a contribution on the turpentine oils of commerce, and outlines his method of differentiating between them by means of determining their bromine absorbing value.—*Ibid.*, v. 51, p. 257.

Herzfeld, M., criticises the conclusions arrived at by Vaubel, and recommends the routine examination of turpentine oils by means of the refractometer.—*Ibid.*, v. 51, p. 265. (See also Vaubel, Wilh., Ztschr. f. öffentl. Chem., 1906, v. 12, pp. 107, 108.)

Zetzsche, Franz, reviews the several methods that have been proposed for the examination of oil of turpentine.—Pharm. Zentralh., 1906, v. 47, pp. 643–646.

Ahlström and Aschan report an investigation on the pinene fractions of French and American oil of turpentine.—Ber. d. deutsch. chem. Gesellsch., Berl., 1906, v. 39, pp. 1441–1446.

Schimmel & Co. report on a sample of Indian turpentine derived from *Pinus longifolia* Roxb. and the oil derived from it.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 64.

Holley, Clifford D., discusses the collection, manufacture, and properties of oil of turpentine, outlines the method of analysis that has been adopted, and reports on a number of samples of pure and adulterated materials.—Rep. North Dakota Agric. Exper. Sta., 1906, Part II, pp. 127–137.

An inquiry among users of oil of turpentine elicited a number of opinions on the probable effect of the introduction of free alcohol on the demand for turpentine.—Oil, Paint and Drug Rep., 1906, v. 69, June 18, pp. 10–23.

Matzel, R., (Arch. internat. de pharmacod. et de thérap., 1905, v. 15, 331) discusses the pharmacology of terpineols melting at 32° and at 35° on rabbits.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 138.

OLEUM THEOBROMATIS.

Francis, John M., thinks a satisfactory substitute for cacao butter is devoutly to be wished for, but cautions against the staking of either money or reputation on any of them until they shall have been tried out for several months in both summer and winter temperatures.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Matthes and Müller present a table containing data regarding the properties of cacao butter obtained from various kinds of crude material.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 92.

Philipp Röder, Wien, would limit the melting point of oil of theobroma to vary from 30° to 34° C., suggests the addition of a test for wax, and outlines a test for pure oil. Also enumerates a number of substitutes for oil of theobroma.—Pharm. Zentralh., 1906, v. 47, p. 522.

Weigel, G., points out that the Ph. Ndl. requires that oil of theobroma melt between 31° and 34° C. and that the iodine number vary between 33.8 and 36.—*Ibid.*, v. 47, p. 421.

An editorial discusses the economic conditions in the cacao butter market and gives the comparative figures of cost in the Amsterdam and London markets for 1905 and 1906.—Oil, Paint and Drug Rep., 1906, Nov. 12, v. 70, p. 7.

Dieterich, Karl, reports on 17 samples of oil of theobroma. The melting point varied from 28° to 33° C., the acid number from 3.64 to 49.96, and the iodine number from 34.43 to 40.44. Five of the 17 samples were objected to as not coming up to the requirements.—Helfenberger Annalen, 1905, 1906, v. 18, p. 72.

MacFadden, W. Lester, notes that, therapeutically, oil of theobroma is free from objectionable properties, being bland, neutral, and not easily turned rancid. It has an absorption value which, while limited, is distinct and superior to that of other neutral fats. * * * When mixed with other fats it tends to impart smoothness—a valuable property.—Bull. Pharm., Detroit, 1906, v. 20, p. 203.

Smith, Kline & French Co. find that cacao butter turns rancid much more readily than is generally believed, especially if it has been heated at a high temperature during the process of manufacture.—Lab. Rep., S., K. & F., 1906, p. 15.

OLEUM THYMI.

Gane, E. H., points out that the statement that oil of thyme is colorless would seem to exclude the finest grade of thyme oil, which is always highly colored, and put a premium on white oil of thyme of notorious fame. Of samples from importing houses only one was up to the U. S. P. standard. Six samples reported on varied in specific gravity from 0.856 to 0.900, and in phenol content from 3 to 22 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.

Schimmel & Co. assert that the rectified oil of thyme frequently acquires the red-brown color of the crude oil; 0.900 is too high as lowest limit of specific gravity, and this should be 0.894. They have also repeatedly observed oils with a feeble dextrorotation, and further point out that the rotation is sometimes a little higher than indicated in the U. S. P. VIII. In most cases the optical behavior of the oil can only be determined approximately on account of the dark color.—Semi-Ann. Rep. Schimmel & Co., 1906, Apr.–May, p. 77.

Evans Sons Lescher and Webb assert that the red thyme oils from French sources were found to have a rotatory power of from —4° to —5° and to contain from 14 to 44 per cent of phenols. The white variety ranged from —0° 4′ to —12° and the phenols from 17 to 39 per cent.—Analytical Notes, 1906, E., L. & W., Lond., 1907, p. 32.

Lackey, R. H., quotes a correspondent who points out that cheap oils of thyme are commonly sold. Red oil of thyme should be sold on its phenol strength and the white oil of thyme should be sold to comply with the requirements of the pharmacopœia.—Proc. Pennsylvania Pharm. Ass., 1906, p. 117.

Vanderkleed, Charles E., asserts that some trouble has been experienced in obtaining white oil of thyme that would assay 20 per cent of phenols. The red oil assaying 20 per cent is more readily obtainable, but is no longer official.—*Ibid.*, p. 124.

Blome, W. H., reports four samples which assayed, respectively, 4, 14, 8, and 32 per cent of phenols, only one out of the four complying with the requirement.—Proc. Michigan Pharm. Ass., 1906, p. 107.

OLEUM TIGLII.

Brodhead, G. L. (Am. J. Obst., N. Y., July), advises the use of croton oil in olive oil on the back of the tongue to induce purgation during unconsciousness in the toxæmia of pregnancy.—J. Am. M. Ass., 1906, v. 47, p. 235.

Collins, C. D., in discussing the treatment of pruritus vulvæ, says croton tiglium is indicated by fine vesicular rash, with burning after scratching. Tendency to vesicles and pustules. Great itching, but the skin is too sensitive to scratch. Moist dermatitis.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 286.

OPIUM.

The Bureau of Plant Industry reports that a laboratory study of the capsules of the Asiatic poppy, as a source of morphine, codeine, and other opium alkaloids has been continued on material from various sources.—Ann. Rep. U. S. Dept. Agric., 1906, p. 207.

True, Rodney H., outlines a plan for converting the waste product of the poppy seed industry, the capsule, into a valuable source of opium alkaloids.—Oil, Paint, and Drug Rep., 1906, v. 70, Oct. 17, p. 37.

Norton, Thomas H., is quoted as asserting that the United States offers an admirable field for the cultivation of the opium poppy. The annual imports of opium into the United States amount to upward of $1,200,000. Some additional figures, showing the amount and the value of the opium grown in Turkey and Smyrna, are given.—*Ibid.*, v. 70, July 2, p. 10.

Francis, Alan, presents several illustrations relating to the opium cultivation and the trade in Persia.—Brit. & Col. Drug., Lond., 1906, v. 50, p. 946.

A report on the drug market presents, in tabular form, a summary of the number of cases of opium, with the high and low prices prevailing at Smyrna during the years 1888 to 1905, inclusive.—Oil, Paint, and Drug Rep., 1906, Jan. 29, part 2, p. 33.

An editorial discusses the opium traffic in various countries.—Pharm. J., Lond., 1906, v. 23, p. 336.

Hosie, Alex., presents an interesting paper on the opium trade of China, based upon the Report on the Foreign Trade of China.—*Ibid.*, v. 23, pp. 512, 513.

An editorial discusses the gradual decrease in the production of opium in India and the causes which have led up to the loss to the revenue from the discontinuance of the traffic in opium.—*Ibid.*, v. 22, pp. 679, 680. (See also p. 706.)

An editorial calls attention to the condemnation of the opium traffic by the British Parliament and the edict of the Chinese Government providing for the suppression of the use of opium.—J. Am. M. Ass., 1906, v. 47, p. 1493.

An editorial discusses the regulations that have been drafted under the Chinese edict abolishing opium.—Brit. & Col. Drug., Lond., 1906, v. 50, p. 434.

An editorial notes that the "mecon" of the Icelandic Pharmacopœia of the thirteenth century can only refer to *Papaver somniferum*, especially cultivated, as only the yellow *Papaver nudicaule* is to be found growing wild in Iceland.—Chem. & Drug., Lond., 1906, v. 69, p. 969.

Spiegel, L., discusses the chemistry of the opium alkaloids.—Biochem. Centralbl., Leipz., 1906–7, v. 5, pp. 149–156.

Stern, Dora (Naturw. Rundsch. 21, 469–472), reviews the newer researches on the constitution of the opium alkaloids.—Chem. Centralbl., Berl., 1906, v. 77, II, p. 1205.

An editorial discusses the economic conditions prevailing in the opium market and presents a table giving the average highest and lowest prices since 1886.—Oil, Paint, and Drug Rep., 1906, v. 70, Nov. 26, p. 7.

Reichard, C., discusses the reactions given with boric acid and the several opium alkaloids.—Pharm. Ztg., Berl., 1906, v. 51, pp. 817, 818.

Pschorr and Haas record some experiments on the decomposition of thebaine by means of benzoylchloride.—Ber. d. deut. chem. Gesellsch., Berl., 1906, v. 39, pp. 16–19.

Freund, Martin, discusses the constitution of thebaine and reports some further investigations of its properties, and behavior with reagents.—*Ibid.*, v. 39, pp. 844–850.

Reichard, C., discusses the reactions for thebaine and its differentiation from other alkaloids.—Pharm. Zentralh., 1906, v. 47, pp. 623–629.

Reichard, C., reviews the reactions and tests for narcein.—*Ibid.*, v. 47, pp. 1028–1031, 1048–1051.

Weigel, G., points out that the Ph. Ndl. IV, requirement that opium contain not more than 15 per cent of moisture is rather difficult to meet, as many commercial samples contain from 16 to 18 per cent.—*Ibid.*, v. 47, p. 422.

Vanderkleed, C. E., points out that powdered and deodorized opium and the tinctures of opium and deodorized opium have been *nominally* decreased in strength. Gum opium remains the same, and extract of opium has been increased in strength. *Actually*, however, on account of the newly required lime-water purification of the crystallized morphine obtained by the process of assaying, the strengths are, in effect, all *increased*—the two tinctures and the powdered and deodorized opium very slightly, the gum markedly, and the extract much more than a simple consideration of the nominal increase from 18 to 20 per cent of morphine would indicate.—Proc. Pennsylvania Pharm. Ass., 1906, p. 122.

Caesar and Loretz suggest the estimation of the moisture content of opium and outline a method for the determination of morphine present. For the latter they prefer the estimation of the amount of anhydrous morphine in the water-free opium.—Geschafts. Ber. v. Caesar & Loretz, 1906, pp. 107, 108.

Dohme, A. R. L., points out that in the preliminary work relating to the adoption of assays for the U. S. P. VIII, seven reputable chemists, operating on the same sample of drug by the same process, differed in the percentage quantity of morphine found in opium from 14.44 to 16.02 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Kebler, L. F., submits results obtained by nine analysts with powdered opium by three different methods: (1) U. S. P. VIII, with additions; (2) U. S. P. VIII, modified by Lamar; (3) combination method. The results obtained are presented in the form of a table, for ready comparsion. The results obtained varied from 10.68 to 13.15 per cent of morphine. Average, 12.29.—Proc. Off. Agr. Chem., 23rd. Ann. Conv., pp. 132–134. (Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 105.)

Moerk, Frank X., points out that all of the opium assays, excepting that for the extract, are directed to have uniform concentration and uniform quantities of alcohol, ether, and ammonia are directed. To secure uniformity in all of the opium assay processes it would only be necessary to increase the weight of the extract and the aqueous solution to 6 and 20 gm. respectively.—Proc. Pennsylvania Pharm. Ass., 1906, p. 160.

Puckner, W. A., reviews some of the literature relating to the assay of opium and points out that to the disappointment of the many who have been favorably impressed with the concordant results yielded by the Stevens method, the Revision Committee pursued a conservative course and retained the assay method of the old pharmacopœia for opium, modified only by subtracting from the weight of crude morphine obtained the impurities insoluble in lime water.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 270.

Herting, Otto, suggests that the name "Squibb" be appended to the assay process for the determination of morphine in opium, as the process is essentially that proposed by Squibb.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 15.

Weigel, G., points out that the U. S. P. VIII directs that the morphine in opium be estimated in the hydrated form and that 9 per cent required corresponds to approximately 8.46 per cent, or that the 12 to 12.5 per cent of morphine in granulated or in powdered opium corresponds to about 11.28 to 11.75 per cent of anhydrous morphine.—Pharm. Zentralh., 1906, v. 47, p. 64.

Francis, John H., heartily commends a change in assay process but believes that the direct lime-extraction method advocated by Stevens is preferable because it is shorter, less complicated, and yields approximately the same results. After all, none of the various opium assays are strictly accurate because they all depend upon crystallization to remove the morphine from solution.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Eliel, Leo, criticises the method of opium assay. He recommends the obtaining of filtrates of respectively 50, 150, and 100 c. c., the use of tared, glass-stoppered Erlenmeyer flasks, and of two counterpoised, rapid-acting filters.—Proc. Indiana Pharm. Ass., 1906, p. 195.

Asher, Philip, presents and discusses at length his modification of the Stevens process for the assay of opium and its preparations.—Am. J. Pharm., Phila., 1906, v. 78, pp. 262–267.

Philipp Röder, Wien, recommends an assay process for opium that is practically identical with the U. S. P. process, and reports on 9 samples of opium.—Pharm. Post., Wien, 1906, v. 39, p. 283.

Lloyd, John Uri, asserts that chemists in the Orient who have made a specialty of the assay of opium assured him that the U. S. P. VIII, process was unsatisfactory in that the results were too low.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 454.

Lyons, A. B., points out that in the washing of morphine with lime water precautions should be taken that there is no appreciable absorption of carbon dioxide, as this would obviously vitiate the result.—*Ibid.*, v. 54, p. 455.

Fromme, G., discusses the conclusions offered by Bernstrom in Svensk Farm. Tidskr., 1905.—Geschäfts-Ber., v. Cæsar & Loretz, in Halle a. S., 1906, pp. 41–43.

Picard, L., after reviewing the several methods for the determination of morphine in opium, presents a modified Léger method and a lime method. He prefers the Léger to the Petit method.—Bull. des. sc. pharmacol., Par., 1906, v. 13, pp. 419–427.

Lefeldt, Max., discusses the assay process for opium and opium preparations of the Ph. Germ., and suggests that the process of the Ph. Germ. III be again adopted with the use of ether in place of acetic ether directed in that process.—Ber. d. pharm. Gessellsch., Berl., 1906, v. 16, p. 335.

Lyons, A. B., believes that in the assay for opium the crude morphine should be directed to be weighed on a pair of counterpoised filters, instead of being detached from the filter for weighing. The directions for washing are too complicated and in inexperienced hands are liable to vitiate results. He prefers the use of morphinated water.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 441.

Herting, Otto, commends Caspari's method for the assay of opium for codeine as being less complicated and less time consuming than would appear from the perusal of the method as outlined. (Proc. Am. Pharm. Ass., 1904, v. 52, pp. 386–389.)—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 16.

Gardner, Hermann, describes and figures a bottle designed to be used in the assay of opium. Because of the absence of awkward interior corners it is thought to facilitate the removal of the precipitated morphine.—Pharm. J., Lond., 1906, v. 22, p. 548.

Evans Sons Lescher and Webb report on the examination of 18 lots of opium, in which the average morphine content was 11.3 per cent, the lowest was 10 per cent, and the highest 12.44 per cent. They outline the method of assay which they use.—Analytical Notes, 1906, E., L. & W., Lond., 1907, pp. 25, 26.

Graham, Willard, reports the assay of 10 cases of opium. The moisture present varied from 21.3 to 24.8 per cent, the morphine in moist opium varied from 9.07 to 10.79 per cent, and calculated to dry opium from 11.85 to 14.05 per cent.—Proc. Pennsylvania Pharm. Ass., 1906, p. 157.

Thaysen, H., records an examination of manipulated opium which was found to contain considerable gum (7.52 per cent). While the gum opium showed a morphine content of 10.26 per cent, the resulting extract only contained 16.965 per cent.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 276.

Fernan, Albert, reports that of 6 samples of opium examined 3 were found deficient in morphine, 6.5, 7, and 8.9 per cent, respectively. He also asserts that perfectly starch-free opium is seldom met with, probably due to the fact that starch or flour is used as a dusting powder.—Ztschr. d. allg. österr. Apoth-Ver., Wien, 1906, v. 44, p. 80.

Taylor, S., hopes that the extract will be presented in the near future as a powder, so that it will fall into line with other extracts.—Pharm. J., Lond., 1906, v. 23, p. 669.

Baird, J. W., reports two samples examined in 1904, one adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Dunning, H. A. B., asserts that a tincture of opium not deficient in strength may be made by mixing 100 gm. powdered opium with 50 gm. calcium phosphate, pumice, or other suitable agent and percolating with dilute alcohol (1,000 c. c.), collect, percolate, set aside, and then exhaust the opium with water.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 445.

Cline, R. R. D., suggests that in making tincture of opium the powdered opium be first mixed with sharp, clean, dry sand, previously sterilized and percolated with petroleum benzin, to free it from the odorous and otherwise objectionable principles. The benzin is subsequently evaporated and the resulting drug exhausted in the usual way.—Proc. Texas Pharm. Ass., 1906, v. 17.

Dunning, H. A. B., recommends the use of powdered paper in making tincture of opium, and asserts that a mixture of paper and opium can readily be extracted by percolation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

Ladd, E. F., points out that laudanum has been found to vary in strength from 25 per cent to 116 per cent of the official standard of the United States Pharmacopœia.—Rep. North Dakota Agric. Exper. Stat., 1906, Part II, p. 36.

Sayre, L. E., reports that 11 samples of tincture of opium examined varied from 0.82 to 1.53 per cent of morphine.—Bull Kansas Bd. Health, 1906, v. 2, p. 176.

The revisors of pharmacies in Würtemberg, Germany, found 7 samples of tincture of opium to be deficient in morphine, while four additional samples barely complied with the requirements.—Pharm. Zentralh., 1906, v. 47, p. 650.

Fernan, Albert, found a sample of tincture of opium containing 0.25 per cent of morphine with 4.32 per cent of extract.—Ztschr. d. allg. österr., Apoth.-Ver., Wien, 1906, v. 44, p. 80.

Krüer, Hero, points out that the tincture of opium of the Ph. Germ. IV, when cooled to 10° C. becomes cloudy and frequently, at least, does not become perfectly transparent on rewarming. His experiments indicate this to be due to extracted gums.—Pharm. Ztg., Berl., 1906, v. 51, p. 1104.

Wetterstroem, Theo. D., reports the results of a comparsion of the U. S. P. VII, and U. S. P. VIII, requirements for morphine in tincture of opium. Presents the results of his experiments in the form of a table.—Proc. Am. Pharm. Ass., 1906, v. 54. pp. 431, 432.

The Ph. Brit. Committee of Reference in Pharmacy concludes that the assay process for tincture of opium requires improvement, and should be adapted to the latter preparation.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Wilbert, M. I., discusses the origin and history of Sydenham's laudanum and points out that, while of English origin, it is practically unknown in its original form in English-speaking countries.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 479–481.

Eliel, Leo, frequently has use for the tinctura opii crocata of the Ph. Germ. and thinks a similar preparation should be in the U. S. P.—*Ibid.*, v. 54, p. 482.

Lyons, A. B., believes that the use of petroleum benzin in making deodorized tincture of opium is objectionable for many reasons. Outlines a method for preparing an odorless tincture.—*Ibid.*, v. 54, p. 448.

Francis, John M., asserts that, while the new product is perhaps cheaper and good enough for practical purposes, it is not equal to the old, as the extraction is not so thorough. He thinks further that the purified benzin required by the process is not easily obtainable and recommends a process by which the pharmacist may prepare his own supply.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Wippern, Franz, suggests that in the making of the Ph. Germ. equivalent of camphorated tincture of opium the pharmacopœia directs that tincture of opium be used in place of powdered opium.—Pharm. Ztg., Berl., 1906, v. 51, p. 807.

Maridet discusses the extemporaneous production of camphorated tincture of opium.—Répert de pharm., Par., 1906, v. 18, pp. 3, 4.

Liverseege, L. F., in a review of past analyses of drugs officially bought in Birmingham says that four out of ten samples of camphorated tincture of opium examined had been wrongly prepared.—Yearbook of Pharmacy, 1906, p. 272.

Dixon, W. E., discusses the value of alkaloids as over against galenicals; using opium as an illustration, he says that while it must be standardized so as to contain roughly 10 per cent of morphine, it is nevertheless quite variable, owing to the presence of anywhere from 2 to 10 per cent of narcotine. Opium obtained from Persia and India is unsuitable as a drug on account of the large quantity of narcotine which it contains.—Brit. Med. J., Lond., 1906, v. 2, p. 1459.

Meyer, Ernst, discusses the influence on metabolism exerted by opium in disease of the pancreas.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 58–72.

Ritter, John, calls attention to the official preparations of opium having the advantage over a large number of unofficial opium preparations of being constant in composition, whereas the unofficial are variable in strength.—J. Am. M. Ass., 1906, v. 47, p. 684.

Musser, J. H., strongly urges the continuous use of opium or morphine in cases of cardiac debility.—Am. J. M. Sc., Phila., 1906, v. 131, p. 45.

Douglass, Malcolm E., describes the use of camphor, opium, and ipecac, 1 part each with 7 parts of potassium sulphate; dose, 2 to 10 grains.—Hahneman. Month., Phila., 1906, v. 41, p. 43.

OXYMEL SCILLÆ N. F.

The Ph. Brit. Committee of Reference in Pharmacy reports that the process for oxymel of squill needs revision so as to insure a constant product.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

PANCREATINUM.

Weidermann, H. P., calls attention to the methods employed in preparing pancreatin in a commercial way.—Chem. Eng., Phila., 1906–7, v. 5, p. 73.

Francis, John M., thinks that the starch test, while admittedly arbitrary and imperfect, is a great improvement on any test hitherto employed and serves to distinguish an inferior from an active pancreatin. He recommends that it be stocked only in limited quantities and carefully stored.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Vanderkleed, Charles E., points out that samples of pancreatin should be subjected to the U. S. P. test for starch converting properties.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Patch, E. L., reports that market samples of pancreatin converted from 10 to 25 times their own weight of starch, by the U. S. P. VIII test.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.

Apple, F. M., presents a review of 1,000 prescriptions and some additional figures obtained from wholesale druggists to illustrate the limited use of pancreatin in ordinary practice.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 135–143.

Delezenne (Soc. biol., v. 60, p. 1070) reports some observations on the activation of pancreatic juice by means of calcium salts and the specific action of calcium.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 603.

Pozerski, L., (Soc. biol. 1906, v. 60, p. 1068) points out that pancreatic juice that has been activated by a calcium salt rapidly loses its amylolytic power in favor of the proteolytic power.—*Ibid.*, v. 5, p. 605.

Iscovesco and Matza report a study of the colloids resulting from digestion with pancreatin and point out that the resulting colloids are invariably electronegative irrespective of the nature of the albumenoid bodies used.—*Ibid.*, v. 5, p. 603.

Meyer, Ernst, discusses the influence on metabolism exerted by pancreatin in disease of the pancreas.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 58–72.

An answer in "Queries and Minor Notes" disclaims any confidence in the trypsin treatment of cancer, but discusses available forms.—J. Am. M. Ass., 1906, v. 47, p. 450.

Additional references on the use of pancreatin and its constituents will be found in the Index Medicus and the J. Am. M. Ass.

PARAFFINUM.

Francis, John M., calls attention to the fact that commercial paraffin varies much more widely than is indicated by the pharmacopœial melting points, and recommends that in ordering the melting point be specified, to save both vexation and money.—Bull. Pharm., Detroit, 1906, v. 20, p. 142.

Fisher, Th., discusses the methods proposed for determining the congealing point of paraffin and outlines a method which depends on noting the degree of temperature at which the thermometer will stand for at least ten minutes. The necessary apparatus is figured.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, part 2, pp. 1323–1326.

The Ph. Brit. Committee of Reference in Pharmacy reports that the melting point of paraffin should be 50° to 55° C.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

MacFadden, W. Lester, says that paraffin and its near relative, ceresin, have the rare grace of stability. They are neutral, simple in composition, and do not take part in destructive interreactions. Therapeutically, nothing more than protection can be expected of them, absorption being *nil*. Their sole office is to harden protective applications.—Bull. Pharm., Detroit, 1906, v. 20, p. 203.

Kirschner, J., (Virchows Arch., 182, H. 3) discusses the destiny of paraffin that has been injected into the cellular structures, and the structural changes produced.—Biophysik. Centralbl., Leipz., 1906, v. 1, p. 227.

Additional references on the use of paraffin will be found in the Index Medicus and the J. Am. M. Ass.

PARALDEHYDUM.

Broadbent, W., (Practitioner, Lond., July) states that paraldehyde or chloral is preferable to sulfonal, trional, or monal in the sleeplessness of the young.—J. Am. M. Ass., 1906, v. 47, p. 463.

PAREIRA.

Scholtz, M., contributes a further study on the alkaloids of commercial pareira.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 555–560.

The Ph. Brit. Committee of Reference in Pharmacy assert that pareira will probably be omitted.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Taylor, S., says Greenish has shown how the liquid extract of pareira may be improved by using a menstruum of dilute alcohol and glycerin. The product keeps well.—Pharm. J., Lond., 1906, v. 23, p. 669.

PEPO.

Nelson, Burt E., describes and illustrates the characteristic structures of pumpkin seed and also discusses the constitutents.—Merck's Rep., N. Y., 1906, v. 15, p. 68.

PEPSINUM.

The Ph. Brit. Committee of Reference in Pharmacy report on pepsin says the monograph requires complete revision. See U. S. P. and paper by Lucas. Pepsin is nearly insoluble in alcohol (90 per cent).—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Weidermann, H. P., outlines the method of preparing pepsin in a commercial way and calls attention to the precautions that are necessary to prevent decomposition.—Chem. Eng., Phila., 1906, 1907, v. 5, p. 72.

Tocher, J. F., discusses the nature of pepsin and records a number of experiments. He concludes:

(1) Solutions of sodium bicarbonate, sodium, potassium, and ammonium hydrates when added to solutions of pepsin in the cold have an immediate inhibitory or destructive effect on pepsin, according to the concentration.

(2) Dilute solutions of caustic alkali immediately destroy the activity of dilute solutions of pepsin.

(3) Carbonate of bismuth precipitates pepsin from aqueous solutions; subnitrate does not.

(4) Compound mixtures containing solution of bismuth, morphine, carmine, etc., should contain no pepsin, since the activity of the enzyme is much retarded by the morphine and is destroyed proportionally to the amount of alkali present in solution.—Year Book of Pharmacy, 1906, pp. 307–313.

Schmidt-Nielsen, Sigval, (Zeit. physiol. Chem., 1906, v. 48, pp. 92–109) concludes that the enzyme which curdles neutral milk can not be identical with pepsin.—Abstr. in J. Chem. Soc., Lond., 1906, v. 90, pt. 1, p. 720.

Jacoby, M., outlines a method for the demonstration of the presence of pepsin which depends on the clarifying action of pepsin and hydrochloric acid on a solution of ricin in 1.5 per cent solution of sodium chloride. (Festschrift. a d. Path. Inst. zu., Berlin, 1906.)—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 491.

Francis, John M., commends the 3,000 to 1 standard as practical and efficient. For the assay process he recommends that wherever possible a mechanical agitator be employed to eliminate the personal factor.—Bull. Pharm., Detroit, 1906, v. 20, p. 143.

Vanderkleed, Charles E., points out that in making the U. S. P. assay for pepsin care must be taken to disintegrate thoroughly the coagulated egg albumin, and to adhere rigidly to the method of agitation.—Proc. Pennsylvania Pharm. Ass., 1906, p. 133.

Löhlein, Walter, discusses the use of Vollhard's method of pepsin estimation, by titration, using an acid solution of casein. The amount of free acid is determined titrimetrically before and after being subjected to digestion with pepsin. He records a number of experiments and concludes that the titrimetric estimation of pepsin is a practicable procedure combining with simple technic a reasonable accuracy in the result.—Beitr. z. chem. Path. u. Physiol., Brnschwg., 1905–6, v. 7, pp. 120–143.

Cowie and Dickson report experiments made for devising a process for the assay of pepsin based upon the amount of true peptone formed in a given time, and outline a method which they believe to be practicable.—Pharm. J., Lond., 1906, v. 22, pp. 221–223.

Eldred and Bartholomew outline a method of pepsin testing based on the amount of nitrogen obtained in solution. They also review the several methods that have been recommended and record a series of comparative tests between the U. S. P. 1890, the U. S. P. VIII, and the proposed nitrogen determination method.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 402.

Wiebelitz, H., suggests that a finer sieve be directed for breaking up the coagulated albumen, and that the gradual deterioration of pepsin be recognized.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Fernan, Albert, suggests extending the time limit of the Ph. Germ. IV, test for pepsin from one to two hours, and increasing the temperature to 45° C. He also asserts that the peptonizing property is materially reduced on keeping.—Ztschr. d. allg. österr. Apoth.-Ver., Wien., 1906, v. 44, p. 80.

Caldwell, Paul, asserts that with a slight modification the solution of pepsin N. F. is more palatable than essence of pepsin.—Drug. Circ. & Chem. Gaz. N. Y., 1906, v. 50, p. 393.

Dunning, H. A. B., thinks aromatic liquid pepsin N. F. is badly flavored.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 486.

The Ph. Brit. Committee of Reference in Pharmacy recommends to include with glyceritum pepsini a method for testing its activity.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Taylor, S., says that glycerin of pepsin, one drachm of which will, or ought to, digest 28 oz. of hard-boiled white of egg, is manifestly too strong. Boa suggests improvements of manipulation, advising solution of the pepsin in the water before addition of the glycerin and acid.—Pharm. J., Lond., 1906, v. 23, p. 669.

Caldwell, Paul, believes that sherry wine should be detannated for making wine of pepsin. He also believes that the alcohol might well be replaced by wine.—Drug. Circ. & Chem. Gaz. N. Y., 1906, v. 50, p. 393.

A review suggests making wine of pepsin extemporaneously by mixing the necessary wine with a glycerite of pepsin.—Pharm. Ztg., Berl., 1906, v. 51, p. 491.

Apple, F. M., presents the results of an analysis of 1,000 prescriptions showing the amount and the kind of digestive ferments used by physicians.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 135–143.

Iscovesco, Henri, concludes from his preliminary researches that a gastric juice which is normally very acid (e. g., that of the dog) will bear a very great increase in acidity before its digestive action is impaired. On the contrary, a digestive juice much less acid (e. g., that of swine) is much more sensitive to the action of an excess of HCl.—Compt. rend. Soc. de biol., Par., 1906, v. 61, p. 282.

Roger and Garnier find that for the ferment as well as for the acid there is an optimum dose, and this dose varies considerably according to the proportion of hydrochloric acid.—*Ibid.*, v. 61, p. 314.

Ferranini, Andrea, states that in certain cases the peptones act as correctives or antidotes to the antipeptic action of HCl.—*Ibid.*, v. 61, p. 689.

Jacoby, M., (Biochem. Zeitschr., 1906, v. 1, pp. 53–74) discusses the relations of pepsin and rennet action and reports a number of experiments on the properties of pepsin and rennin.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 491.

Papasotirion, J., (Arch. f. Hyg., 1906, v. 57, p. 269) presents some observations on the influence of bacteria on pepsin. He concludes that putrefaction bacteria destroy pepsin rapidly.—*Ibid.*, v. 5, p. 787.

Additional references on the use of pepsin will be found in the Index Medicus and the J. Am. M. Ass.

PETROLATUM.

Richardson, Clifford, presents an exhaustive paper, in which he reviews the occurrence, nature, and composition of the petroleums of North America, and records considerable information relating to the petroleums obtained from the several American sources.—J. Franklin Inst., Phila., 1906, v. 162, pp. 57–70, 81–128.

Walden, P., discusses the optical activity of petroleum and of petroleum products. Also reviews the literature relating to optical activity and to the origin of petroleum and concludes that from the available data we are justified in concluding that vegetable substances supplied the material for the formation of petroleum oils.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 390–393.

MacFadden, W. Lester, says the petrolatums are negative almost to the point of having no impurities. They enter into no reactions, are not absorbed by the skin, and are arbitrary solvents. * * * Its smoothness adapts it to wide use as a diluent.—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

Enell, Henrik, (from Svensk Farm. Tidskr.) discusses the melting point of petrolatum and records the results obtained from an examination of a number of commercial samples. The figures given vary from 35° to 45° C.—Pharm. Zentralh., 1906, v. 47, p. 9.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the melting point of petrolatum should be 37–40° C.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., asserts that the available petrolatum does not comply with the U. S. P. requirements. For the sulphuric acid test the temperature should be indicated, 48, 50, or more degrees. The available American white petrolatum will not stand the sulphuric acid test. The Russian grades are better, but melt at from 33° to 37° C.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 343, 344.

PETROLATUM LIQUIDUM.

Francis, John M., considers that while the Russian water-white petrolatum is more attractive it is in no way superior to the American product therapeutically; in fact, the greater "body" of the latter is believed by many to be an advantage. He thinks the Sp. Gr. (0.87 to 0.94) a little high; that best suited for inhalants, nebulizers, etc., is about 0.86. Unless purchased on proper specification and at a commensurate price the petrolatum will not be either bland or odorless.—Bull. Pharm., Detroit, 1906, v. 20, p. 143. See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

Patch, E. L., asserts that liquid petrolatum is hard to obtain of official quality, particularly the specific gravity.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 335.

The Ph. Brit. Committee of Reference in Pharmacy report on paraffin oil says the specific gravity is between 0.860 and 0.880.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

PETROLATUM SAPONATUM LIQUIDUM N. F.

An unsigned article contains a number of formulas adapted from continental formularies for paragens or vasoliments; preparations consisting of mixtures of liquid paraffin, oleic acid, and spirit of ammonia similar to the saponated petrolatum of the N. F., in which various medicaments are dissolved.—Pharm. J., Lond., 1906, v. 22, pp. 618, 619.

MacFadden, W. Lester, discusses the solvent power of ammonium oleate when combined with petrolatum, etc., to form the "vasoliniments" of German practice.—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

Zernik, F., points out that the content of free iodine in Jodvasoliment was 1.25 per cent while iodine vasogen was practically free from free iodine. The total iodine content in iodine vasogen was demonstrated to be 5.96 per cent.—Arb. a. d. pharm. Inst., d. Univers., Berl., 1906, pp. 202–204.

PETROLATUM SAPONATUM SPISSUM N. F.

An article in Notes and Queries points out some of the precautions to be exercised in the making of solid petrox, N. F., and the need for using ingredients that are of U. S. P. standard.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 443.

PHENOL.

Schieffelin, Wm. Jay, is quoted as pointing out that while a sample of phenol may crystallize at 40° C. when the test is first applied, the same sample, upon repeating the test, will drop a degree; for this reason a certain degree of latitude should be allowed in this test.—Am. Druggist, N. Y., 1906, v. 49, p. 347.

Wippern, Franz, points out that it is practically impossible to prevent the acquisition of a reddish tint by phenol, on standing, and that, once discolored, there is no known method by which it can readily be decolorized. He suggests that the Ph. Germ., in the coming revision, permit of a slight reddening on standing.—Pharm. Ztg., Berl., 1906, v. 51, p. 805.

A report on the drug market presents a compilation of the high and low prices for phenol prevailing during 1901 to 1905, inclusive.—Oil, Paint, and Drug Rep., 1906, v. 69, Jan. 29, part 2, p. 33.

Kebler, Lyman F., reports that a sample of "Carbolic acid, pure crystals," was found to be a brownish black; an extremely poor quality.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

An abstract (Pharm. Zentralh.) points out the variation in the composition of phenol camphor, also known as Chlumsky's solution, and recommends 1 part of phenol, 2 parts of camphor, and a small proportion of alcohol.—J. d. Pharm. v. Elsass-Lothr., 1906, v. 33, p. 257.

Lemberger, Ignaz, reviews some of the literature relating to the production and use of mixtures of phenol and camphor. Also records some experiments made to determine the properties of the mixture.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 215–217.

Caldwell, Paul, points out that the public demand is for a stronger ointment, and that the ointment is insufficient in consistence, and suggests the addition of from 5 to 10 per cent of paraffin to the white petrolatum which constitutes the base of the 1900 ointment.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, pp. 159–160.

He asserts that the U. S. P. VIII ointment is less sightly and generally less satisfactory than the corresponding preparation of the U. S. P. 1890.—*Ibid.*, v. 50, p. 160.

Hommel, P. E., finds this ointment unsatisfactory in the summer, as it liquefies; he wonders why paraffin was not added to give it consistency, as in the boric acid ointment. He suggests a formula with yellow wax and yellow petrolatum.—Proc. New Jersey Pharm. Ass., 1906, p. 108.

Blyth, M. Winter, presents a very interesting discussion on the standardization of disinfectants; he recommends the use of milk, the composition of which may be made exactly to represent, with regard to its influence on germicidal action, an equal weight of solid fœcal matter.—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 1183–1193.

See also a paper by R. Tanner Hewlett, who experimented with *B. typhosus* in broth culture, using phenol, cyllin, and kerol.—Pharm. J., Lond., 1906, v. 23, pp. 69, 70.

Meyer, Leo B., calls attention to the dangers of weak solutions of phenol when used as surgical dressing and cites 21 cases of greater or less injury resulting from its use in this way.—N. York M. J., 1906, v. 84, p. 598.

PHENOLPHTHALEIN.

Kastle, J. H., reports a study of the conduct of phenolphthalein in the animal organism, the conduct of other phthaleins in the animal organism, and the action of ferments on phenolphthalein.—Bull. Hyg. Lab., U. S. P. H. & M.-H. S., No. 26, pp. 23–29.

Brasch, G., (Ztschr. f. Med. Beamte, Berl., 1906, XIX, 450–452) discusses the use of phenolphthalein as a laxative with remarks on the introduction of new remedies.—Reference from Index Med., 1906, p. 984.

Wilcox, R. W., recommends the use of phenolphthalein in the treatment of gallstone disease.—J. Am. M. Ass., 1906, v. 47, p. 348.

Von Best (Ztschr. Med. Beamte, 1906) reports a case of untoward effect from the use of purgen, a proprietary preparation containing phenolphthalein. Two tablets, the advertised medium dose, in addition to free purgation caused uneasiness, flushed face, difficulty in breathing, palpitation, and rapid pulse. The general condition improved in the course of several hours, but the accompanying colic-like pain did not disappear until the following day.—Jahresb. d. Pharm., 1906, Götting, 1907, v. 41, p. 258.

Brasch, G., (Ztschr. Med. Beamte, 1906) considers phenolphthalein to be an excellent laxative in doses of from 0.05 to 0.1 gm. for children and 0.1 to 0.2 for adults; in obstinate cases of constipation 0.3 to 0.5 gm. may be given without fear of secondary complications.—*Ibid.*, v. 41, p. 258.

PHENYLIS SALICYLAS.

The Ph. Austr. VIII in a footnote indicates that "Phenylum salicylicum" occurs in trade as "salol." The Ph. Belg. III includes salol as a French synonym for "Phenolum salicylicum."

Riedel's Berichte (Berl., 1906, p. 25) agrees with Schmidt that the melting point of salol is 42.5° C. In an air bath it melts at 43° C.

Smith, Kline & French Co. report on the examination of 15 samples of salol, many of which were rejected on account of their physical appearance and odor. The melting point of all the samples examined was from 42° to 43° C.—Lab. Rep., S. K. & F., 1906, p. 20.

Ohliger, Willard, reports salol of dark color and strong odor.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Caspari, Chas. E., reports 13 samples examined—11 U. S. P.—2 were off color.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Broadbent, W., (Practitioner, Lond., July) mentions the use of salol in sleeplessness resulting from gastro-intestinal fermentation.—J. Am. M. Ass., 1906, v. 47, p. 463.

PHOSPHORUS.

Enell, Henrik, discusses the quantitative determination of phosphorus in phosphorated oils.—Arch. f. Pharm. og Chem. Copenhagen, 1906, v. 13, pp. 9–12, 22–28.

Vanderkleed and Turner outline a method for determining phosphorus in phosphorated resin and other pharmaceutical preparations by oxidizing with fuming nitric acid.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 395, 396.

Smith, F. A. Upshur, in discussing the preservation of phosphorus suggests that a rectangular block of wood in which a round hole is cut, with a center bit, to within half an inch of the bottom, is useful for guarding bottles of phosphorous, sodium, and other dangerous solids from accidental injury.—Pharm. J., Lond., 1906, v. 22, p. 84.

Philips, C. D. F., (Med. Brief, St. Louis, 1906, XXXIV, 764) discusses the physiological actions and therapeutical uses of phosphorus and some of its compounds.—Reference from Index Med., 1906, p. 1312.

Pouchet and Chevalier (Soc. de Therap., 14/11/06; v. 10, p. 407, v. 11, p. 96) present a study of the pharmacodynamy of phosphorus and its organic compounds. A comprehensive abstract and their conclusions are presented in Bull. des sc. pharmacol., Par., 1906, v. 13 (Compt. rend. des. soc. sav.) pp. 72–118.

PHYSOSTIGMA.

Nelson, Burt E., describes and illustrates the characteristic structures of physostigma and outlines means for recognizing them microscopically.—Merck's Rep., N. Y., 1906, v. 15, p. 67.

Puckner, W. A., reviews some of the more recent literature relating to the assay of physostigma.—Pharm. Rev., Milwaukee, 1906, v. 24, p. 271.

The Ph. Brit. Committee of Reference in Pharmacy report on physostigma says, this drug will probably be omitted, and its alkaloid only retained.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Gordin, H. M., thinks the method unnecessarily complicated and suggests a method which he asserts is short and exact.—Am. J. Pharm., Phila., 1906, v. 78, pp. 456, 463. (See also Proc. Am. Pharm Ass., 1906, v. 54, p. 381.)

Beckurts (Apoth. Ztg.) outlines a method for the valuation of physostigma and extract of physostigma.—Pharm. Zentralh., 1906, v. 47, p. 325.

Moerk, Frank X., points out that the extract of physostigma is 13.33 times the strength of the drug, and that the tincture represents but 9.3 per cent of the contained alkaloids in place of representing 10 per cent of the drug.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

PHYSOSTIGMINÆ SALICYLAS.

A German patent awarded to E. Merck outlines a method for preparing a sulphite of eserine, which, it is claimed, will give aqueous solutions that are permanently colorless. Chem. Ind., Berl., 1906, v. 29, p. 41.

Riedel's Berichte (Berl., 1906, pp. 29, 30) presents a report of some comparative observations on the action of the official physostigmine sulphate and an acid sulphate. Physostigmine acid sulphate not alone has objectionable physical properties but also possesses decidedly weaker physiological activity.

Walton, C. E., suggests the use of physostigmine salicylate for hyperdistension following abdominal operations.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 214.

Panas and Scrini suggest the use of a solution of 0.05 to 0.10 physostigmine alkaloid in 10 gm. of olive oil, washed and sterilized as a myotic collyrium.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, p. 58.

White, Mark, reports the use of eserine to stimulate peristalsis in a dog.—Am. Vet. Rev., N. Y., 1906, v. 30, p. 374.

Martin, C. F., (N. York M. J., Sept. 15) mentions the use of small doses of the alkaloid of the ripe calabar bean in the treatment of the ataxia rectum.—J. Am. M. Ass., 1906, v. 47, p. 1054.

PHYTOLACCA.

Henkel, Alice, mentions *Phytolacca decandra* L., also known as *Phytolacca americana* L., commonly called phytolacca, poke, pokeweed, garget, scoke, and inkberry, as growing in rich, moist soil, Maine to Minnesota, south to Florida and Texas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 52.

Senft, Eman, describes the root of *Phytolacca decandra* and figures the characteristic structures that it contains.—Pharm. Post, Wien, 1906, v. 39, pp. 281–282, 293–295.

Kebler, L. F., shows that a so-called rheumatism cure, "Magic Foot Drafts," consisted largely of poke root and pine tar.—J. Am. M. Ass., 1906, v. 47, p. 1628.

PILOCARPINÆ HYDROCHLORIDUM.

Riedel's Berichte (Berl., 1906, p. 25) reports that pilocarpine hydrochloride melts at 196.5° C., and in an air bath at 199° C. As the salt is hygroscopic it is necessary to dry carefully.

Farner, A., points out that in the case of pilocarpine it will be necessary to differentiate between three isomers, pilocarpine, isopilocarpine, and metapilocarpine.—Schweiz, Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 616.

Moureu, Charles, reviews the literature, giving bibliographic references of pilocarpine, its salts and related substances.—J. de pharm. et de chim., Par., 1906, v. 24, pp. 111–113.

Utz asserts that it requires from 195.6 to 199° C. to melt pilocarpine hydrochloride.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

Spiegel, L., discusses the chemistry of pilocarpine.—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 161.

Helch, Hans, suggests a modification of his test for pilocarpine by the addition of a fragment of potassium dichromate.—Pharm. Post, Wien, 1906, v. 39, p. 314.

Panas and Scrini suggest the uses of a solution of 0.20 gm. of pilocarpine alkaloid in 10 gm. of olive oil as collyrium, in place of the corresponding aqueous solution.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, p. 58.

Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, p. 194, contains several references to the use of pilocarpine hydrochloride. See also the Index Medicus and the J. Am. M. Ass.

PILOCARPINÆ NITRAS.

Evans Sons Lescher and Webb, report on the examination of a sample of pilocarpine nitrate with the melting point at 165° C.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 27.

PILOCARPUS.

Weigel, G., calls renewed attention to the substitute for Paraguay jaborandi that appeared in Marseille, and asserts that these leaves have been offered on the drug market under the name "Feuilles de Bois d'Inde." He points out that "Bois d' Inde" is a designation that is applied in France to the wood of *Hæmatoxylon campechianum* L., a tree indigenous to Central America and the West India Islands.—Pharm. Zentralh., 1906, v. 47, p. 891.

Moureau, Ch., (J. de pharm et de chim., 1906) reviews the work done by Jowett, who says that javorin of Hannack and Meyer is only a mixture of pilocarpine, pilocarpidine, and isopilocarpine.—Pharm. Ztg., Berl., 1906, v. 51, p. 832.

Evans Sons Lescher and Webb, point out that two samples of the *P. microphyllus* variety of jaborandi leaves gave 0.765 and 0.783 per cent of alkaloid, respectively. They have not been able to obtain supplies of the official variety.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 21.

The Ph. Brit. Committee of Reference in Pharmacy report on jaborandi says, if retained, *Pilocarpus microphyllus* should be substituted for the present official variety and the galenical preparation standardized; leaves to give 0.5 to 0.75 per cent total alkaloid.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caesar and Loretz suggest the estimation of the moisture content of jaborandi, and outline a method for determining the alkaloids present.—Geschäft-Ber., von Caesar & Loretz, in Halle a. S., 1906, pp. 103, 104.

Puckner, W. A., reviews some of the recent literature relating to the assay of pilocarpus, and points out that the U. S. P. VIII method is satisfactory in that it avoids the use of aliquot parts.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 271, 272.

Lyons, A. B., reports that but 4 of the 12 replies received indicated that the U. S. P. VIII standard for fluid extract of pilocarpus is satisfactory.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Gordin, H. M., considers the method for the assay of the fluid extract unnecessarily complicated, and suggests a simpler and quicker one, using his separatory funnels.—*Ibid.*, v. 54, p. 380. See also Am. J. Pharm., Phila., 1906, v. 78, pp. 457–462.

Puckner, W. A., points out that the sand method prescribed in case of fluid extract of pilocarpus is antiquated; a method similar to that for fluid extract of belladonna gives good results and is more expeditious.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 441.

Eli Lilly & Co. are quoted as asserting that the U. S. P. VIII standard for fluid extract of pilocarpus is too low; it should be 0.75 gm. of alkaloid in 100 c. c.—*Ibid.*, v. 54, p. 440.

Francis, John M., thinks the standard, 0.4 per cent alkaloids, not by any means high. From 1895 to 1900 the average alkaloidal content of 22 lots of drugs was 0.55 per cent, only 3 samples containing 0.75 per cent or more; while from 1900 to 1905 the average content of 19 lots, representing about 8,000 pounds, was 0.81 per cent; 12 assayed above 0.75 per cent and only 1 below 0.5 per cent.—Bull. Pharm., Detroit, 1906, v. 20, p. 11. (See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 338.)

Caspari, Chas. E., reports 10 samples examined—8 contained less than 0.2 per cent alkaloids, 1 contained 0.67 per cent alkaloid, 1 contained 0.85 per cent alkaloid.—Proc. Missouri Pharm. Ass., 1906, p. 104.

Moerk, Frank X., points out that the fluid extract of pilocarpus represents but 80 per cent of the alkaloidal strength of the drug in place of 100 per cent, as is generally supposed.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Duval, A. A. P., reports some researches on the physiological and therapeutical characteristics of jaborandi plants. (Thèse phar. de Paris, 1905, No. 8, 130, p. 14.)—Biochem. Centralb., Leipz., 1906–7, v. 5, p. 707.

Webster, Herbert T., recommends specific jaborandi as an excellent adjunct to *Rhamnus californica* in rheumatism.—Eclectic Med. J., Cincin., 1906, v. 66, p. 119.

PILULÆ.

Caspari, Chas., jr., discusses the making of pills and the care necessary for their preservation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 263.

Taylor, S., says that pills have not received the amount of attention they require, and presents some notes that have been contributed.—Pharm. J., Lond., 1906, v. 23, p. 670.

An abstract (from Prnegl. lekarski, 1906, No. 31) recommends the use of mutton tallow as an excipient for pills that are designed to exert their action in the intestines. Mutton tallow is not affected in the stomach, but is readily dissolved in the intestine. A tallow having a melting point of about 45° C. should be used.—Pharm. Zentralh., 1906, v. 47, p. 806.

Byrd, P. W., (South. Drug. J., Jan., 1906, 30) finds most of the processes for salol-coated pills slow, produce a smooth and even coating with difficulty, and one that is brittle and easily broken. He recommends a method which, he believes, is free from these objections.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 649.

Trush, M. Clayton, thinks it unfortunate that a pill of iron, quinine, and strychnine was not introduced, as they are popularly prescribed in this form owing to the marked bitter taste of the liquid preparations.—Am. J. Pharm., Phila., 1906, v. 78, p. 33.

He regrets that the popular pill of aloin, belladonna, and strychnine with cascara was not admitted.—*Ibid.*, v. 78, p. 34.

PILULÆ ALOES.

Francis, John M., thinks the point has been reached where aloes may well be abandoned for an equivalent amount of aloin; it is obtainable of uniform quality, at low price, and practical experience shows that it is a wholly satisfactory substitute; moreover, the preference of the consumer is for a small pill.—Bull. Pharm., Detroit, 1906, v. 20, p. 143.

PILULÆ CATHARTICÆ COMPOSITÆ.

Francis, John M., asserts that the substitution of 20 gm. resin of jalap for 30 gm. of the extract amounts to almost doubling the jalap, for, on the basis of the yield from the drug, 20 gm. of resin is equivalent to approximately 60 gm. of extract.—*Ibid.*, v. 20, p. 143.

PILULÆ FERRI CARBONATIS.

Francis, John M., thinks glucose might well replace sugar and glycerin. When properly made and coated, Blaud's pills will keep indefinitely; he has assayed pills fourteen years old, which were still of full strength. Without a gelatin or sugar coating they deteriorate rapidly.—*Ibid.*, v. 20, p. 143.

The inspectors of pharmacies point out that while the homemade pills of ferrous carbonate are usually of good quality, the commercial Blaud's pills are quite unsatisfactory; they are not soluble in cold water and do not dissolve with effervescence in hydrochloric acid. As met with, they generally contain oxide of iron.—J. de pharm. d'Anvers., 1906, v. 62, p. 85.

Evans Sons Lescher and Webb report a test of the keeping properties of Blaud's pills, which were put aside for three years, and preserved their full activity. They were kept in ordinary corked pill bottles and no particular pains were bestowed upon their storage.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 10.

The Ph. Brit. Committee of Reference in Pharmacy suggest that the formula for pills of ferrous carbonate be amended, introducing glucose in place of sugar.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Scheinert, R., suggests that a portion or all of the potassium carbonate in the Ph. Germ. formula for pills of ferrous carbonate might be substituted by sodium carbonate.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 349.

An editorial calls attention to the fact that 1906 marks the seventy-fifth anniversary of the introduction of Blaud's pill and reproduces what is generally accepted as being the original formula.—Pharm. Ztg. Berl., 1906, v. 51, p. 911. (See also Pharm. J. Lond., 1906, v. 23, pp. 369, 406, 410.)

Kal, A., (Pharm. Weekbl., 1906) presents a formula for a liquid preparation containing approximately 1 per cent of ferrous carbonate in solution.—Pharm. Ztg., Berl., 1906, v. 51, p. 832.

PILULÆ FERRI IODIDI.

Francis, John M., thinks the average pharmacist will find this pill difficult to handle. Chemical action often continues for weeks after the pill is made so that it is liable to crack or blister. Before coating, dry the pills slowly and thoroughly in trays of powdered althæa or powdered licorice root.—Bull. Pharm., Detroit, 1906, v. 20, p. 143.

The inspectors of pharmacies report that they have repeatedly found pills of ferrous iodide that were deficient in iodide.—J. de pharm. d'Anvers, 1906, v. 62, p. 85.

PILULÆ LAXATIVÆ COMPOSITÆ.

The Alkaloidal Clinic is quoted as criticizing the formula for compound laxative pills, U. S. P. VIII, on the ground that the dose of extract of belladonna is enormously excessive, should not exceed $\frac{1}{32}$ grain, or, better still, be replaced by $\frac{1}{1000}$ grain of atropine.—New Idea, Detroit, 1906, v. 28, p. 9.

An editorial replying to an adverse criticism on the editorial columns of the Alkaloidal Clinic shows that the function of the Pharmacopœia is to set drug standards and establish formulas, not to set therapeutic standards. This pill has long been indorsed by medical authority, and it was not the function of the Revision Committee to change the formula. As to the licorice, this is a pharmaceutical necessity as a building agent.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 58.

PIMENTA.

Nelson, Burt E., figures and describes the microscopical appearance of powdered pimenta.—Merck's Rep., N. Y., 1906, v. 15, p. 321.

The Ph. Brit. Committee of Reference in Pharmacy suggests that an ash limit for pimenta be stated.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Thamm, R., reports finding from 4.25 to 4.86 per cent of sand-free ash in pimenta. Also discusses the composition of the ash.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, p. 168.

Sprinkmeyer and Fürstenberg found the content of sand-free ash in pimenta to vary from 4.12 to 5.21 per cent.—*Ibid.*, v. 12, p. 657.

Smith, Kline & French Co. report the following data from their examination of pimenta: Ash, 3.81 per cent; ash insoluble in hydrochloric acid, 0.01 per cent; ether extractive (nonvolatile), 6.4 per cent; crude fiber, 20.7 per cent.—Lab. Rep., S., K. & F., 1906, p. 35.

PIPER.

Nelson, Burt E., figures and describes the structural characteristics of the several parts of pepper.—Merck's Rep., N. Y., 1906, v. 15, p. 321.

Gehe & Co. discuss the importations of black and of white pepper in the principal European ports for the years 1903, 1904, and 1905; also the exports from Java for 1900–1901 to 1904–5, inclusive, and the exports from Singapore and Penang for 1903, 1904, and 1905.—Handels Ber., Gehe & Co., 1906, p. 44.

Hartwich, C., presents some observations on (1) the grain weight of pepper, (2) a foreign piperaceous fruit in black pepper, (3) partially destroyed pepper fruit, (4) contamination of black pepper with foreign seeds, (5) artificially colored black pepper.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 524–530.

Sprinkmeyer and Fürstenberg found the sand-free ash of black pepper to vary from 3.81 to 5.62 per cent, for white pepper they report a sand-free ash content of from 0.83 to 3.99 per cent. They also give other factors relating to the composition of the ash.—*Ibid.*, v. 12, p. 653.

The Ph. Brit. Committee of Reference in Pharmacy report on black pepper says the characters of the powder, ash yield, and oleoresin standard may be given.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Smith, Kline & French Co. report the following results of their examination of Singapore black pepper: Ash, 4.8 per cent; ash insoluble in hydrochloric acid, 0.8 per cent; ether extractive (nonvolatile), 7.35 per cent; crude fiber, 11.7 per cent; microscopically normal.—Lab. Rep., S., K. & F., 1906, p. 33.

Philipp Röder, Wien, reports examining six samples of pepper. The ash content in the air dry drug varied from 1.52 to 6.74 per cent, the minimum for black pepper being 4.68 per cent. Only one sample of black pepper came within the maximum 5 per cent ash, permitted by the Ph. Austr. VIII.—Pharm. Post, Wien, 1906, v. 39, p. 264.

Lührig and Thamm report examining 9 samples of black pepper and 10 samples of powdered pepper. The whole pepper, with one exception, varied in ash content from 4.67 to 5.28 per cent. The ash content of the powdered pepper varied from 4.56 to 5.67 per cent. They present a table containing additional analytical data.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 11, pp. 128–132.

Truffi, Ferruccio, reviews the literature relating to the adulteration of whole pepper and reports finding an evidently light-weight

Singapore pepper that had been coated with a mixture of flour, chalk, and umber so as to increase its size and weight. (From Bollett. Chimic. Farmaceut., 1906.)—Apoth. Ztg., Berl., 1906, v. 21, p. 796.

Teyxeira and Bimbi (Bull. Chim. Farm., 1906, pp. 68, 69) recently found in the market a natural pepper falsified by the addition of powdered marble. A second sample (*Ibid.*, 188, 189) was adulterated with farinaceous and collagenous materials.—Abstr. in Bull. des. sc. pharmacol. Par., 1906, v. 13, pp. 518–520.

Truffi, Ferruccio, reports the examination of an adulterated black pepper.—Bull. chim. farm. Milan, 1906, v. 45, pp. 521–528.

PIX LIQUIDA.

Caldwell, Paul, asserts that the formula for glycerite of tar is a very unsatisfactory one and suggests the addition of potassium carbonate. He also points out that wine of tar does not keep well, because there is not enough alcohol in the formula. Stronger white wine contains from 20 to 25 per cent of alcohol, but it is necessary to have 50 per cent of alcohol in order to insure the permanency of the preparation.—Drug. Cir. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

Gottheil, William S., states that he has found tar externally as useful as chrysarobin in the treatment of psoriasis.—J. Am. M. Ass., 1906, v. 47, p. 1637.

PLUMBUM.

Mayer, O., describes a method for the volumetric estimation of lead, which depends on the precipitation of the lead with an excess of volumetric solution of potassium chromate and determination of the excess of chromate by the iodometric method.—Pharm. Ztg., Berl., 1906, v. 51, p. 299.

White, John, presents a study of two complex salts of lead containing chlorine.

White & Nelson also present a study of the reactions involved in the formation of certain complex salts of lead.—Am. Chem., J., 1906, v. 35, pp. 217–227, 227–235.

Quellien, Paul, (Thèse de Paris, 1905, No. 151, p. 48) shows that saturnism is accompanied by increased blood pressure. With the increase of the disease the blood pressure rises.—Abstr. in Biochem, Centralbl., Leipz., 1906–7, v. 5, p. 133.

Simon and Spillman discuss the alterations in the blood in experimental saturnism.—Compt. rend. Soc. de biol., Par., 1906, v. 60, p. 765.

Deléaide and Dubois (Presse Méd. Par., v. 14, No. 13, 1906) discuss saturnine intoxication and its treatment.—J. Am. M. Ass., 1906, v. 46, p. 1243.

PLUMBI ACETAS.

An abstract from a German patent specification outlines an economic method for the production of lead acetate.—Chem. Repert. Cöthen, 1906, v. 30, p. 282.

Caspari, Chas. E., reports three samples examined—two U. S. P., one contained sulphide.—Proc. Missouri Pharm. Asso., 1906, p. 100.

Collins, C. D., recommends the use of a 5 or 10 per cent solution of lead acetate as a palliative measure in the treatment of pruritus vulvæ.—Trans. Am. Inst.. Homœop., 1906, v. 62, Part II, p. 286.

PLUMBI OXIDUM.

Wiebelitz, H., asserts that the solution of lead oxide in diluted nitric acid is not complete and that the pharmacopœia should permit a slight residue.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

PODOPHYLLUM.

Henkel, Alice, mentions *Podophyllum peltatum* L., commonly known as podophyllum, May-apple, wild mandrake, American mandrake, and wild lemon, as being found in rich woods, from Canada to Minnesota, south to Florida and Texas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 53.

Francis, John M., thinks the pharmacopœia should include a standard of quality, if for no other reason than that it may serve as a basis for standardizing the fluid extract. The drug is more scarce than formerly and the quality has deteriorated.—Bull. Pharm., Detroit, 1906, v. 20, p. 143.

Beille, L., asserts that the root of *Podophyllum emodi* Vall. is being sold on the London market, where its value is considered to be equal to the American root from *Podophyllum peltatum*, L.—Bull. Soc. de Pharm. de Bordeaux, 1906, v. 46, p. 172.

Smith, Kline & French Co. report that in 6 samples of podophyllum root examined the average resin content was 5.1 per cent.—Lab. Rep., S., K. & F., 1906, p. 19.

Francis, John M., thinks the menstruum for fluid extract of podophyllum weak, and not so good a solvent for the resinous active principle of the drug.—Bull. Pharm., Detroit, 1906, v. 20, p. 11.

See also under Resina Podophylli.

POTASSIUM.

Precht, H., reviews the development of the potassium industry in the Stassfurt district.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, pp. 1–7.

Jänecke, Ernst, discusses the formation of the potassium deposits in the Stassfurt district.—*Ibid.*, v. 19, pp. 7–14.

Blasdale, W. C., describes the Stassfurt salt industry and presents some data regarding the composition of the ore, the material as found, and the manufacture of pure potassium salts.—Chem. Eng., Phila., 1906–7, v. 5, pp. 59–65.

Leffmann, Henry, points out that "eikonogen," a sodium naphthol sulphonate, is freely soluble in water, while the corresponding potassium compound is but sparingly soluble and that this substance can, therefore, be used as a reagent for potassium salts.—Proc. Pennsylvania Pharm. Ass., 1906, p. 162.

Additional reagents and tests for potassium are referred to in the Exper. Sta. Rec., 1906–7, v. 18, pp. 608, 708, 909, 1037, etc.

POTASSII ACETAS.

The Ph. Brit. Committee of Reference in Pharmacy report on potassium acetate says the formula given does not represent the substance actually in use, which can not, on a technical scale, be rendered anhydrous without decomposition. An allowance of 10 per cent water on drying at 110° C. would be reasonable.—Chem. & Drug., Lond., 1906, v. 69, p. 684.

Patch, E. L., reports examining four samples of potassium acetate. One contained 2.32 per cent of absolute acetic acid in excess and three contained 0.26, and 0.22, and 0.89 per cent of chloride, with trace of sulphate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Caspari, Chas. E., reports 13 samples examined—3 U. S. P., 4 contained metallic impurities, and 6 arsenic.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Bulkley, L. Duncan, states that potassium acetate is often of great value in the treatment of psoriasis, especially in the congestive forms. It may be combined with nux vomica and other drugs.—J. Am. M. Ass., 1906, v. 47, p. 1634.

Additional references on the use of potassium acetate are included in the Index Medicus and the J. Am. M. Ass.

POTASSII BICARBONAS.

Klienhans, F. A., states that he has used potassium bicarbonate on himself in the treatment of psoriasis. Sometimes the remedy affords relief and at other times it has no effect.—J. Am. M. Ass., 1906, v. 47, p. 1638.

POTASSII BITARTRAS.

Philipp Röder, Wien, outlines a method for the titrimetric determination of tartaric acid in potassium bitartrate.—Pharm. Zentralh., 1906, v. 47, p. 522.

Evans Sons Lescher & Webb state that the quantity of lead in cream of tartar is very seldom over 0.001 per cent, and that the arsenium is invariably below three parts per million. A sample of "cream of tartar" which they were asked to identify was found to be superphosphate of calcium.—Analytical Notes. 1906. E. L. & W., Lond., 1907, pp. 16, 17.

Bell, J. Carter, points out that for potassium bitartrate there is a fairly comprehensive list of possible impurities—among them, acid phosphate of lime, sulphate of soda, and maize starch.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 549.

Sayre, Lucius E., reports that one sample of potassium bitartrate sold as "commercial" consisted of acid phosphate and sulphate of calcium, starch, etc.—Bull. Kansas Bd. Health, 1906, v. 2, p. 174.

POTASSII BROMIDUM.

Wiebelitz, H., suggests that the tests for purity, in the case of potassium bromide, be directed to be made on 2 gm. of the substance, previously dried at 100° C. The salt to be dissolved in sufficient distilled water to make 100 cc. and the required quantity of this solution taken not less than 25 cc. for titration with tenth normal sulphuric acid to determine the limit of alkali.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Cormimboeuf, H., discusses the analysis of potassium bromide.—Ann. de chim. analyt., Par., 1906, v. 11, pp. 131–134.

The Ph. Brit. Committee of Reference in Pharmacy recommends to modify the potassium bromide thiocyanate test as suggested by F. A. Upshur Smith.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caspari, Chas. E., reports three samples examined; all contained excess of chloride.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Skoog, A. L., states that Spratling analyzed some thirty "patent medicine" preparations on the market, so-called cures for epilepsy, and potassium bromide was found to be the chief ingredient in every case. A large number of diseases is mentioned in which potassium bromide is used.—J. Am. M. Ass., 1906, v. 47, p. 1821.

Butler, George F., calls attention to many of the disadvantages of potassium bromide in the treatment of epilepsy, such as destruction of the mentality, weakening the heart, impoverishing the blood, impairing sexual function, and making the patient altogether miserable.—*Ibid.*, v. 47, p. 1481.

Robinson, W. J., cites a case of impotence and general ill health resulting from the use of bromo seltzer, which he treated.—*Ibid.*, v. 47, p. 508.

Gordon, Alfred, states that reduction of the sodium chloride in the diet gives better results in the treatment of epileptics when the bromides are administered than when these are not given.—N. York M. J., 1906, v. 84, p. 774.

Additional references on the use of potassium bromide will be found in the Index Medicus and the J. Am. M. Ass.

POTASSII CARBONAS.

The Ph. Brit. Committee of Reference in Pharmacy points out that commercial potassium carbonate is a mixture containing about 16 per cent of combined water.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Evans Sons Lescher & Webb point out that potassium carbonate often contains a dangerous amount of arsenic.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 27.

Ohliger, Willard, reports potassium carbonate containing excess of chlorides.—Proc. Michigan Pharm. Ass., 1906, p. 48.

POTASSII CHLORAS.

An abstract (from la Rev. de chim. industr.) outlines the production of alkaline chlorates simultaneously with bichromates by means of chlorine.—Oil, Paint, and Drug Rep., 1906, Jan. 1, p. 22.

Barnard, H. E., reports that of nine samples of potassium chlorate examined five were pure and four below standard.—Rep. Indiana Bd. Health, 1906, pp. 390.

Simon & Spillman report the results of experiments from which they conclude that chlorate of potassium is an energetic blood poison.—Compt. rend. Soc. de biol. Par., 1906, v. 61, p. 241.

Albrecht (Sem. Méd. Paris, 29/XI/05) reports fatal intoxications with small doses of potassium chlorate.—Dental Cosmos, Phila., 1906, v. 48, p. 360.

Koster, Leiden, discusses the use of potassium chlorate in the eye. In 3 per cent solutions it acts as an astringent and as a disinfectant. (From Zeitshr. f. Augenhke., 1906, v. 15, p. 6.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 628.

POTASSII CITRAS.

The Ph. Brit. Committee of Reference in Pharmacy report on potassium citrate says:

> The formula of this salt contains one molecule of water of crystallization; the volumetric requirements do not correspond to the formula given and should be altered. The anhydrous salt can be obtained only with difficulty.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., reports on a sample of potassium citrate which contained 0.26 per cent of chloride with 0.42 per cent of free citric acid.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Caspari, Chas. E., reports four samples examined; all contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Francis, John M., considers the new "pan" granulation superior in both appearance and stability to the formerly official effervescent potassium citrate.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

Tyson, James, states that potassium citrate is the best drug for abnormally scanty urine in chronic nephritis, but he believes that in the main more harm than good has probably been done by drugs in chronic nephritis.—N. York M. J., 1906, v. 83, p. 223.

Additional references on the use of potassium citrate will be found in the Index Medicus and the J. Am. M. Ass.

POTASSII DICHROMAS.

An abstract (from la Rev. de chim. Industr.) outlines a method for producing alkaline dichromates simultaneously with chlorates by treating a solution of normal chromate with chlorine.—Oil, Paint, and Drug Rep., 1906, Jan. 1, p. 22.

Kollo, Konstantin, discusses the use of potassium dichromate as the basis of titration and its comparative usefulness for the standardization of volumetric solutions.—Pharm. Prax., 1906, v. 5, pp. 437–439.

Schreinemakers, F. A. H., (Z. physik. Chem., 1906, v. 55, pp. 77–98) states that 100 gm. of water at 30° C. will dissolve 64.91 gm. potassium chromate, and 18.12 gm. potassium dichromate.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 313.

Mucha, V., gives the pathologic-anatomic findings; Zdarek, E., the results of the chemic analysis in a case of poisoning by dichromate and one by chromic acid. (Vierteljahrsschr. f. gerichtl. Med. usw., 1906, v. 31, Supplement.)—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 133.

Leming, William, (Modern Eclecticism) uses bichromate of potash in ulcerative conditions of the upper bowel, with yellow-coated tongue, reddish tissues, and secretion of a glutinous material.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, p. 441.

Chiron, Paul, (L'Art Méd.) recommends Kali bichr. in sciatica of the left side, principally in men (Puls. for women).—Abstr. Hahnemann Month., Phila., 1906, v. 41, p. 879.

POTASSII HYDROXIDUM.

Caspari, Chas. E., reports five samples examined—four U. S. P.; one contained excess of carbonate.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Robinson, A. R., states that caustic potash is one of the most efficient agents in the treatment of cancer, causing rapid liquefaction of the tissues and an intense inflammation with much serious transudation, with destructive action upon the pathological epithelial cells lying in the lymph spaces.—N. York M. J., 1906, v. 84, p. 1260.

Van Hartingen, A., (J. Cut. Diseases, N. Y., August) reports his results in the treatment of 55 cases of epithelioma by the use of caustic potash, the results being satisfactory in the majority of cases.—J. Am. M. Ass., 1906, v. 47, p. 720.

POTASSII HYPOPHOSPHIS.

Caspari, Chas. E., reports two samples examined; both contained excess of alkali.—Proc. Missouri Pharm. Ass., 1906, p. 101.

POTASSII IODIDUM.

Wiebelitz, H., points out that the Ph. Germ. test for carbonate should prescribe the dissolving of the potassium iodide in recently boiled distilled water.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Baroni, E., (Boll. chim. farm., 1906, fasc. 14, p. 529) criticises the Tassinari method of the Ph. Ital. for detecting nitrates in potassium iodide.—Abstr. in J. de pharm. et de chim., Par., 1906, v. 24, p. 552.

Francis, John M., says that up to the present date manufacturers seem to have found it almost impracticable to meet the pharmacopœial limitations as to free alkali and iodate.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

Graham, Willard, reports that potassium iodide was found to be reasonably pure. The alkalinity was generally slightly above the U. S. P. limits, sulphates were present in most instances and the granular form was usually found to be contaminated with sodium iodide.—Proc. Pennsylvania Pharm. Ass., 1906, p. 156.

Patch, E. L., found two lots of potassium iodide containing iodate. One of these samples did not show presence of iodate in 5 per cent solution, but gave distinct evidence of the presence of the contamination in 10 per cent solution.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Caspari, Chas. E., reports 78 samples examined—29 U. S. P., 14 contained iodate and metallic impurities, 19 contained iodate, 15 an excess of alkali, and 1 iodate and excess of alkali.—Proc. Missouri Pharm. Ass., 1906, p. 98.

Féré and Tixier discuss the elimination of iodine after ingestion of the iodide.—Compt. rend. Soc. de biol., Par., 1906, v. 60, pp. 189, 1024.

Lefschitz, Sophie, (Arch. f. Dermatol. u. Syphilis, 75–353–77) reports observations on the elimination of iodine after large doses of potassium iodide.—Jahresb. u. Tier Chem. for 1906, Wiesb., 1907, v. 36, p. 129.

Miles, T. Willis, says iodide of potassium is one of our greatest glandular sitmulants. It favors retrogade metamorphosis and elimination, hence its wide range of use in chronic ailments.—Eclectic Med. J., Cincin., 1906, v. 66, p. 465.

Brooks, H., uses potassium iodide in the treatment of coronary sclerosis.—J. Am. M. Ass., 1906, v. 47, p. 1594.

Additional references on the use of potassium iodide will be found in the Index Medicus and the J. Am. M. Ass.

POTASSII NITRAS.

An abstract (from Ztschr. ang. Chem.) points out that the production of Chile saltpeter in 1905 amounted to 16,946,646 quintals, an increase of 802,307 quintals over the year preceding.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 146.

Mehrtens, C. Paal and Gustav, review some of the efforts to devise a satisfactory method for estimating potassium nitrate in meat products. They outline a method based on the use of nitron.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1906, v. 12, pp. 410–416.

Evans Sons Lescher and Webb assert that they have found potassium nitrate to be practically free from arsenic contamination.—Analytical Notes for 1906, E. L. & W., Lond., 1907, p. 27.

POTASSII PERMANGANAS.

Baxter, Boylston and Hubbard report experiments on the solubility of potassium permanganate, describe their methods, and present their results in a table and platted on a chart. At 24.8° C. the average of the determinations was found to indicate a solubility of 7.055 per cent of $KMnO_4$.—J. Am. Chem. Soc., 1906, v. 28, pp. 1336–1343.

Patterson, Austin M., contributes a note on the solubilities of the permanganates of the alkali metals and records his observations. The specific gravity of the saturated solution of potassium permanganate at 15° C. is 1.035, and 100 cc. solution contains 5.22 gm. of the dissolved salt.—*Ibid.*, v. 28, pp. 1734–1736.

Voerman, G. L. (Chem. Weekblad, 1905, v. 2, 766, 767; Chem. Centr., 1906, v. 1, pp. 124, 125), has determined the solubility of potassium permanganate in water. At 15° C. water is capable of dissolving 4.95 per cent of this salt.—Abstr. in J. Soc. Chem. Ind., Lond., 1906, v. 25, p. 120.

Klein, Joseph, outlines a method for the estimation of formic acid by means of potassium permanganate. (Chem. Ber., 1906, v. 39, pp. 2640, 2641.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 764.

Garner & King report on the germicidal action of potassium permanganate.—Am. Chem. J., 1906, v. 35, pp. 144–147.

Voerner, Hans, (La Odont, Madrid, August, 1906) employs potassium permanganate, either in solution, in powder, or as a paste in minor surgical operations.—Dental Cosmos, Phila., 1906, v. 48, p. 1162.

Felter, Harvey Wickes, says that eclectic physicians and surgeons have always been partial to potassium permanganate as an antiseptic cleansing agent, preferring it over such drugs as corrosive sublimate, iodoform, and carbolic acid. He adds a caution as to the proper dispensing of the drug.—Eclectic Med. J., Cincin., 1906, v. 66, p. 588.

Wellman, F. C., describes his successful treatment of a case of snake bite with potassium permanganate placed in the wound left by excising the tissues about the bite. The bite of the snake, ombuta, was supposed to be fatal.—N. York M. J., 1906, v. 83, p. 1295.

Additional references on the use of potassium permanganate will be found in the Index Medicus and the J. Am. M. Ass.

POTASSII ET SODII TARTRAS.

The Ph. Brit. Committee of Reference in Pharmacy report on potassium tartrate points out that the formula should contain half the water shown in the Ph. Brit. The figures in the volumetric test are based upon the incorrect formula.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Kebler, Lyman F., says that the chief impurities of Rochelle salts during the past year have been dirt and metallic lead.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 349.

Ohliger, Willard, reports Rochelle salt that was dirty and contained a large amount, apparently, of chaff, and some hard granular white substance not soluble in boiling water.—Proc. Michigan Pharm. Ass., 1906, p. 48.

POTASSII SULPHAS.

Patch, E. L., reports that one lot of potassium sulphate had 0.4 per cent of chloride; another 0.05 per cent.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 334.

PRUNUS VIRGINIANA.

Henkel, Alice, mentions *Prunus serotina* Ehrh., also known as *Prunus virginiana* Mill, not of Linnæus, commonly called prunus virginiana, wild cherry, and rum cherry, as growing in woods or open places from Ontario to Florida, west to Texas and Dakota. Most abundant in the Southwestern States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 56.

According to Lyons, A. B., every botanist knows that *Prunus virginiana* is a misnomer, and yet it is retained in successive editions of the pharmacopœia because so universally used.—Bull. Pharm., Detroit, 1906, v. 20, p. 39.

Schneider, Albert, points out that the bark of the *Prunus* species is used medicinally by the Indians, and that the wild cherries are used as a tonic and diuretic. Occasionally an alcoholic drink is made from the fruit.—Merck's Rep., N. Y., 1906, v. 15, p. 127.

Holmes, E. M., calls attention to a false *Prunus serotina* bark which has appeared in the English market and points out that a number of the North American species of *Prunus* are difficult to distinguish, and for this reason it would be difficult to identify the particular bark under consideration.—Pharm. J., Lond., 1906, v. 22, p. 315.

Lyons, A. B., asserts that a fluid extract of wild cherry made according to the U. S. P. VIII is unsatisfactory in that it precipitates badly. Meyer Brothers suggest that repercolation would offer a better means of entirely exhausting the drug.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 443.

Francis, John M., thinks the method and the product a great improvement.—Bull. Pharm., Detroit, 1906, v. 20, p. 11.

The Ph. Brit. Committee of Reference in Pharmacy concludes that the formula for syrup of wild cherry requires revision.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Taylor, S., quotes Greenish to the effect that the processes of Lucas and Flett offer no advantage over the present official process.—Pharm. J., Lond., 1906, v. 23, p. 670.

England, Joseph W., considers the syrup of wild cherry of the U. S. P. VIII distinctly inferior to those formerly official and recommends the use of the formula of 1890 slightly modified.—Am. J. Pharm., Phila., 1906, v. 78, pp. 267–270. (For discussion, see *Ibid.*, v. 78, p. 349.)

Dunning prefers the old to the new formula for the preparation of syrup of wild cherry, and thinks the formula will probably be changed back in the next revision because of the great amount of criticism that has appeared.—Proc. Maryland Pharm. Ass., 1906, p. 93.

Klie, G. H. Chas., criticises the change that has been made in the method of preparing syrup of wild cherry. He advises a return to the former method of adding the glycerin to the menstruum for exhausting the drug.—D.-A. Apoth. Ztg., N. Y., 1906–7, v. 27, p. 74.

PULVIS ACETANILIDI COMPOSITUS.

Francis, John M., referring to the criticisms elicited by the inclusion of this mixture, thinks that so long as the public insists upon consuming headache powders in such enormous quantities, pharmacists may as well have an official formula for preparing the product. He thinks the formula would have been improved by the addition of monobromated camphor.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

PULVIS CRETÆ COMPOSITUS.

An editorial points out that the use of powdered acacia in connection with the compound chalk powder frequently is the cause of fermentation, in the compound chalk mixture, and thus might have a directly opposite action from that intended.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 77.

PULVIS EFFERVESCENS COMPOSITUS.

Patch, E. L., reports examining several samples of Seidlitz powder. One contained 50 per cent of Rochelle salt and 50 per cent of sodium bicarbonate in the blue paper; in another the blue papers were each 15 grains short in weight. Another sample contained 60 per cent of Rochelle salt and 40 per cent of sodium bicarbonate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Liverseege, J. F., reports that the examinations of Seidlitz powders have not been at all satisfactory. One of the samples found contained only one-half of the proper quantity of tartaric acid and one-third of the right amount of Rochelle salt, while the sodium bicarbonate was twice as much as it should have been. The box bore the following impudent label: "Caution to the public—thousands of boxes of a common imitation of the genuine Seidlitz powders are being sold by unprincipled traders for extra profit. We guarantee all our powders to be genuine."—Yearbook of Pharmacy, 1906, p. 270.

PULVIS GLYCYRRHIZÆ COMPOSITUS.

"Northport" suggests the inclusion of powdered ginger in compound licorice powder to prevent the senna griping; he would add 1 oz. powdered ginger instead of 1 oz. powdered sugar, leaving 5 oz. in the Ph. Brit. formula.—Pharm. J., Lond., 1906, v. 23, p. 291.

Alcock, F. H., presents the results of his experiments to determine how much sulphate would be ordinarily contained in compound licorice powder, and a method for the estimation of sulphur; he thinks the carbon disulphide process undesirable.—*Ibid.*, v. 23, p. 485.

PULVIS TALCI SALICYLICUS N. F.

Lefeldt, Max., points out that the Ph. Germ. requirement for the salicylated talcum powder should permit of a reddish tint as the talc is seldom free from traces of iron.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 341.

PYROGALLOL.

Riedel's Berichte (Berl., 1906, p. 25) reports the melting point of recrystallized and carefully dried pyrogallol to be 132° C., in an air bath 132.5° to 133° C.

Lefeldt, Max, suggests that the Ph. Germ. require that pyrogallol be free from odor. He has met with samples having a cyanide odor.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 341.

PYROXYLINUM.

An unsigned article records the origin and history of gun cotton, its discovery in 1832 by the French chemist Braconnot and by Pelouze in 1838, and the attempts at practical application made by Schönbein in 1846.—Sc. Am. Suppl., 1906, v. 61, pp. 25447, 25448.

Lunge, G., discusses the production and the properties of pyroxylin.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, part 2, pp. 2051–2058.

An unsigned article describes the production of gun cotton of various grades, the production of soluble gun cotton, and enumerates the solvents for the latter.—Sc. Am. Suppl., 1906, v. 61, pp. 25394, 25507.

QUERCUS.

Henkel, Alice, mentions *Quercus alba* L., commonly called quercus, white oak, and stone oak, as being found in woods from Maine to Minnesota, south to Florida and Texas; more abundant in the Middle States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 57.

Schneider, Albert, states that the fresh galls of the oak are used by th Indians for sore eyes and the bark to check diarrhœa.—Merck's Rep., N. Y., 1906, v. 15, p. 127.

Berthelot discusses the insoluble potassium compounds that exist especially in the leaves, in preference to the trunk (wood and bark).—Compt. rend. Acad. des Sc., Par., 1906, v. 142, pp. 313–316.

QUILLAJA.

An editorial reviews the efforts that are being made to induce East Indian planters to devote a part of their acreage to the growing of soap bark.—Oil, Paint and Drug Rep., 1906, v. 70, July 30, p. 7.

Holmes, E. M., calls attention to a quillaia bark quite different in appearance from that usually met. He describes the characteristics of the bark and suggests that it is probably derived from a different species of *Quillaia*, as there are two other species indigenous to Chili, whence *Quillaia saponaria* is derived.—Pharm. J., Lond., 1906, v. 22, p. 315.

Hemmans, L. F., (Brit. M. J., Lond., i, p. 318) discusses the use of quillaia as an emulsifying agent.—Reference from Index Medicus, 1906, p. 277.

Zickgraf discusses the use of a decoction of quillaja in the treatment of the upper respiratory passages and concludes that in the majority of cases of chronic bronchitis and of emphysema the local use of a decoction of quillaja, as a gargle, is a harmless and excellent expectorant.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 160–163.

QUININA.

Francis, John M., finds the specifications for quinine salts, while practically the same, more accurate than heretofore, with the exception of the test for the secondary alkaloids.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

Gehe & Co. discuss some of the peculiar conditions prevailing in the market for quinine, give a table showing the amount of bark, and the approximate quinine content of the bark offered in Amsterdam, also a table showing the decrease of export of quinine from Germany.—Handels-Ber., Gehe & Co., 1906, pp. 67, 68.

A report on the drug market presents a number of interesting facts relating to the economic conditions prevailing in the cinchona and quinine markets.—Oil, Paint and Drug Reporter, 1906, Jan. 29, v. 69, part 2, p. 33.

An editorial discusses the price of quinine and states that the consumption of quinine has greatly decreased in 1905, probably owing to the war on mosquitoes, but Java exported the largest amount of cinchona bark on record.—Brit. M. J., Lond., 1906, v. 1, p. 1370.

Gordin, H. M., reviews the progress made in the chemistry of quinine during the year 1905.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 370, 371.

Legradi, Th., discusses the chemistry and the probable constitution of quinine and cinchonine.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, pp. 187–188, 203–204, 215–217.

Herder, M., discusses the use of calcium and barium-mercuric iodides as microchemical reagents for quinine.—Arch. d. Pharm., Berl., 1906, v. 244, p. 120.

Deniges, G., discusses the influence of halogen salts on the fluoresence of quinine sulphate solutions and presents the results of some experimental work to determine the amount of halogen salts necessary to cause the disappearance of fluorescence.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 129–133.

Führer, Hermann, discusses the application of the thalleioquin reaction to quinine and its relation to bodies derived from *p*-oxychinolin.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 602–622.

Patch, E. L., points out that the quinine called for by the U. S. P. is the trihydrated alkaloid. Market salts may contain 12 to 22 per cent excess of water, and the pharmacist should estimate the value of his purchase.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 329.

Blome, W. H., found a sample which contained more cinchonine and cinchonidine than is permitted by the pharmacopœia.—Proc. Michigan Pharm. Ass., 1906, p. 104.

Evans, John, outlines a process for the determination of quinine in the wine, which he says should contain 10 to 12 per cent of alcohol and be free from preservatives. Several cases have been recorded in which alcohol was absent and salicylic acid present.—Apothecary, Boston, 1906, v. 18, p. 908.

Roch, M., (Semaine Méd.) elaborates on a suggestion, made by Yvon, to mask the taste of quinine by mixing the drug with a fatty substance and proposes boluses of quinine with oil of theobroma. The bolus is to be taken with hot milk.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 395.

Laqueur, Ernst, presents a study of the action of quinine on ferments with a particular consideration of its probable effect on metabolism.—Arch. f. exper. Path. u. Pharmakol., 1906, v. 55, pp. 240–261.

Rodriguez Carracido, José, (Rev. de la R. Acad. de Ciencias, v. 3, pp. 141–148; An. de la Soc. esp. de fis. y quim. Madrid, 1905, v. 3, pp. 276–283) discusses the action of quinine and pilocarpine on oxidases.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 130.

Schmitz, Richard, discusses the elimination of quinine in the urine, the form in which it is eliminated, the quantity eliminated, the elimination following subcutaneous administration, the elimination of quinine in the fœces, and finally presents his conclusions.—Arch. exper. Path. u. Pharmakol., 1906, v. 56, pp. 301–313.

Morgenbesser, H., experimenting on himself, found that quinine caused a decreased excretion of nitrogen, confirming the more generally held opinion that it decreases the metabolism.—N. York M. J., 1906, v. 83, p. 762.

Brem, Walter V., states that the treatment of malarial hæmoglobinuria may be summed up in the word quinine. The 1,107 malarial patients received as routine treatment from 20 to 40 grains of quinine daily.—J. Am. M. Ass., 1906, v. 47, pp. 1992–1997.

QUININÆ HYDROCHLORIDUM.

Carrette states that the neutral quinine chlorhydrate when crystallized in water contains 2½ molecules of water of crystallization, but when crystallized in alcohol its composition is different, and so the quantity of quinine in the compound varies.—J. de pharm. et de chim. Par., 1906, v. 23, p. 134.

Lebeaupin, in a report to the therapeutic society, urges the necessity for the use of soluble neutral salts of quinine for hypodermic injections, the avoidance of any fault of asepsis and injection deep into the muscle.—J. de pharm. et de chim. Par., 1906, v. 24, pp. 42, 43.

Brem, Walter V., reports that he found the intramuscular injection of quinine bihydrochloride caused less irritation than did that of the bimuriate and urea, but that neither caused great discomfort.—J. Am. M. Ass., 1906, v. 47, p. 1904.

Guigues, P., following up his studies of the incompatibility of quinine and acetate of ammonia, has produced neutral and basic formiates of quinine and describes their characters.—J. de pharm. et de chim. Par., 1906, v. 24, p 301.

Bretau, in criticising Guigues's results, showed that, under the influence of heat, the basic formiate loses all its formic acid and is transformed into a hydrate of quinine.—*Ibid.*, v. 24, p. 493.

Lacroix, H., adds some further remarks on the same subject.—*Ibid.*, v. 24, p. 377.

QUININÆ SULPHAS.

Dohme, A. R. L., points out that owing to objections made by manufacturers of quinine the Committee of Revision of the U. S. P. did not see its way clear to adopt the standard official in the Ph. Germ. IV. While the present U. S. P. standard is better than it was it is not what it should be, as it enables Germany to unload on the United States all quinine sulphate that will not meet the Ph. Germ. IV requirements.—Am. Druggist, N. Y., 1906, v. 49, p. 267.

The Ph. Brit. Committee of Reference in Pharmacy report on quinine sulphate says the Ph. Brit. test should be replaced by that in the French Codex, which is more easily carried out. The Ph. Brit. standard requires a less pure quinine sulphate than any other important pharmacopœia. The 3 per cent of cinchonidine obtained in the assay indicates the presence of more than twice the amount in the sample.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Biginelli, P., points out a cause of error in the determination of quinine in quinine sulphate and discusses the influence of various factors on the final results.—Boll. chim. farm., Milan, 1906, v. 45, pp. 253–260, 372–375, 489–493, 604–606, 708–711.

Dunlop, Thomas, notes that quinine sulphate with phenazone remains insoluble, but on the addition of citric acid a perfect and permanent solution is produced.—Pharm. J., Lond., 1906, v. 23, p. 144.

Gane, E. H., reports finding four samples of quinine sulphate which did not pass the U. S. P. ammonia test.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Sayre, L. E., reports that three out of five samples examined contained a slight excess of other cinchona alkaloids.—Bull. Kansas Bd. Health, 1906, v. 2, p. 175.

RESINA.

Herty, Chas. H., discusses the composition of rosin and reviews some of the literature relating to it.—Chem. Eng., Phila., 1906–7, v. 5, pp. 235, 236.

An editorial discusses the economic conditions prevailing and presents a table giving high and low quotations for each month during 1904, 1905, and 1906.—Oil, Paint, and Drug. Rep., 1906, v. 70, Dec. 3, p. 7.

RESINA PODOPHYLLI.

The Ph. Brit. Committee of Reference in Pharmacy report on resin of podophyllum says the question of the exclusion of Indian podophyllin is a matter requiring further consideration. The committee does not know of a satisfactory test to distinguish the one variety from the other.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Dott, D. B., discusses the difference in the behavior of the resinoid from *Podophyllum emodi* from that obtained from *Podophyllum peltatum* when they are dissolved in water of ammonia.—Pharm. J., Lond., 1906, v. 23, p. 431.

Lenton, Walter H., welcomes the above note and says that the examination of a large number of samples, representing many thousand pounds of root, leads him to suggest that a 10 per cent limit of insoluble matter errs well on the side of leniency.—*Ibid.*, v. 23, p. 478.

Martin, G., asserts that podophyllin may be grossly adulterated and still meet the U. S. P. tests. The yellow variety is precipitated by alum. The solubilities do not conform to the U. S. P., and it contains less than 1 per cent of ash. The brown variety is precipitated with hydrochloric acid and is nearly of equal merit with the U. S. P.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

Patch, E. L., reports examining a number of samples of podophyllin which varied from being completely soluble in alcohol to a residue of from 1 to 5.6 per cent insoluble in alcohol.—*Ibid.*, v. 54, p. 344.

Vanderkleed, Charles E., finds that much of the resin of podophyllin on the market tests only 90 to 95 per cent alcohol soluble. One manufacturer reported inability to make resin of podophyllin above 95 per cent alcohol soluble.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

French, Harry B., asserts that much of the resin of podophyllum, or "podophyllin" as it is popularly called, is made with acetone and not with alcohol, as the pharmacopœia directs. He points out that though acetone does generally have the same solvent properties as alcohol, resin of podophyllin being a mixture of different proximate principles, it remains to be proven that the acetone product is as active physiologically as the alcohol product.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 302.

An unsigned report gives details relating to a fatal case of poisoning from 18 grains of podophyllin.—Australas. J. Pharm., Melbourne, 1906, v. 21, pp. 254, 255.

In the case of poisoning of a workman, a coroner's jury rendered a verdict of death from podophyllin poison inadvertently taken.—Pharm. J., Lond., 1906, v. 23, p. 311.

Leming, William, (Modern Eclecticism) recommends podophyllin where there is general atonicity, with glandular sluggishness and dry, hard stools, the tongue full, generally pale and coated at the base.—Abstr. Eclectic Med. J., Cincin., 1906, v. 66, p. 441.

Watkins says that podophyllin is adapted to that uncertain condition called "billiousness," which, in fact, is ptomaine infection from a good appetite gratified without reason or judgment.—*Ibid.*, v. 66, p. 566.

RESINA SCAMMONII.

Francis, John M., points out that this resin is presumed to be made from the crude gum-resin produced by incising the green root of the *Convolvulus scammonia;* in other words, it is a purified scammony. He doubts very much whether any appreciable quantity of the resin is produced by this roundabout method, and thinks it cheaper and more rational to extract the cured root with hot alcohol and precipitate and purify the resin by the usual method. He attributes the sudden reduction in price some years ago to the introduction of so-called "Mexican scammony root," *Ipomœa orizabensis.*—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

Patch, E. L., asserts that resin freshly prepared from virgin scammony will turn red with sulphuric acid and the addition of 15 per cent of rosin makes little difference. He outlines a test for rosin, using solution of potassium hydroxide, heat, and hydrochloric acid.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

RESORCINOL.

Riedel's Berichte (Berl., 1906, p. 26) reviews the melting point quoted by various authors and asserts that carefully recrystallized and dried material will melt at 110–111° C.; heating rapidly, it may require as much as 116° C. to melt.resorcin.

Francis, John M., points out that the melting point of the best brands of resorcin average about 113° to 115° C. and that of melting point 119° seems to be unobtainable.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

Smith, Kline & French Co. point out that the resorcinol of the market is of excellent quality. All the samples examined by them had a melting point of 112° to 113° C.—Lab. Rep., S., K. & F., 1906, p. 20.

Wiebelitz, H., asserts that an aqueous solution of resorcin is invariably acid in reaction.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Carobbio, Arturo, outlines a method for the detection of resorcin in presence of phenol, naphthol, acetanilide, or other similar compounds.—Boll. chim. farm., Milan, 1906, v. 45, p. 365.

RHAMNUS PURSHIANA.

Henkel, Alice, mentions *Rhamnus purshiana* DC., also called cascara sagrada, chittem-bark, sacred-bark, and bearberry-tree, as being found on the sides and bottoms of canyons, Rocky Mountains, west to the Pacific Ocean, and extending north into British America.—Bul. Bur. Plant Ind., U. S. Dept. Agri., 1906, No. 89, p. 58.

Schneider, Albert, asserts that the *Rhamnus* species are the most important medicinal trees in California, that the Indians have long made medicinal use of them as a cathartic, and that the whites ascertained their medicinal value from the Indians.—Merck's Rep., N. Y., 1906, v. 15, p. 127.

An editorial reviews the cascara sagrada outlook, gives some estimates of the probable crop, and publishes a table showing the high and low prices prevailing during the past four years.—Oil, Paint, and Drug Rep., 1906, v. 70, Aug. 20, p. 7, and Sept. 24, p. 7.

Philipp Röder, Wien, reports a careful examination of six samples of *Rhamnus purshiana;* the ash content of the air dry drug varied from 5.41 to 10.02 per cent. Only one sample came within the 6 per cent limit of the Ph. Austr. VIII, which Röder believes to be too low.—Pharm. Post., Wien, 1906, v. 39, p. 234.

Mitlacher, Wilhelm, discusses the demonstration of oxymethyl anthraquinone in cascara sagrada, by microchemical means, and points out that while distinct crystals were not readily obtained the sublimed material gives the characteristic deep red color with solution of potassium hydroxide.—Pharm. Prax., 1906, v. 5, pp. 433–435.

Taylor, S., says there seems to be some doubt as to the intention of the Ph. Brit. concerning the condition of extract of cascara sagrada. He takes it that it should be in powder form.—Pharm. J., Lond., 1906, v. 23, p. 669.

Dieterich, Karl, records the extract obtained from four different samples of cascara sagrada, with varying menstrua.—Helfenberger, Ann. Berl., 1905–6, p. 115.

Wiebelitz, H., suggests that a formula for fluid extract of cascara sagrada be included in the coming edition of the Ph. Germ. IV.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Feil, Joseph, discusses the percentage of alcohol remaining in fluid extract of cascara sagrada, and points out that the alcoholic content of a finished fluid extract can not be the same as the menstruum in any case, and the percentage found should always be coordinated with the moisture of the drug, the volume of the extractive, and a certain amount of loss in manufacture.—Am. Druggist, N. Y., 1906, v. 49, p. 65. (See also Proc. Ohio Pharm. Ass., 1906, p. 48.)

The Ph. Brit. Committee of Reference in Pharmacy asserts that the alcohol in liquid extract of cascara sagrada is insufficient. Amend the process.—Chem. & Drug., Lond., 1906, v. 69, p. 863.

Francis, John M., thinks it wholly unnecessary to dry the mixture of drug and calcined magnesia before percolation, and the amount of alcohol employed is excessive. A great mistake to flavor with orange when the public is accustomed to anise, fennel, and wintergreen. So long as our committee has merely followed the example of the large manufacturers, it may well have profited by their experience. We predict that the U. S. P. "Aromatic Cascara" will be a source of loss to the druggist.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

An abstract from a German patent specification outlines a method for separating a cathartic principle from cascara sagrada and from frangula.—Chem. Repert., Cöthen, 1906, v. 30, p. 365.

Pfaff and Nelson find that cascara sagrada increased intestinal peristalsis in experiments on animals.—J. Am. M. Ass., 1906, v. 47, p. 1820.

Webster, Herbert T., thinks the term "cascara sagrada" ought to be dropped from every scientific work on materia medica, because it means nothing definite. *R. purshiana* is totally unworthy of confidence unless one wants a slowly acting cathartic; for good results in rheumatism, however, one must use *R. californica*, and in full dose. An excellent adjunct is specific jaborandi.—Eclectic Med. J., Cincin., 1906, v. 66, pp. 117–119.

RHEUM.

Beille, L., asserts that the principal markets for Chinese rhubarb are London and Hamburg, where this root is classified as Shensee, Canton, or Highdried.—Bull. Soc. de Pharm. de Bordeaux, 1906, v. 46, p. 172.

K. discusses the literature relating to Chinese rhubarb, the probable origin of the root, and the various routes traveled in its course to market.—D.-A. Apoth, Ztg., N. Y., 1906, v. 27, p. 137.

Wilson, E. H., in view of the differences of opinion existing as to actual species yielding the Chinese rhubarb of commerce, endeavors to show that while it is possible two or more species may be involved, the bulk of the commercial drug is furnished by one species, viz, *Rheum officinale* Baillon.—Chem. & Drug., Lond., 1906, v. 69, p. 371.

Gehe & Co. discuss the export of rhubarb from Shanghai to the various ports during the years 1898 to 1905, inclusive.—Handels-Ber., Gehe & Co., 1906, p. 46.

Skalweit, B., (Arb. deut. Landw. Gesel., 1906, No. 117, pp. 45–51) discusses the commercial culture of rhubarb in England.—Exper. Sta. Rec., 1906, v. 18, p. 237.

Kunath (Arb. deut. Landw. Gesel., 1906, No. 117, pp. 12–44, figs. 5) gives an extensive account of rhubarb culture in Germany.—*Ibid.*, v. 18, p. 237.

The Ph. Brit. Committee of Reference in Pharmacy report on rhubarb says ash limit is not feasible. Experiment with Tschirch's assay process. A limit of extractive to 60 per cent alcohol is a useful test.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caesar and Loretz suggest that in addition to the tests laid down in the Ph. Germ. IV, a colorimetric estimation of rhubarb be made, according to the method outlined by Tschirch, and reproduced with the suggestion.—Geschäfts-Ber. v. Caesar & Loretz, 1906, pp. 111–112.

Mitlacher, Wilhelm, outlines a method for demonstrating the presence of oxymethyl anthraquinones, in emodin containing drugs by microchemical means; sublimation.—Pharm. Prax., 1906, v. 5, pp. 432–435.

Gilson, E., (Rev. pharm. Grand, 1906, n. s., XXII, 289–304) discusses the purgative principles of the Chinese rhubarb. (Reference from Index Med., 1906, p. 1312.)

Evans, John, asserts that Gregory's powder is frequently made with magnesium carbonate instead of oxide, the ash will then be considerably less than that of the official preparation, about 69 per cent.—Apothecary, Boston, 1906, v. 18, p. 908.

Taylor, S., says that the Ph. Brit. sirup of rhubarb is not satisfactory; Greenish has devised an improved formula, but suggests further work, keeping in view the recent knowledge of the constituents of the drug.—Pharm. J., Lond., 1906, v. 23, p. 670.

Scheinert, R., suggests that the potassium carbonate, in the Ph. Germ. formula for sirup of rhubarb, might advantageously be substituted by sodium carbonate.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 351.

Caldwell, Paul, believes that the wine of rhubarb, N. F., is neither a popular nor an elegant preparation. He suggests the addition of 4 grammes of potassium carbonate to each 1,000 cc. of the sirup.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 160.

Pfaff and Nelson, experimenting on animals, found that the infusion of rhubarb produced peristalsis and caused defecation, which, however, was not diarrhœic, but the tincture proved ineffective.—J. Am. M. Ass., 1906, v. 47, p. 1820.

RHUS GLABRA.

Henkel, Alice, mentions *Rhus glabra* L., commonly called smooth sumac and scarlet sumac, as being found in dry soil, thickets, and waste places nearly throughout the United States and Canada.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 58.

RUBUS.

Henkel, Alice, mentions *Rubus villosus* Ait., otherwise known as rubus and one-flowered dewberry, as growing in sandy or dry soil near the coast from Maine to South Carolina. Also mentions *Rubus cuneifolius* Pursh., commonly known as rubus, sand-blackberry, and knee-high blackberry, as being found in sandy soil from Connecticut to Florida, west to Missouri and Louisiana.

Rubus nigrobaccus Bailey, also known as *Rubus villosus* A. Gray, not Ait., commonly known as rubus and high-bush blackberry, is also mentioned. Found in dry fields and along roadsides, New England States to Florida, and west to Arkansas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, pp. 59–60.

Schneider, Albert, states that root infusions of the *Rubus* species are used by the Indians to check diarrhœa.—Merck's Rep., N. Y., 1906, v. 15, p. 127.

SABAL.

Henkel, Alice, mentions *Serenoa serrulata* (Roem. & Schult.) Hook. f., also called sabal and saw-palmetto, as found in sandy soil from North Carolina and Arkansas to Florida and Texas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 63.

Francis, John M., thinks that while "dried fruit" perhaps fully describes the drug most usually seen in commerce, it is not a fit description of the saw palmetto fruit used by the most careful pharmaceutical manufacturers.—Bull. Pharm., Detroit, 1906, v. 20, p. 185.

SABINA.

Henkel, Alice, mentions *Juniperus sabina* L., also known as sabina, savin, and shrubby red cedar, as occurring in rocky places in northern United States.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 40.

Leth, K. K., presents the results of a morphologic-anatomic study of *Juniperus sabina* (illustrated).—Arch. f. Pharm. og Chem., Copenhagen, 1906, v. 13, p. 382.

SACCHARUM.

Jackson, John R., discusses the various sources of error and describes the several sugars known in different parts of the world.—Pharm. J., Lond., 1906, v. 22, pp. 210–213.

Horne, William D., suggests a uniform method of chemical control of cane sugar factory working under diverse conditions and presents a series of notes bearing on standardizing apparatus, sampling, and analyses.—Chem. Eng., Phila., 1906, v. 4, pp. 1–12.

Browne, C. A., discusses the various methods employed in the analysis of sugars and the fermentation of sugar cane products.—J. Am. Chem. Soc., 1906, v. 28, pp. 439–469.

Tolman and Smith discuss the estimation of sugars by means of the refractometer, report a number of experiments, and present a table which graphically portrays the results obtained with the various sugars.—J. Am. Chem. Soc., 1906, v. 28, pp. 1476–1482.

Kelhofer, W., presents a table for the ready determination of invert sugar by weighing the dried precipitate obtained by means of Fehling's solution.—Ztschr. f. anal. Chem. Wiesb., 1906, v. 45, pp. 88–91, 745–747.

Schoorl and van Kalmuthout critically review the several color reactions for the more important varieties of sugar and point out some of the shortcomings or advantages they possess.—Ber. d. deutsch. chem. Gesellsch., Berl., 1906, v. 39, pp. 280–285.

Seaman, F. A., uses cut-loaf sugar in the making of syrups and asserts that they keep better.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 264.

Le Baillif, A., concludes that the blue deposit in syrups of ether and codeine is due to the precipitation of the coloring matter used to "blue" beet sugar in refining. Cane sugar gave no such coloration.—Bull. des sc. pharmacol. Par., 1906, v. 13, p. 558.

Trillat, A., (Acad. des sc., 19. II. 1906, v. 142, p. 454) says that when sugar is caramelized not only is formaldehyde disengaged, but the caramel formed contains formic aldehyde in quantity sufficient, either free or combined, to insure the infermentescibility of the sugar.—*Ibid.*, p. 111; see also p. 117.

SACCHARUM LACTIS.

Nielson, R., (Pharm. Ztg., 1906, v. 51, no. 3, p. 31) in a Danish patent describes the method for the technical preparation of milk sugar.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 911.

Patein, M. G., outlines a number of methods used for the estimation of lactose in milk.—Bull. Soc. de chim., Par., 1906, v. 35, pp. 1022–1030.

Haupt, M., suggests that as an additional test for milk sugar it should be required that one part of milk sugar dissolved in two parts of hot water should give a clear, colorless solution.—Apoth. Ztg. Berl., 1906, v. 21, p. 953.

Leffman, H., suggests the reversal of the Badouin reaction for sesame oil as a reaction for the detection of saccharose in sugar of milk (Chem. Ztg., 1906).—Jahresb. d. Pharm. Götting., 1906, 1907, v. 41, p. 229.

Riedel's Berichte (Berl. 1906, pp. 37–39) points out that the tests provided in the Ph. Germ. IV for sugar of milk are quite inadequate, shows that samples found to be contaminated with metallic impurities, dirt, acid, and fungus growths still complied, in a general way, with the requirements of the pharmacopœia. A tabulated résumé of the examination of 16 samples of sugar of milk is appended.

Evans Sons Lescher and Webb report on the examination of a sample of "Lactose" sugar of American origin which was found to be readily soluble in water to a dirty solution, and to contain a distinct trace of sulphuric acid.—Analyt. Notes, E. L. & W., Lond., for 1906, 1907, p. 24.

Patch, E. L., asserts that products sold as pure sugar of milk contained 24 and 28 per cent of glucose.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Gane, E. H., points out that he has found a sample of sugar of milk which was grossly adulterated with a fine grade of glucose, known commercially as confectioners' grape sugar or starch sugar. Another sample offered as Pure Lactose Sugar consisted wholly of grape sugar or glucose.—Am. Druggist, N. Y., 1906, v. 48, p. 99. (See also Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.)

Ohliger, Willard, finds that many samples of sugar of milk contain considerable amounts of cane sugar; the solubility ranges from 1:5 to 1:11.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Caspari, Chas. E., reports six samples examined; three U. S. P.; three contained cane sugar.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Evans, John, asserts that the presence of magnesium lactate will cause coagulation of milk, rendering the preparation unfit for use in infants' foods.—Apothecary, Bost., 1906, v. 18, p. 908.

Dieterich, Karl, reports examining eight samples of sugar of milk. The maximum ash found in the acceptable samples was 0.080 per cent, while the ash content in the samples that did not comply with the Ph. Germ. IV requirements varied from 0.13 to 0.15 per cent.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, p. 141.

SAFROLUM.

Schimmel & Co. point out that the specific gravity for safrol, 1.105 to 1.106, as originally given by the U. S. P. VIII, corresponds to the determination of this constant at 15° C.—Semi-Ann. Rep., 1906, Apr.-May, p. 76.

Patch, E. L., thinks that the advice to use and sell safrol in place of oil of sassafras would tend to make trouble for the pharmacist if he labels it oil of sassafras. The latter has a rotation of +4°; under the specified conditions safrol is optically inactive.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 343.

SALES.

Barnett, J. J., criticises the method of preparation of granular effervescent salts and compares the new with the old or so-called English method. He objects to manipulation while heating, and thinks that in the sodium and magnesium preparations of the U. S. P. VIII there is too little citric acid.

Lowry, Wm. J., jr., also objects to this manipulation and suggests several modifications of the method.—Proc. Maryland Pharm. Ass., 1906, pp. 86–90.

Lunan, George, makes some interesting observations and suggestions concerning granular effervescent preparations.—Pharm. J. Lond., 1906, v. 23, pp. 665–668.

Remington, J. Percy, describes his method for the manufacture of granular effervescent salts.—Proc. Pennsylvania Pharm. Ass., 1906, p. 144.

Vanderkleed and Turner discuss methods for the analysis of granular effervescent salts, which, as the authors point out, involves a number of more or less complicated problems. They present in detail the methods used by them for the analysis of a number of commercial samples.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 412–422.

SAL CAROLINUM FACTITIUM N. F.

Klut points out that the crystalline form of artificial Carlsbad salt, as usually found, is of uncertain composition because the several ingredients do not crystallize out uniformly, the sodium carbonate being more soluble than the other ingredients remaining in the mother liquor.—Pharm. Ztg., Berl., 1906, v. 51, p. 460.

SALICINUM.

Irvine and Rose describe a synthetical method which they devised in order to prove that salicin possesses the γ-oxidic linking.—J. Chem. Soc. Lond., 1906, v. 89, pt. 1, pp. 814–822.

Tyrrell, John Boyd, describes the technic of salicin administration in the treatment of acute articular rheumatism, and states that it is usually borne better alone than the mixed treatment.—N. York M. J., 1906, v. 84, p. 1089.

SALVIA.

An editorial notes that *Salvia officinalis* is mentioned in the Icelandic Pharmacopœia of the thirteenth century.—Chem. & Drug., Lond., 1906, v. 69, p. 969.

Fyfe, John William, says that *Salvia officinalis* was extensively employed in coughs, colds, and fevers, and held in such high esteem that one author wrote: "Why dies the man whose garden sage affords?"—Eclectic M. J., Cincin., 1906, v. 66, p. 322.

SANGUINARIA.

Henkel, Alice, mentions *Sanguinaria canadensis* L., commonly called sanguinaria, bloodroot, red puccoon, Indian-paint, and tetterwort, as being found in rich, open woods from Nova Scotia to

Nebraska, south to Florida and Arkansas.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 61.

Francis, John M., thinks that the acetic fluid extracts form one of the few mistakes committed in this most splendid work [U. S. P. VIII]. See under Lobelia.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Fyfe, John William, says that *Sanguinaria canadensis* was extensively employed by the early eclectics. It was regarded by them as a remedy of great value in malignant scarlet fever and in pneumonia, and especially indicated when the expectoration was streaked with blood.—Eclectic M. J., Cincin., 1906, v. 66, p. 319.

SANTONICA.

Weigel, G., found santonica adulterated to the extent of 10 to 12 per cent with the seeds of other plants.—Pharm. Zentralh., 1906, v. 47, p. 891.

SANTONINUM.

Wedekind, E., presents a study of the history and composition of santonin with some observations on the basic properties of santonin, santoninsulphonic acid, and the constitution of santonin.—Arch. d. Pharm. Berl., 1906, v. 244, pp. 623–639.

Riedel's Berichte (Berl., 1906, p. 26) reports the melting point of a recrystallized santonin to be 169.5° C., on careful heating, and in an air bath 172° C.

Wiebelitz, H., suggests the adoption in the pharmacopœia of the requirement found in Hager that 1 gm. of santonin should dissolve completely in 6 gm. of chloroform.—Pharm. Ztg. Berl., 1906, v. 51, p. 1004.

Felter, Harvey Wickes, quotes several authors as to the value of santonin in diabetes mellitus, and adds that the drug opens up possibilities that seem to have been overlooked in its earlier history, and none will be more welcome than its good effects in diabetes if proven to be true.—Eclectic M. J., Cincin., 1906, v. 66, p. 343.

Fyfe, J. W., (Eclectic Rev., October, 1905) discusses the use of santonin in the relief of the irritation, pain, and scalding sensations in the urethra which are experienced by some women during and immediately after micturition. It is also a very useful remedy where there is retention of urine in the advanced stages of acute diseases in children.—Abstr., *Ibid.*, p. 94.

For additional references on the use of santonin, see Index Medicus, J. Am. M. Ass. and Merck's Ann. Rep., Darmstadt.

SAPO.

Fahrion, W., outlines a method for the analysis of soap in which he determines (*a*) the total fat, (*b*) the total alkali, (*c*) the free alkali, (*d*) the combined alkali, (*e*) the average molecular weight of the fatty acids, also the amount of water and the amount of insoluble material.—Ztschr. f. ang. Chem., Berl., 1906, v. 19, pp. 385–388.

Cohn, Robert, makes a contribution to the knowledge of hydrolysis of soap, and reasserts that the amount of free alkali may be determined titrimetrically in aqueous solutions without the addition of alcohol.—Ztschr. f. öffentl. Chem., 1906, v. 12.

The Ph. Brit. Committee of Reference in Pharmacy would introduce a test for the nature of the fatty acids in soap.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., found a sample of powdered castile soap 54 per cent insoluble in alcohol, 34 per cent talc. Another sample was 30 per cent insoluble in alcohol and contained 20 per cent talc.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Ohliger, Willard, finds castile soap quite commonly adulterated with animal fats.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Sayre, L. E., reports that two samples of powdered soap, supplied on an order for Conti, contained animal fats. One sample of Conti bar was free from animal fats, while a sample of Mazzini bar contained animal fat.—Bull. Kansas Bd. Health, 1906, v. 2, p. 175.

Vanderkleed, Charles E., asserts that very few samples of powdered soap on the market will conform to the U. S. P. VIII limit of alkalinity for soap.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

MacFadden, W. Lester, considers certain soaps to have a distinct value in adjusting bases. In ointments proper (those of a fatty base) they are usually immiscible, but in creams containing a considerable amount of water they are frequently a very happy addition.—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

Rodet, A., (J. de la parfum. et savonn. franc. 1905, 1906) records some experiments on the antiseptic value of soap.—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 406.

SAPO MOLLIS.

The Ph. Brit. Committee of Reference in Pharmacy would require a limit for water in soft soap.—Chem. & Drug., Lond., 1906., v. 69, p. 864.

Graves, A. (Apoth. Ztg. XXI, No. 92, 1906, 990) suggests a process for the preparation of soft soap of satisfactory quality.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 683, 684.

SARSAPARILLA.

Gehe & Co. point out the marked decrease in the amount of Honduras sarsaparilla brought to the port of New York, and discuss some of the reasons for this decline.—Handels-Ber. Gehe & Co., 1906, p. 46.

Kraemer, H., reports that a bundle of Mexican sarsaparilla weighing $4\frac{1}{2}$ pounds contained 19 ounces of dirt.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

Philipp Röder, Wien, reports examining three samples of sarsaparilla which varied from 6.78 to 8.21 per cent of ash in the air-dry material, or from 7.47 to 9.14 per cent of ash in the anhydrous material.—Pharm. Post, Wien, 1906, v. 39, p. 284.

Hartwich, C., found a sample of cut sarsaparilla which contained no true Honduras sarsaparilla, but consisted of a mixture of at least six roots, several of them not at all related to sarsaparilla.—Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich, 1906, v. 44, p. 8.

Semon, Felix, discusses some unusual manifestations of syphilis and recommends sarsaparilla in the form of decoction under certain conditions.—Brit. M. J., Lond., 1906, v. 1, pp. 61–65. (See also pp. 710, 791.)

Additional references to the use of sarsaparilla will be found in the Index Medicus and J. Am. M. Ass., Chicago.

SASSAFRAS.

Henkel, Alice, mentions *Sassafras variifolium* (Salisb.) O. Kuntze also known as *Sassafras officinalis* Nees & Eberm., and *Sassafras sassafras* (L.) Karst., commonly known as sassafras and ague tree, as a native in rich woods, Massachusetts to Ontario and Michigan, south to Florida and Texas.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 62.

Weiss, Howard Frederick, discusses the structure and development of the bark in sassafras.—Bot. Gaz., Chicago, 1906, v. 41, pp. 434–444.

Fyfe, John William, says that Laurus sassafras was thought to be a good remedy in acute inflammation of the eyes, as well as in catarrhs and dysentery. According to Eberle its continued use cured an inveterate rheumatism.—Eclectic M. J., Cincin., 1906, v. 66, p. 321.

SCAMMONIUM.

The Ph. Brit. Committee of Reference in Pharmacy report on scammonium says this will probably be omitted, as there is no object in retaining it if the extracted resin is official.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

An editorial inquires:

> Is this a red rag? Who that has had experience with good scammonium and scammony resin can doubt that the natural exudation has properties which make it more desirable medicine than the extracted resin? We would say this superiority is a reason for its retention. Perhaps the committee's suggestion is based on the fact that scammonium is no longer ordered in any Ph. Brit. preparation, but the contents of the official book should not be measured by such a standard.—*Ibid.*, p. 861.

Guigues does not believe in the efficacy of the determination of the ether-soluble resins of scammony: he advises the use of the polarimeter. He presents a lengthy paper on the origin and preparation of scammony, its substitutes, adulteration, and tests.—J. de pharm. et de chim. Par., 1906, v. 24, pp. 376, 404–407, 498–501.

Martin, G., suggests that the acid number of a sample of scammony would give a plain indication of adulteration with rosin. Scammony has a low acid number, from 10 to 15, while rosin has a high number, 155 to 175.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

Evans Sons Lescher and Webb report on seven samples of scammony gum labeled "Aleppo" which were tested for their solubility in ether (0.720). The results ranged from 19.6 per cent to 51.3 per cent. Two samples yielded 32 per cent of ash. Four samples of "virgin" gum examined gave an ether extract of from 70 to 90 per cent, and several samples contained starch.—Analyt. Notes, E., L. & W., 1906, Lond., 1907, p. 29.

The Ph. Brit. Committee of Reference in Pharmacy report says probably no standard for scammony root need be introduced, but different varieties of scammony resin are now being obtained from roots imported from Mexico, and this should be considered.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Pfaff and Nelson used scammony, gamboge, elaterium, jalap, euonymin, frangula, and other drugs on animals in the study of the effects on peristalsis. The drugs just specified increased the peristalsis of the stomach very slightly, but that of the intestines markedly. Scammony and gamboge showed marked diarrhœic defecation.—J. Am. M. Ass., 1906, v. 47, p. 1820.

SCILLA.

The Ph. Brit. Committee of Reference in Pharmacy believes that a limit of moisture for squill is necessary.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Patch, E. L., reports finding a sample of powdered squill containing 28 per cent of ash, mostly kaolin or other clay.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Ohliger, Willard, reports squill of low extractive.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Francis, John M., thinks fluid extract of squill is deficient by reason of very imperfect extraction: the former menstruum was satisfactory and should have been retained.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Houghton, E. M., presents a comparison of the pharmacologic activity of the fluid extracts of squill prepared according to the formulas of the U. S. P. VII and VIII.—J. Am. M. Ass., Chicago, 1906, v. 46, pp. 1417–1420.

Wiebelitz, H., believes that, in connection with vinegar of squill, it would be desirable to state that on keeping there is a gradual decrease in acidity.—Pharm. Ztg., Berl., 1906, v. 51, p. 1003.

Caldwell, Paul, believes that acetic acid in sirups is objectionable, and suggests that an alcoholic extract of squill would make a more desirable sirup.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

He recommends the addition of 5 per cent of glycerin in the making of compound sirup of squill and filtering the mixture of fluid extracts and water through magnesium carbonate.—*Ibid.*

Searby, W. M., notes an apparent inconsistency between the doses of the sirup and the compound sirup of squill; that of the former being equivalent to 1.35 grains of squill, of the latter to 2.4 grains, which carries with it 2.4 grains of senega and one-sixth grain of antimony and potassium tartrate—enough to nauseate, yet not enough to serve as an emetic.—Am. J. Pharm., Phila., 1906, v. 78, p. 209.

Abraham, A. C., discusses the preparation of oxymel of squill, and points out some of the precautions to be observed.—Pharm. J., Lond., 1906, v. 22, p. 213.

A number of additional references to oxymel of squill Ph. Brit. will be found in Pharm. J., Lond., 1906, v. 22 and 23.

Haynes, G. S., says the most striking feature of the results obtained from his experiments is the superiority of squill over digitalis and strophanthus as a cardiac stimulant.—Biochem. J., Liverpool, 1906, v. 1, pp. 62–87.

Dixon, W. E., comparing digitalis, squill, and strophanthus, says that squill has the more powerful effect on ordinary cardiac muscle, and, provided the three drugs reach the circulation in equal amounts, it increases the output from the heart more than the other two. It has, however, the disadvantages that it is but slowly absorbed and tends to produce some constriction of the coronary vessels.—Brit. M. J., Lond., 1906, v. 2, p. 1460.

SCOPOLA.

Moerk, Frank X., points out that the extract of scopola is required to be four times the strength of the drug.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159. See Gordon's comment under Belladonna Folia.

SCOPOLAMINÆ HYDROBROMIDUM.

Gordin, H. M., reviews the progress made in the chemistry of scopolamine during the year 1905 and abstracts, at some length, the paper by E. Schmidt on scopoline.—Pharm. Rev., Milwaukee, 1906, v. 24, pp. 371–374.

Beckurts, H., reports an examination made by Prochow to determine the amount of scopolamine in *Datura arborea.* He found the leaves to contain an average of 0.444 per cent and the stems 0.225 per cent.—Apoth. Ztg.. Berl., 1906, v. 21, p. 661.

Riedel's Berichte (Berl., 1906, pp. 26–29) points out that the melting point for scopolamine hydrobromide, as given in the Ph. Germ. IV, is much too low. Laboratory experiments show that a pure, carefully dried scopolamine hydrobromide softens at 187° C. and melts at 191° C.

Reviews the requirements for scopolamine that have been outlined by Kobert and Hesse and reports that it has been possible to isolate an optically active scopolamine, with a melting point of 193° C. from *Scopolia japonica.*

Panas and Scrini suggested the use of scopolamine hydrobromide 0.01 to 0.02 gram in 10 grams of washed and sterilized olive oil.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, p. 57.

Hessel, Otmar G., details his experiments with three samples of scopolamine on frogs, cats, and dogs, also a series of experiments on dogs with scopolamine and morphine. He finds that the individual reaction of the subject experimented upon is of more importance than any difference in physical properties of the preparation used, and that the higher one goes in the animal scale the greater is the need of care.—Arch. internat. de pharmacod. et de thérap. Par., 1906, v. 16, pp. 1–32.

Wood, H. C., jr., (Amer, Med., Phila., Dec.) reports a series of 1,988 cases of scopolamine-morphine anæsthesia in 1,987 of which he examined the original literature. Twenty-three deaths occurred, and of these Wood thinks that nine are positively to be attributed to the anæsthetic, a death rate of more than four per thousand.—J. Am. M. Ass., 1907, v. 48, p. 454.

Kennedy, Alexander Ralph, sketches the history of mandragora and states that so far from scopolamine anæsthesia being new it is probably the oldest of anæsthetics. He states that the custom of giving wine of mandragora to the crucified led to sleep resembling death, from which recovery was so frequent that the Roman soldiers were ordered to mutilate those who had been crucified before removal.—N. York M. J., 1906, v. 84, pp. 841–844.

Lloyd and Mundy contribute a paper on the history and therapy of scopolamine and hyoscine. Lloyd finds that they are chemically and physiologically, but not therapeutically, identical. He adds, " In our opinion, one has no more right to dispense scopolamine for hyoscine than to label hyoscyamus as belladonna."—Eclectic M. J., Cincin., 1906, v. 66, pp. 411–419.

Bryant, Edgar R., reports the use of scopolamine in doses of one-tenth grain, in three divided doses, at intervals of one hour. He also reports one case that received one-fourth grain in the three doses.—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. II, pp. 48, 49.

Merck's Ann. Rep., 1906, Darmstadt, 1907, v. 20, pp. 217–221, gives a large number of references on the subject of scopolamine-morphine anæsthesia.

Additional references will be found in the Index Medicus and the J. Am. M. Ass.

SCUTELLARIA.

Henkel, Alice, mentions *Scutellaria lateriflora* L., also known as scutellaria, skullcap, madweed, and hoodwort, as a native in damp places along banks of streams from Canada south to Florida, New Mexico, and Washington.—Bul. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 63.

Schneider, Albert, states that the leaves of *Scutellaria californica* Gray are very bitter, and that the Indians are said to have used them as a substitute for quinine.—Merck's Rep., N. Y., 1906, v. 15, p. 127.

Fyfe, John William, quotes Wooster Beach as having cured a large number of severe cases of chorea with *Scutellaria lateriflora*, and Vanderveer as having preserved with this remedy 4,000 persons and 1,000 cattle from becoming affected with rabies after they had been bitten by rabid animals.—Eclectic M. J.. Cincin., 1906, v. 66, p. 318.

SENEGA.

Henkel, Alice, mentions *Polygala senega* L., commonly called senga, and senega snakeroot, as found on hillsides and in rocky woods from New Brunswick and western New England to Minnesota, south to North Carolina and Missouri.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 54.

The Bureau of Plant Industry reports that studies of Seneca snakeroot (*Polygala senega*) have begun to show good results.—Ann. Rep. U. S. Dept. Agric. for 1906, p. 206.

The Ph. Brit. Committee of Reference in Pharmacy asserts that no ash limit is necessary for senega.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Naylor, W. A. H., reviews the present knowledge of senega and points out that a thorough reinvestigation of this drug is needed.—Year Book of Pharmacy, 1906, pp. 217. (See also Pharm. J., Lond., 1906, v. 23, p. 77.)

Caesar and Loretz report that it is comparatively easy to control the quality of senega, but that it is becoming more difficult to secure the light colored, and desirable.—Geschäfts-Ber. v. Caesar & Loretz, in Halle a. S., 1906, p. 48.

Dieterich, Karl, reports a systematic study of the extractive yielded by senega to alcoholic and hydro-alcoholic menstrua.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, pp. 127–128.

An editorial discusses the outlook for senega root and presents a table giving high and low quotations for this drug during the past five years.—Oil, Paint & Drug Reporter, 1906, v. 69, June 4, p. 7. (See also Aug. 27, p. 7.)

Lyons, A. B., thinks that the retail druggist will probably find the now official fluid extract of senega to keep better than the preparation of the U. S. P., 1890, which contained ammonia water.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 443.

Francis, John M., commends the change from 50 c. c. volatile alkali, ammonia, to 30 c. c. potassium hydroxide to prevent gelatinization.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Caldwell, Paul, recommends that 5 per cent of alcohol and the same amount of glycerin be added in making sirup of senega. He also recommends the use of magnesium carbonate as a clarifying agent.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

SENNA.

Gehe & Co. point out that the imports of Tinnevelly senna into London amounted to 8,028 bales, against 6,731 bales in 1904 and 4,524 bales in 1903. The export of Alexandria senna from Hodeida, Arabia, is given as being 828 bales in 1904, 419 bales in 1903, 717 bales in 1902, and 644 bales in 1901.—Handels.-Ber., Gehe & Co., 1906, p. 28.

The Ph. Brit. Committee of Reference in Pharmacy report on senna says the ash should be almost entirely soluble in hydrochloric acid, and microscopical characters should be indicated.—Chem. and Drug., Lond., 1906, v. 69, p. 864.

Philipp Röder, Wien, reports examining eight samples of senna, which varied from 3.97 to 11.54 per cent of ash. The amount of extractive soluble in 90 per cent alcohol varied from 3.22 to 14.82 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 264.

Dieterich, Karl, reports on four samples of Alexandria senna, which yielded from 25.90 to 32.62 per cent of dry aqueous extract.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, p. 110.

Mitlacher, Wilhelm, asserts that oxymethylanthraquinones are readily demonstrated to be present in senna, by sublimation and subsequently dissolving the sublimed material in solution of potassium hydroxide.—Pharm. Prax., 1906, v. 5, p. 435.

Francis, John M., thinks that both time and alcohol will be saved by putting the drug in a strong cloth, wringing or squeezing out the excess of alcohol thoroughly and then proceeding with the percolation as usual without preliminary drying. A 30 per cent alcoholic menstruum would have been found as satisfactory as the diluted alcohol prescribed.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

SERPENTARIA.

Henkel, Alice, mentions *Aristolochia reticulata* Nutt., also known as serpentaria, Texas serpentaria, Texas snakeroot, and Red River snakeroot, as being native in the Southwestern States, occurring on river banks from Arkansas to Louisiana.

Aristolochia serpentaria, also known as serpentaria, Virginia snakeroot, and Virginia serpentaria, is also mentioned. Found in rich woods from Connecticut to Michigan and southward.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 12.

The Ph. Brit. Committee of Reference in Pharmacy believes that an ash limit is necessary for serpentaria.—Chem. and Drug., Lond., 1906, v. 69, p. 864.

Fyfe, John William, says that *Aristolochia serpentaria* was deemed an efficient tonic and diaphoretic and therefore good to promote perspiration and strengthen the stomach. It should be given warm to sweat; cold, to strengthen.—Eclectic Med. J., Cincin., 1906, v. 66, p. 320.

SERA.

Bloss, James R., discusses the theory, uses, and limitations of serum therapy.—N. York Med. J., 1906, v. 83, pp. 547–551.

Ekblom, Elias, discusses the origin and preparation of various vaccines and sera.—Arch. f. Pharm. og Chem., Copenhagen, 1906, v. 13, pp. 68–75, 85–89.

Schrank, Josef, discusses several of the successfully applied sera and bacterial preparations, among them antidiphtheritic serum, antitetanic serum, and a number of the less well-known sera for human or animal use.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, pp. 439–440, 447–449, 459–460.

Paton, D. Montgomerie, reports the use of various serums by the mouth. He advances the theory that their action is explained by the way they increase tissue resistance, and they have neither an antitoxic nor an antibacterial action.—Brit. M. J., Lond., 1906, v. 1, p. 1032.

Morzler, Gustav, discusses bacterial toxines and the production of antibodies, immunizing and curative sera.—Ztschr. d. Allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, pp. 315–317, 327–329, 348–349.

Emery, W. D., (Practitioner, Lond., Nov.) considers the serum therapy with reference to scarlet fever, rheumatism, anthrax, typhoid, plague, pneumonia, and dysentery.—J. Am. M. Ass., 1907, v. 48, p. 84.

Rosenau and Anderson discuss the subject of hypersusceptibility to serum.—J. Am. M. Ass., 1906, v. 47, pp. 1007–1009. (See also Bull. Hyg. Lab., U. S. P. H. and M. H. S., 1906, No. 29, p. 95.)

Vaughan, Ruediger, Smith, and Rosenau discussed the paper of Rosenau and Anderson just referred to.—J. Am. M. Ass., 1906, v. 47, pp. 1009, 1010.

Merck's Ann. Report, 1906, Darmstadt, 1907, v. 20, pp. 221–229, gives a number of references on the subject of curative sera. Additional references will be found in the Index Medicus and the J. Am. M. Ass.

SERUM ANTIDIPHTHERICUM.

The Ph. Belg., III, includes serum antidiphthericum in the liquid form, while the Ph. Japon., III, includes both the liquid as well as the dried.

Layson, L. C., discusses the antitoxic depreciation in antidiphtheritic serum, records his own experiments, method of testing, and the results.—Therapist, Lond., 1906, v. 16, pp. 5–8.

Marx, E., presents some information on the permanence of antidiphtheric serum and records results obtained with serum upward of 5 years old.—New Idea, Detroit, 1906, v. 28, pp. 87–89. (From the Festschrift issued in honor of Robert Koch's sixtieth birthday.)

Weill-Hallé and Lemaire point out that antiserum, a serum obtained from a rabbit immunized to horse serum, will cause a copious precipitation in an antidiphtheric serum obtained from horses, and that this precipitate will include a varying amount of the antitoxin which may be washed out with water. (Soc. biol., 1906, v. 61, p. 407.)—Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 898.

An editorial calls attention to the advantages of the Gibson method of preparing antitoxin.—N. York M. J., 1906, v. 83, p. 92.

Park and Throne think it safe to conclude from the results in 100 cases that the removal of a part of the nonantitoxic globulins and the albumins from the serum by the Gibson method has eliminated much of the deleterious matter from the serum, so that constitutional disturbances are less likely to occur.—J. Am. M. Ass., 1906, v. 47, p. 1854; Am. J. M. Sc., Phila., 1906, v. 132, pp. 686–692.

Rahn, A., discusses the general question of diphtheria serum therapy statistics and the precautions to be observed in compiling them.—Therap. Monatsh., Berl., 1906, v. 20, pp. 78–82.

Cornell, Walter S., reports 600 cases of diphtheria and states that antitoxin is harmless in the largest doses; that early dosage is essentrial to success, but that many physicians still do not believe in the use of antitoxin.—N. York M. J., 1906, v. 84, p. 835.

Pilcher, A. M., tabulates his cases of diphtheria for some years and states that he has the greatest confidence in the administration of the antidiphtherial serum by the mouth.—Brit. M. J., Lond., 1906, v. 1, p. 379.

Rhodes, T. Basil, discusses the treatment of diphtheria and states that recovery usually follows the use of 4,000 to 6,000 units of antitoxin on the third day, and the physician would do well to administer antitoxin when diphtheria is only suspected.—*Ibid.*, v. 1, p. 376.

Rolleston, J. D., calls attention to the tonsilitis in convalescence from diphtheria and states that the chances of its being nonspecific are such that it should be dealt with locally first, owing to the severe manifestations which may follow fresh injections of serum.—*Ibid.*, v. 1, p. 1152.

Reilly, T. F., calls attention to the use of large doses of diphtheria antitoxin and to the fact that it is useful against post-diphtheritic paralysis.—J. Am. M. Ass., 1906, v. 47, p. 649.

Bracken, H. M., points out that the position of antidiphtheric serum, in the prevention of diphtheria, is as nothing compared with vaccination in the prevention of smallpox; for the immunity conferred by antitoxin is of but short duration—rarely more than a month. The chief and great value of antitoxin is its curative rather than its preventive influence.—Trans. Am. Inst. Homœop., 1906, 62d sess., v. 1, p. 634.

Anderson, John F., discusses maternal transmission of immunity to diphtheria toxin and hypersusceptibility to horse serum in the same animal.—Bull. Hyg. Lab., U. S. P. H. and M. H. S., 1906, No. 30, p. 19.

Rosenau and Anderson report on a stomach lesion in guinea pigs caused by diphtheria toxin, and its bearing upon experimental gastric ulcer.—Bull. Hyg. Lab., U. S. P. H. and M. H. S., 1906, No. 32, pp. 10 with 11 figures.

Additional references to the production and the uses of antidiphtheritic serum will be found in the Index Medicus and the J. Am. M. Ass.

SERUM ANTITETANICUM.

The Ph. Belg. III includes a description for the liquid antitetanic serum, while the Ph. Japon. III includes both the liquid as well as the dried.

Waters, C. H., discusses the question of serum treatment in tetanus and the various problems that are involved; he concludes that antitoxin serum is the natural and the best means of combating tetanus and that the essential factors in success are early use and careful technique.—Therapist, Lond., 1906, v. 16, pp. 28, 29.

The same author presents some additional notes on the therapeutic value of antitetanic serum and points out that many lives might be preserved if the prophylactic use of this antiserum was more general.—*Ibid.*, pp. 109, 110.

Dewey, E. L., reports a case of tetanus neonatorum treated with antitetanic serum and with chloral and potassium bromide with recovery.—J. Am. M. Ass., 1906, v. 47, p. 583.

Scheick, H. J., compares the results of treating wounds from toy pistols, giant crackers, etc., with and without the antitetanic serum. He cites 56 cases and 16 deaths without serum, and 291 cases and no death with the serum.—*Ibid.*, 1906, v. 47, pp. 500–502.

Reilly, T. F., states that antitetanic serum may be considered as a specific when used prophylactically.—*Ibid.*, v. 47, p. 649.

Additional references will be found in the Index Medicus and the J. Am. M. Ass.

SEVUM PRÆPARATUM.

The Ph. Brit. Committee of Reference in Pharmacy report on suet says, if retained, acid, saponification, and iodine values should be given.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

SINAPIS ALBA.

Henkel, Alice, mentions *Sinapis alba* L., commonly known as white mustard and yellow mustard, as having been naturalized from Europe and found in fields and waste places, but not so widely distributed as black mustard.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 64.

Nelson, Burt E., describes and illustrates the characteristic structure of sinapis, both black and white.—Merck's Rep., N. Y., 1906, v. 15, p. 130.

Evans, John, says that the presence of starch is a sure indication of an adulteration; this can easily be detected by boiling and the addition of tincture of iodine.—Apothecary, Boston, 1906, v. 18, p. 906.

Mansier records an extensive study on the colorimetric analysis of mustard flour.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 565–573.

SINAPIS NIGRA.

Henkel, Alice, mentions *Brassica nigra* (L.) Koch., also known as *Sinapis nigra*, commonly known as sinapis nigra, black mustard, brown mustard, and red mustard, as introduced from Europe. Found in fields and waste places almost throughout the United States.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 16.

Dieterich, Karl, reports examining 26 samples of mustard seed. He found the volatile oil content to vary from 0.56 to 1.02 per cent.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, pp. 123, 124.

Dieterich, Karl, reports a comparative study of the efficiency of mustard paper and asserts that many complaints of inefficiency appear to be based on insufficient wetting of the paper with luke warm water rather than deterioration of the paper itself.—Helfenberger Annalen 1905, Berl., 1906, v. 18, pp. 151, 152.

Taylor, S., quotes Gerard's suggestion that the solution of india rubber should be 1 in 40 of pure benzol, and that the mustard leaf should be made by passing the paper over the mixed ingredients contained in a shallow dish.—Pharm. J., Lond., 1906, v. 23, p. 669.

SODII ACETAS.

Caspari, Chas. E., reports on one sample of sodium acetate examined: contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 102.

SODII ARSENAS.

The Ph. Brit. Committee of Reference in Pharmacy points out that the lead acetate test is correct if carried out as described.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

An editorial cites a case of poisoning in which sodium arsenite was administered repeatedly to the members of a family.—Brit. M. J., Lond., 1906, v. 1, p. 759.

SODII BENZOAS.

The Ph. Brit. Committee of Reference in Pharmacy points out that more allowance should be made for moisture, say 4 per cent.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caspari, Chas. E., reports 19 samples examined.—6 U. S. P.; 3 yielded turbid aqueous solutions, 2 contained chloride, and 9 metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Fonteyne, A., concludes that (1) respirations become more and more frequent in proportion to the injections; (2) the volume of air expired per minute likewise increases progressively with the injections, being twice as great as normal with doses of 16 gm.; (3) the volume of air expired with each respiration increases likewise with each injection of benzoate of soda. He discusses the action of sodium benzoate on respiration, gives some general conclusions, and a number of historical and pharmacological references.—Arch. internat. de pharm. et de thérap. Par., 1906, v. 16, pp. 396–403, 449 ff.

Barr, James, states that the benzoates have long been favorites with him in the treatment of arteriosclerosis, especially when the kidneys are involved.—Brit. M. J., Lond., 1906, v. 1, p. 126.

SODII BICARBONAS.

Dieterich, Karl, reports that three out of four samples of sodium bicarbonate examined contained an excess of monocarbonate, two of the samples also contained chloride.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, p. 97.

Smith, F. A. Upshur, points out that as sodium bicarbonate decomposes in moist air it should never be kept in paper parcels or in wooden drawers.—Pharm. J., Lond., 1906, v. 22, p. 84.

The Ph. Brit. Committee of Reference in Pharmacy reports that the test for carbonate in sodium bicarbonate should be replaced by one on the lines of the U. S. P.—Chem. & Drug., Lond., 1906, v. 69, p. 864.

Caspari, Chas. E., reports 2 samples examined.—1 U. S. P.; 1 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 100.

Linossier and Lemoine present a study of the action of sodium bicarbonate on gastric secretion and assert that they have been able to demonstrate that sodium bicarbonate increases gastric secretion (Soc. biol., v. 60, p. 539).—Abstr. in Biochem. Centralbl., Leipz., 1906–7, v. 5, p. 368.

Additional references on the use of sodium bicarbonate will be found in the Index Medicus and the J. Am. M. Ass.

SODII BORAS.

Yale, Charles G., is quoted as asserting that the production of borax in the United States is confined to the State of California. The total output for the year 1905 was 46.334 short tons valued at $1,019,154, as against 45.647 tons in 1904.—Chem. Eng., Phila., 1906–7, v. 5.

Reichard, C., points out that a mixture of alphanitroso-betanaphthol and sodium borate assume a characteristic green color that is specially recommended as a reaction for sodium borate.—Pharm. Ztg., Berl., 1906, v. 51, p. 298.

Liverseege, J. F., outlines a method of analysis and reports on three samples of borax adulterated with sodium bicarbonate.—Year Book of Pharmacy, 1906, pp. 265–267. (See also Pharm J., Lond., 1906, v. 23, p. 96.)

Kebler, Lyman F., reports that "Borax U. S. P." produced an extremely dirty, turbid solution when dissolved in water.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 348.

Baird, J. W., reports 17 samples examined in 1904, 5 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Ehman, J. W., reports that F. A. Butter assayed 4 samples of borax which ranged from 88.12 per cent to 98.03 per cent, average 91.83 per cent.—Am. J. Pharm., Phila., 1906, v. 78, p. 417.

Von Foregger, Richard, discusses the nature and identity of sodium perborate and gives formulas for a number of toilet preparations containing sodium perborate, among them talcum powder, nail bleach, nail powder, and a dusting powder for sweaty feet.—Am. Druggist, N. Y., 1906, v. 48, pp. 61, 62.

SODII BROMIDUM.

Wiebelitz, H., suggests the same modifications for the tests for sodium bromide and sodium iodide that he proposes for the corresponding salts of potassium.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Ziegler, J., asserts that the pure, anhydrous sodium bromide is freely soluble in 9 parts of alcohol and that the salt containing water of crystallization is soluble in 5 parts of alcohol.—Apoth. Ztg., Berl., 1906, v. 21, p. 911.

Gane, E. H., reports sodium bromide as being 97, 97.1, and 98.8 per cent pure.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Ohliger, Willard, reports sodium bromide containing an excess of alkali.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Caspari, Charles E., reports 4 samples examined—2 U. S. P.; 2 contained excess of chloride.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Fernan, Albert, found a sample of sodium bromide containing 23.6 per cent of water.—Ztschr. d. allg. oesterr. Apoth.-Ver., Wien, 1906, v. 44, p. 79.

v. Wyss, H., reports observations and experiments made to determine the behavior of the bromide salts in the human and animal organism.—Arch. f. exper. Path. u. Pharmakol., 1906, v. 55, pp. 263–287.

References on the use of sodium bromide will be found in the Index Medicus, the J. Am. M. Ass., and Merck's Ann. Rep.

SODII CARBONAS MONOHYDRATUS.

Kohut, Adolph, presents a sketch of Nicolas Leblanc, the founder of the soda industry, points out the advance that has been made in the science as well as in the practical application of chemistry as the result of the work done by Leblanc, and also calls attention to the lack of recognition given him.—Pharm. Ztg., Berl., 1906, v. 51, pp. 39, 40.

Jurisch, Konrad W., presents some practical observations on the ammonia soda industry as developed in Germany, England, France, and Austria.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 681–683, 719–721, 799, 800, 821–823, 880, 881, 905–907, 1143–1145, 1170–1173.

Francis, John M., in commenting on the notable instability of the three salts—the normal crystalline, the exsiccated, and the monohydrated—says it is fair to presume that chemical manufacturers will make provision to meet the demand for the official salt.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

The Ph. Brit. Committee of Reference in Pharmacy believes that for exsiccated sodium carbonate it is necessary to allow a limit of water.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Kebler, Lyman F., reports on a sample of "anhydrous" sodium carbonate which contained dirt, silicious matter, and 8.53 per cent of moisture.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 349.

Patch, E. L., reports finding slight traces of iron in monohydrated sodium carbonate.—*Ibid.*, v. 54, p. 346.

Caspari, Charles E., reports 6 samples examined—5 U. S. P.; 1 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 100.

The author of an unsigned article quotes J. F. Palmer in the Clinical Journal, Aug. 15, 1906, to the effect that soaking the feet in water containing sodium carbonate, night and morning, will suffice to cure corns.—J. Am. M. Ass., 1906, v. 47, p. 1909.

SODII CHLORIDUM.

Richaud, Alb., presents an extensive study of the rôle of sodium chloride in physiology, pathology, and therapeutics.—J. de pharm. et de chim., Par., 1906, v. 24, pp. 205–211, 259–266.

Caspari, Charles E., reports 2 samples examined; both contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 102.

Ohliger, Willard, reports sodium chloride containing traces of iron, and dirty.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Loeb, Jaques, reports a series of observations on the toxicity of isotonic solutions of chemically pure sodium chloride on lower forms of life, and on the reduction or removal of this toxicity by the addition of K and Ca ions.—Biochem. Ztschr., Berl., 1906, v. 2, pp. 81–110.

Eaton, R. L. (Mod. Eclecticism), thinks that alternate teaspoonful doses of ten grains to four ounces solutions of potassium and sodium chlorides prevent effusion in pleurisy.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 283.

SODII CITRAS.

Francis, John M., notes that this is a favorite constituent in liquid iron preparations, to which it adds stability.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Caspari, Charles E., reports 2 samples examined—1 U. S. P.; 1 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 101.

Cotton, A. C., discusses the use of sodium citrate in infant feeding.—J. Am. M. Ass., 1906, v. 47, p. 1080–1083.

Southworth, Thomas S., discusses the advantages of sodium citrate over lime water and other alkalies in infant feeding.—*Ibid.*, v. 47, p. 1084.

For additional references on the use of sodium citrate in infant feeding, see the Index Medicus and J. Am. M. Ass.

SODII HYDROXIDUM.

Reusch, K., reviews the literature of the year relating to the production of caustic soda in a commercial way.—Chem. Ztg., Cöthen, 1906, v. 30, p. 328.

Alcock, F. H., points out that twenty years ago attention was called to the presence of nitrite in sodium hydroxide, and that this contamination is still frequently met with. He suggests that the Pharmacopœia insist that the caustic alkalies should be free from nitrite and believes that this requirement could be readily met.—Pharm. J., Lond., 1906, v. 22, p. 705.

Philipp Röder, Wien, reports concerning two samples of sodium hydrate which were found to contain 99.16 and 99.10 per cent of sodium hydrate, respectively.—Pharm. Post, Wien, 1906, v. 39, p. 283.

SODII HYPOPHOSPHIS.

The Ph. Brit. Committee of Reference in Pharmacy recommends replacing the permanganate test by Jowett's.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Patch, E. L., reports on two samples of sodium hypophosphite with 0.71 and 0.029 free NaOH, respectively.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Caspari, Charles E., reports one sample examined contained excess of alkali.—Proc. Missouri Pharm. Ass., 1906, p. 101.

SODII IODIDUM.

Caspari, Charles E., reports 7 samples of sodium iodide examined—1 U. S. P.; 5 contained metallic impurities, and 1 excess of alkali.—Proc. Missouri Pharm. Assoc., 1906, p. 99.

Baird, J. W., reports 10 samples examined in 1904, 4 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Wells, G. Harlan, discussing the uses of sodium iodide, says the best results are obtained from the administration of small doses over a long period of time—five to ten drops of a saturated solution well diluted in water, three times a day.—Hahneman. Month., Phila., 1906, v. 41, p. 263.

SODII NITRAS.

Grimbert, L., points out that sodium nitrate occasionally contains chlorate, which may be a source of error in using nitrate in the incineration for the determination of chloride.—Compt. rend. Soc. de biol., Par., 1906, v. 60, p. 261.

Patch, E. L., refers to sodium nitrate contaminated with chlorate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

SODII NITRIS.

The Ph. Brit. Committee of Reference in Pharmacy would give a volumetric permanganate test, instead of the gasometric one, for sodii nitris.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Smith, F. A. Ushur, points out that the U. S. P. VIII omits to state in connection with sodium nitrite that similar precautions should be observed to those given under sodium bisulphite, to hinder oxidation to nitrate.—Pharm. J., Lond., 1906, v. 22, p. 85.

Surveyor, N. F., presents a study of the influence of nitrite of sodium on animal metabolism.—Biochem. J., Liverpool, 1906, v. 1, pp. 347–354.

SODII PHENOLSULPHONAS.

Patch, E. L., reports on a sample of sodium sulphocarbolate which was found to be decidedly pinkish instead of white.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Landus, J. R., (Med. Rec., N. Y., June 2) prefers the sulphocarbolate as an intestinal disinfectant in typhoid fever.—J. Am. M. Ass., 1906, v. 46, p. 1885.

SODII PHOSPHAS.

Ahlum, C. Chester, points out the close similarity of the reactions of disodium hydrogen phosphate and trisodium hydrogen phosphate and outlines methods for their determination.—J. Am. Chem. Soc., 1906, v. 28, pp. 533–537.

Ehman, J. W., reports that C. C. Shomo examined nine samples of sodium phosphate, of which one gave test for iron, five slight, and one decided, tests for arsenic, eight gave test for calcium, and six for chlorides. All contained traces of sulphates, none contained the full amount of water of crystallization.—Am. J. Pharm., Phila., 1906, v. 78, p. 416.

Smith, Kline & French Co. report that many samples of sodium phosphate contained considerable quantities of arsenic. They also detected tin, iron, aluminum, and silica in the commercial article.—Lab. Rep., S., K. & F., 1906, p. 20.

Kebler, Lyman F., reports sodium phosphate " C. P." as containing dirt and an excess of arsenic.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 349.

Baird, J. W., reports 32 samples examined in 1904, 1 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Caspari, Charles E., reports 7 samples examined—3 U. S. P.; 3 contained arsenic, and 1 calcium and metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Dunning, H. A. B., thinks the formula for effervescent sodium phosphate does not contain sufficient citric acid, and that the mixture should not be manipulated while fusing.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

Francis, John M., comments on the tremendous growth in the consumption of sodium phosphate combinations, and adds that one of the most pleasant and effective methods of administering this salt is to carbonate the aqueous solution and serve in "split" bottles well cooled, and wonders why the pharmacist should leave this field to the profitable exploitation of a single company.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

SODII PHOSPHAS EXSICCATUS.

Gane, E. H., found exsiccated sodium phosphate contaminated with dirt and foreign matter from careless drying.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

Patch, E. L., found dried sodium phosphate that did not dissolve with a clear solution.—*Ibid.*, v. 54, p. 346.

SODII SALICYLAS.

Alcock, F. H., notes that the official monograph (Ph. Brit.) does not include a quantitative test; he finds the process suggested some years ago for sodium benzoate quite satisfactory. Phenol may be detected during the process, and it thus obviates the official test for this impurity.—Pharm. J., Lond., 1906, v. 23, p. 597.

Ohliger, Willard, finds that sodium salicylate often yields too dark a solution.—Proc. Michigan Pharm. Ass., 1906, p. 48.

Caspari, Charles E., reports 14 samples examined—6 U. S. P.; 2 yielded colored aqueous solutions; 6 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 99.

Morgenbesser, H., experimenting on himself, found that salicylate of sodium increases the output of nitrogen, confirming previous observers.—N. York M. J., 1906, v. 83, p. 762.

Clarke, Thomas Wood, discussing the value of massive doses of the salicylates in the diagnosis and treatment of acute articular rheumatism, concludes that sodium salicylate can and should be given in much larger doses than are generally used.—Am. J. Med. Sc., 1906, v. 132, pp. 429–434.

Fonteyne, A., discusses the influence of sodium salicylate on respiration, and gives a number of historical and pharmacologic references in addition to the details of his own researches.—Arch. internat. de pharmacod. et de thérap., Par., 1906, v. 16, pp. 387–396, 449. (See also "General Conclusions," *Ibid.*, p. 449 ff.)

Moeller, S., discusses the possibility of reducing kidney irritation by the simultaneous administration of salicylates with alkalies. He concludes that while it is by no means a proven fact that this method of administering salicylates will invariably prevent or even reduce kidney irritation, the simultaneous administration of sodium bicarbonate with salicylates is nevertheless advisable.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 185–190.

Croftan, Alfred C., states that salicylic acid preparations, including sodium salicylate, are next in importance to opium in the treatment of diabetes.—N. York M. J., 1906, v. 84, p. 637.

Additional references will be found in the Index Medicus, the J. Am. M. Ass. and in Merck's Ann. Rep.

SODII SULPHAS.

Eddy, J. A., (Engineering and Mining Journal) discusses the composition of the waters of some soda springs in New Mexico. The waters of these springs contain 3.13 pounds of dry solid matter to the gallon, and of this upward of 83 per cent is sodium sulphate.—Oil, Paint, and Drug Rep., 1906, v. 69, May 7, pp. 38.

Gane, E. H., says that exsiccated sodium sulphate frequently contains dirt and foreign matter owing to careless drying.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 345.

Maberly, J., (Lancet, Lond., Nov. 10) thinks that sulphate of sodium has an action in addition to that of a mere aperient and liver stimulant, strongly pointing to its action as an intestinal antiseptic.—J. Am. M. Ass., 1906, v. 47, p. 1961.

Pfaff and Nelson found that sodium sulphate and sodium phosphate increased the peristalsis and induced watery discharges, the sulphate increasing the peristalsis of the stomach more markedly than did the phosphate.—*Ibid.*, v. 47, p. 1821.

Merck, E., presents an exhaustive paper on the fate of the purgative sulphates in the small intestine, to which he appends an exhaustive bibliography. With reference to sulphate of magnesia, he thinks the intervention of a factor other than that of osmotic tension is incontestable. For the solutions under discussion the purgative of choice acting with least harm to the jejunum will be the sulphate of soda in isotonic or slightly hypertonic solution.—Arch. internat. de pharmacod. et de thérap., Par., 1906, v. 16, pp. 301–340.

SODII SULPHIS.

The Ph. Brit. Committee of Reference in Pharmacy report on sodium sulphite says:

> The volumetric test is best performed by adding the sulphite to iodine solution and titrating back with thiosulphate solution. The Ph. Brit. standard is too high.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Patch, E. L., reports that 4 samples of dried sodium sulphite varied in composition and that 100 parts represented from 137 to 167 of the crystallized salt. All contained an excess of sulphate.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 346.

Smith, Kline and French Co. report on the examination of 12 samples of sodium sulphite, crystals, several of which contained only 90 per cent of absolute sodium sulphite ($Na_2SO_3+7H_2O$) in place of the 96 per cent required by the U. S. P.—Lab. Rep., S. K. & F., 1906, p. 20.

SODII THIOSULPHAS.

Hübener, G., discusses the determination of the purity of sodium thiosulphate and directs attention to the element of error introduced by the presence of sodium sulphite.—Chem. Ztg., Cöthen, 1906, v. 21, pp. 58–60.

Caspari, Charles E., reports 4 samples examined—3 U. S. P.: 1 contained free alkali and metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 102.

SPARTEINÆ SULPHAS.

Scholtz, M., discusses some of the halogen addition products of sparteine and the derivatives of sparteine with halogen alkylates. Also presents a note on the physiologic action of sparteine iodomethylate and benzylate, as compared with sparteine itself.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 72–77.

Valeur, A., reviews the work done on the constitution of sparteine, giving structural formulas and a bibliography.—Bull. des sc. pharmacol., Par., 1906, v. 13, pp. 214–225.

Lowe, C. B., points out that the average dose of sparteine sulphate in the U. S. P. VIII is one-fifth grain, whereas the maximum dose, according to Hare, is 4 grains: other writers assert that failure to get favorable results from this drug is due to the fact that it is not given in sufficiently large doses.—Proc. Pennsylvania Pharm. Ass., 1906, p. 102.

Morgan, A. C., states that sparteine should be used as a heart tonic if the kidneys are faulty in function.—N. York M. J., 1906, v. 84, p. 745.

SPIGELIA.

Henkel, Alice, mentions *Spigelia marilandica* L., otherwise known as spigelia, pinkroot, Maryland pinkroot, Indian pinkroot, and wormgrass, as found in rich woods, New Jersey to Florida, west to Texas and Wisconsin. Occurs principally in the Southern States.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 67.

Stockberger, W. W., describes the drug known as pinkroot and the common adulterant, East Tennessee pinkroot, *Ruellia ciliosa* Pursh.—Pharm. Era, N. Y., 1906, v. 36, pp. 503, 504.

The Bureau of Plant Industry reports that the study of pinkroot has been concluded and the summarized results have been published in Bulletin 100, Part V, of the Bureau of Plant Industry.—Ann. Rep. Dept. Agric. for 1906, p. 207.

Holm, Theo., discusses the substitution of ruellia for spigelia, the probable history of the mistaking of ruellia for phlox, and figures the rhizome of *Ruellia ciliosa* Pursh. and of its structural characteristics.—Am. J. Pharm., Phila., 1906, v. 78, pp. 553–559.

Gane, E. H., asserts that pinkroot is frequently adulterated or mixed with blue cohosh, owing to careless collecting.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 344.

An editorial calls attention to the fluctuations in price that prevailed for spigelia during the current year, and points out that the marked variation in price was due to speculative influences.—Oil, Paint, and Drug Report., 1906, v. 70, Sept. 17, p. 7.

Haines, Oliver L., asserts that *Spigelia anthelmia* is now recognized as a remedy of worth in acute endocarditis and pericardial inflammations.—Trans. Am. Inst. Homœop., 1906, 62d sess., v. 1, p. 428.

Wells, G. Harlan, says that clinically spigelia is very effective in relieving the sharp, shooting pains around the heart and in the walls of the chest, which occur in association with endocarditis, pericarditis, or nervous palpitation.—Hahneman. Month., Phila., 1906, v. 41, p. 264.

SPIRITUS.

Beuttner, E., points out that although the distilled spirits are described in identical terms in the Swiss and German Pharmacopœias, the products of the two pharmacopœias can not be identical, owing to the difference in the amount of alcohol which each directs.—Pharm. Ztg., Berl., 1906, v. 51, p. 637.

Hérissey, H., asserts that the simple alcoholates (Spiritus) of Ph. Ndl. IV, such as that of lavender, are not replaced by tinctures of the essences but are prepared by distillation.—J. de pharm. et de chim., Par., 1906, v. 23, p. 481.

Caldwell, Paul, gives the approximate alcohol content of the U. S. P. spirits.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

SPIRITUS ÆTHERIS COMPOSITUS.

Hommell, P. E., thinks the ethereal oil contained in this preparation should be removed, as it contributes a peculiar disagreeable taste, at times nauseating; it is an unnecessary addition. Drescher suggests the use simply of alcohol and ether.—Proc. New Jersey Pharm. Ass., 1906, pp. 108, 110.

Patch, E. L., points out that the compound spirit of ether that is marketed by many of our wholesale manufacturing chemists as U. S. P. does not bear any resemblance to the official product. It is sold at a price that will not pay for the ethereal oil alone.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 341.

SPIRITUS ÆTHERIS COMPOSITUS.

Francis, John M., notes the great improvement in the process of manufacture and the changes in the detail of the assay; other processes he considers tedious.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Wilson, J. Beetham, presents observations on the Ph. Brit. method for preparing spirit of nitrous ether and suggests that the distillation may be safely hastened by using a higher temperature toward the end of the process.—Pharm. J., Lond., 1906, v. 22, p. 523.

Vanderkleed, Charles E., discusses the preparing of spirit of nitrous ether from concentrated nitrous ether and points out several precautions that should be taken to prevent loss by evaporation. The resulting liquid should be assayed to insure its conforming to the requirement of the U. S. P. Outlines a method of assay without a nitrometer.—Proc. Pennsylvania Pharm. Ass., 1906, p. 132.

Gane, E. H., reports on concentrated nitrous ether which assayed 60.5 per cent in place of 88 per cent as claimed.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 340.

Sayre, L. E., reports that two samples of concentrated nitrous ether, when diluted as directed, yielded a spirit which contained 3 and 3.63 per cent of ethyl nitrite, respectively.—Bull. Kansas Bd. Health, 1906, v. 2, p. 175.

Evans, John, comments on the necessity for frequent examination of this preparation and on the rarity of the nitrometer in the equipment of the pharmacy. When deteriorated it should promptly be replaced.—Apothecary, Boston, 1906, v. 18, p. 906.

Wiebelitz, H., in discussing the tests of the Ph. Germ. for spirit of nitrous ether suggests that the spirit be diluted with water, in making the determination of acid content, and that the titration be with one tenth normal solution of potassium hydroxide.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Taylor, S., notes that this preparation has had some attention paid to it by Gilmour and Farrand Wright, but mainly with reference to its preservation. The general use of amber-colored glass has lately been advocated, especially for the many preparations which are acted upon by light.—Pharm. J., Lond., 1906, v. 23, p. 670.

Furbush, Willis St. L., discusses the history, tests and assay, decomposition, and commercial quality of nitrous ether. Only 1 of 22 samples contained 4 per cent ethyl nitrite, and it was strongly acid. He comments on the assay process and gives three figures of apparatus.—Proc. Massachusetts Pharm. Ass., 1906, pp. 114–120.

Sayre, L. E., found that in 14 samples of spirit of nitrous ether examined the per cent of ethyl nitrite varied from 4.57 to 0.14 per cent. Only one of the samples contained the required per cent of ethyl nitrite.—Bull. Kansas Bd. Health, 1906, v. 2, p. 175.

Dieterich, Karl, reports that two out of the three samples of spirit of nitrous ether examined required 0.30 and 0.50 c. c. of normal KOH solution, respectively, to neutralize 10 c. c. of the spirit.—Helfenberger Annalen, 1905, Berl., 1906, v. 18, p. 108.

SPIRITUS AMMONIÆ.

Francis, John M., calls attention to the fact that spirit of ammonia deteriorates very rapidly; it is safe to assert that but a small proportion of that now on the pharmacists' shelves would pass muster. The official process of preparing, while apparently simple, requires care.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Arny, H. V., thinks that the U. S. P. VIII process for the preparation of spirit of ammonia is impracticable.—Am. J. Pharm., Phila., 1906, v. 78, p. 14.

SPIRITUS AMMONIÆ AROMATICUS.

Caldwell, Paul, recommends a modified process for making aromatic spirit of ammonia.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

The Ph. Brit. Committee of Reference in Pharmacy suggests to amend the test for carbonate by adding ammonium chloride.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

SPIRITUS FRUMENTI.

Wiley, H. W., makes a comprehensive report on the whiskies of Great Britain and Ireland, their composition, method of production, method of marketing, and a summary of trade practices.—Bull. Bur. Chem., U. S. Dept. Agric., 1906, No. 102, pp. 1–29.

Ladd, E. F., discusses straight whisky, blended whisky, fortified and colored whisky, and artificial or imitation whisky, the last comprising the largest class found in the State.—Proc. North Dakota Pharm. Ass., 1906, p. 40; Rep. North Dakota Exper. Sta., Part II, pp. 37–40.

Francis, John M., calls attention to the fact that whisky should be not less than 4 years old; as no test is given for ascertaining this fact, he recommends that the taste be cultivated.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Tolman and Trescot report a study of the methods for the determination of esters, aldehydes, and furfurol in whisky.—J. Am. Chem. Soc., 1906, v. 28, pp. 1619–1630.

Stallings, R. E., reports on the examination of a number of samples of whisky, both genuine and fictitious, outlines the history of this substance, and gives a definition of the various terms used in connection with various kinds of whisky.—Rep. North Dakota Agric. Exper. Sta., 1906, Part II, pp. 138–149.

Mann and Stacy discuss the Allen-Marquardt process for the estimation of higher alcohols and give their conclusions.—J. Soc. Chem. Ind., Lond., 1906, v. 25, pp. 1125–1129.

Crampton, C. A., reports on cooperative work on the determination of fusel oil and ethereal salts in distilled liquors.—Proc. Off. Agric. Chem. 23rd Ann. Conv., pp. 20–23. (Bull. Bur. Chem., U. S. Dept. Agric., 1906, No. 105.)

Sadtler, Samuel P., discusses the origin of fusel oil in spirits.—Am. J. Pharm., Phila., 1906, v. 78, pp. 40–43.

Baird, J. W., reports 7 samples examined in 1904, all adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Ladd, E. F., asserts that, judging from the investigation, it is safe to say that up to the present year 95 per cent of the whiskies sold in the drug stores of North Dakota would not have been found to comply with the requirements of the U. S. P. standard, and in the majority of the cases they contained no real whisky whatever.—17th Ann. Rep. N. Dak. Agric. Expt. Sta., 1906, Part II, p. 37.

Leach, Albert E., reports examining several high-priced preparations for the manufacture of distilled liquors. These were sold under the names Wiscoline, Wiscol, Brandol, and Jamaica Rum Essence. They were all made up of artificial fruit essences, chiefly fusel-oil derivatives, colored with caramel.—Rep. Massachusetts Bd. Health, 1906, p. 405.

A formula for essence of rye is furnished, in answer to a correspondent, who desires a formula for making rye whisky.—Meyer Bros. Drug., St. Louis, 1906, v. 27, p. 103.

An answer to a correspondent gives a formula for bead oil.—*Ibid.*, v. 27, p. 103.

SPIRITUS GLYCERYLIS NITRATIS.

Persson, Claës, discusses a modification proposed by Santesson of the method for the qualitative determination of nitroglycerin outlined by Binz.—Svensk. farm. Tidskr., 1906, v. 10, pp. 56, 57. (See also Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 278.)

Gane, E. H., suggests that the spirit of nitroglycerin and the ordinary tablets into which it enters be assayed from time to time to determine what, if any, impairment takes place.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 331.

Vaquez, H., presents a study of the pharmacodynamic action of glyceryl trinitrate and discusses the "dissociated" and the "prolonged" action of trinitrine.—Compt. rend. Soc. de biol., Par., 1906, v. 60, pp. 904–907, 947–950.

Wells, G. Harlan, discusses the value of glonoin in cardiac disorders associated with high arterial tension and spasmodic contraction and in those degenerative changes associated with old age. He notes that an immunity to its action develops after the drug has been taken a short time.—Hahneman. Month., Phila., 1906, v. 41, p. 261.

For additional references see the Index Medicus, the J. Am. M. Ass., and Merck's Ann. Rep.

SPIRITUS VINI GALLICI.

Wiley, H. W., presents a report on Cognac brandies, in which he points out that only brandies made from wines grown in the departments of the Charente, of which region Cognac is the center, are allowed to bear the name "Cognac." The wines are made almost entirely from white grapes, which are not extremely rich in sugar. As soon as the vintage is well over and the first fermentations of the wines are finished the distillation is begun. The report contains additional information regarding method of distilling and the care exercised in storing.—Bull. Bur. Chem., U. S. Dept. Agric., 1906, No. 102, pp. 39–41.

An abstract points out that it was not until the eighteenth century that brandy making was generally practiced in Europe. Practically all the grape brandy made in the United States for commercial purposes comes from California, where brandy making has for some years been a large and profitable industry. Large quantities are used in the manufacture of sweet wines, and the average annual output of commercial brandy in the State is in the neighborhood of 750,000 gallons.—Sc. Am. Suppl., 1906, v. 61, p. 25361.

Leach, Albert E., reports that all of the samples of brandy examined were found to be below the standard, being artificially colored in all cases and having residues consisting largely of sugar.—Rep. Massachusetts Bd. Health, 1906, p. 404.

STAPHISAGRIA.

Nelson, Burt E., describes and illustrates the characteristic structures found in powdered staphisagria.—Merck's Rep., N. Y., 1906, v. 15, p. 129.

The Ph. Brit. Committee of Reference in Pharmacy suggests experiments on the ash limit of staphisagria.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Evans Sons Lescher and Webb report on the examination of two samples of stavesacre seeds in which the ash was 12 per cent and 13 per cent, respectively.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 30.

Francis, John M., recommends chilling the fluid extract and filtering free from the congealed fat.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

An abstract (from N. York M. J.) points out that staphisagria, though rarely, if ever, employed internally, is represented in the U. S. P. VIII by a fluid extract, with an average dose of 1 minim. Staphisagria is used chiefly as a paraciticide, and a fluid extract is not an eligible preparation for that purpose.—Am. J. Pharm., Phila., 1906, v. 78, p. 410.

STILLINGIA SYLVATICA.

Henkel, Alice, mentions *Stillingia sylvatica* L., often called stillingia, queen's-root, queen's-delight, and silver leaf, as occurring in dry sandy soil and pine barrens from Maryland to Florida, west to Kansas and Texas.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 68.

Francis, John M., advises that the fluid extract, because it tends to gelatinize, should be stocked in limited quantity.—Bull. Pharm., Detroit, 1906, v. 20. p. 12.

Chiron, Paul, (L'Art Méd.) recommends stillingia in left-sided syphilitic sciatica, especially with periostitis and nodes of the tibia.—Abstr., Hahneman. Month., Phila., 1906, v. 41, p. 880.

STRAMONIUM.

Henkel, Alice, mentions *Datura stramonium* L., commonly known as stramonium, jimson-weed, Jamestown-weed, thorn-apple, and apple-of-Peru, as having been introduced from the Tropics, and occurring in fields and waste places throughout the United States, with the exception of the North and West.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 25.

Sage, C. Edward, presents an illustration of *Datura tatula* and points out that it can readily be distinguished from *D. stramonium* by its mauve flowers and purple stem, stramonium having white flowers and green stems.—Brit. and Col. Drug., Lond., 1906, v. 50, p. 127.

The Ph. Brit. Committee of Reference in Pharmacy report on stramonium says give an ash limit, 15 per cent, and microscopical characters.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Puckner, W. A., reports the assay of 16 samples of stramonium, which varied from 0.13 to 0.45 per cent of mydriatic alkaloids. He points out that the drug is liable to vary greatly. The standard should not be as high as that for belladonna leaf.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 440.

Fromme, G., reports some comparative results obtained by a modification of Keller's method of assay of stramonium.—Geschäfts-Ber. v. Caesar & Loretz, 1906, p. 27.

Dohme, A. R. L., reports the amount of alkaloid found in the same sample of stramonium leaf, by the same process, by seven analysts to vary from 0.24 to 0.40 per cent.—Am. Druggist, N. Y., 1906, v. 49, p. 268.

Schieffelin, Wm. Jay, on behalf of the Committee of the N. W. D. A. suggested that the standard for stramonium be reduced from 0.35 per cent of mydriatic alkaloids to 0.25 per cent.—*Ibid.*, v. 49, p. 347.

Vanderkleed, Charles E., reports the assay of 9 lots of stramonium leaf which averaged 0.458 per cent of mydriatic alkaloids. Only one sample asayed below 0.35 per cent. (The present standard is 0.25 per cent.)—Proc. Pennsylvania Pharm. Ass., 1906, p. 124.

The Helfenberger Annalen (for 1906, p. 112) records some experiments in the systematic determination of the extract content of stramonium leaves.—Pharm. Zentralh., 1906, v. 47, p. 854.

Lyons, A. B., reports that 6 of the 12 replies received indicated that the former standard, 0.35 gm. mydriatic alkaloids in 100 c. c. of fluid extract of stramonium, is satisfactory and readily maintained.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 437.

Farr and Wright present some notes on the standardization of powdered alcoholic extract of stramonium seed and of stramonium leaf.—Pharm. J., Lond., 1906, v. 22, pp. 310–312.

See Gordin's comment under Belladonnæ Folia.

Moerk, Frank X., points out that the extract of stramonium is required to be four times the strength of the drug and that the tincture represents but 8.6 per cent of the contained alkaloids in place of 10 per cent of the drug strength.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Hommell, P. E., wonders that the tincture should have been made official; he asserts that the average physician prescribes preparations of stramonium, but rarely, perhaps, the ointment or the solid extract.—Proc. New Jersey Pharm. Ass., 1906, p. 109.

Fyfe, John William, asserts that *Datura stramonium* constituted a useful remedy in inflammatory and painful swellings of the glands, and it was also deemed efficient in epilepsy and other convulsions.—Eclectic Med. J., Cincin., 1906, v. 66, p. 321.

STRONTII BROMIDUM.

Brooks, H., uses strontium bromide in the treatment of coronary sclerosis.—J. Am. M. Ass., v. 47, p. 1594.

STRONTII IODIDUM.

Caspari, Charles E., reports 2 samples of strontium iodide examined.—1 U. S. P.; 1 contained metallic impurities, free alkali, and an excess of barium.—Proc. Missouri Pharm. Ass., 1906, p. 101.

STRONTII SALICYLAS.

Caspari, Charles E., reports two samples of strontium salicylate examined: both contained metallic impurities.—Proc. Missouri Pharm. Ass., 1906, p. 102.

STROPHANTHINUM.

Francis, John M., thinks that the increased use of strophanthin warrants its introduction into the pharmacopœia in order that some restrictions may be thrown around it.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Mendel, Felix, discusses the intravenous application of strophanthin according to Fraenkel and concludes that strophanthin frequently fails to give the desired relief and is not comparable in efficiency with the active principles of digitalis.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 447–453.

Hatcher, Robert A., calls attention to the fact that strophanthin constricts the coronary arteries much less than digitoxin does, a matter of much importance in the question of blood supply and strength of the beat.—J. Am. M. Ass., 1906, v. 47, p. 2061.

Lewin and Stadelmann (Berl. klin. Wchnschr., v. 43, No. 50) have studied the effects of ouabain (crystalline, or gratus, strophanthin) in heart disease.—*Ibid.*, 1907, v. 48, p. 555.

STROPHANTHUS.

Gilg (Münch. med. Wochnschr., 1905, p. 2446; from Pharm. Zentralh., 1906, p. 617) describes the characters of the seeds of *Strophanthus gratus* which will easily and absolutely permit the differentiation of seeds which may advantageously replace as officinal those of *S. kombé*.—J. de pharm. et de chim., Par., 1906, v. 24, p. 315.

Boorsma, W. G., (Bull. Inst. bot. Buitenzorg) points out that the seed of *Strophanthus dichotomus* DC. (*Apocyanaceæ*) contains a strophanthin-like glucoside. The leaves and the bark, however, do not contain any appreciable amount of strophanthin.—Bot. Centralbl., Cassel, 1906, v. 101, p. 270.

An abstract (from Münch. med. Wchnschr.) points out that the seed of *Strophanthus gratus* has certain advantages over other varieties. It is readily recognized, is uniformly active, and yields a crystalline principle that appears to represent the active constituent of the drug.—Pharm. Zentralh., 1906, v. 47, p. 617.

Nelson, Burt E., describes and illustrates the characteristic structures found in strophanthus by means of the compound microscope and calls attention to several of the different varieties of this drug.—Merck's Rep., N. Y., 1906, v. 15, p. 98.

Sharp, Gordon, outlines a modification of the official color test for strophanthus seeds.—Pharm. J., Lond., 1906, v. 23, p. 258.

Mann, E. W., concludes that it is possible to chemically standardize strophanthus and its preparations, but that the standardization can only have a real value when the botanical character of the seeds is fully established, and, failing this, the activity of the drug can only be tested by physiological experiments.—*Ibid.*, v. 23, p. 93; also Year Book of Pharmacy, 1906, p. 249. (For discussion, see p. 117.)

Umney, in discussing a paper by Mann, asserted that he had taken seeds giving the two distinct color reactions, red and green, from the same pod, and only those giving the green reaction were official.—Year Book of Pharmacy, 1906, p. 253.

Ball, A. W., announces that the African Lakes Corporation has arranged to have the seeds of *Strophanthus kombé* which they export to Great Britain collected under the direction of competent botanists, so that the identity of the seeds shall be guaranteed as genuine.—Pharm. J., Lond., 1906, v. 22, p. 246.

Holmes, E. M., reviews the commercial history of strophanthus, the first notice of the poison by Livingston, its introduction into medicine by Fraser, and the results of some cultivation experiments.—Pharm. J., Lond., 1906, v. 22, pp. 312–314.

An editorial states that no new remedy from the vegetable world introduced during the past twenty years has proved so valuable medically and so unsatisfactory pharmaceutically as strophanthus.—Chem. & Drug., Lond., 1906, v. 69, p. 129.

The Ph. Brit. Committee of Reference in Pharmacy report on strophanthus says the reaction with sulphuric acid has not proved of great value, as seeds from the same pod have given a green and red reaction. A process of assay is desirable.—*Ibid.*, v. 69, p. 865.

An editorial discusses some of the more recent publications referring to strophanthus.—Pharm. Ztg., Berl., 1906, v. 51, p. 216.

Francis, John M., considers the alkaloidal standard a fair average. Of 19 lots, representing 9,000 pounds, 14 assayed above 0.35 per cent and 5 assayed below; highest, 0.49; lowest, 0.24; and average, 0.366 per cent.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Caesar and Loretz discuss the assay of strophanthus and outline a qualitative and quantitative estimation of strophanthin in strophanthus.—Geschäfts-Ber. v. Caesar & Loretz, 1906, pp. 56–57, 115–118.

The Ph. Brit. Committee of Reference in Pharmacy report on tincture of strophanthus says standardize this preparation and investigate published suggestions.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Cline, R. R. D., suggests removing the oil by means of petroleum benzin in making tincture of strophanthus, and adds that a practically colorless and tasteless tincture can be obtained by treating the tincture with ferric hydroxide and subsequently chilling.—Texas Pharm. Ass., 1906, p. 27.

Francis, John M., says the official menstruum produces a hazy tincture. The drug should be thoroughly extracted with purified benzin to remove fat, dried to remove traces of solvent, and then percolated with 80 per cent alcohol.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Caesar and Loretz report that renewed experiments show that a tincture of strophanthus ordinarily well preserved will retain its activity from year to year, having decided advantages over digitalis in this respect.—Geschäfts-Ber. v. Caesar & Loretz, in Halle a. S., 1906, pp. 85, 86.

Saundby, Robert, says he knows no indication for giving preference to strophanthus over digitalis.—Brit. Med. J., Lond., 1906, v. 2, p. 987.

Dixon, W. E., comparing digitalis, strophanthus, and squill, says that strophanthus in anything like equal doses is a dangerous drug, because of the ease with which it gives rise to delirium cordis and sudden death.—*Ibid.*, v. 2, p. 1460.

Haynes, G. S., considers strophanthus a dangerous drug. The dose in Ph. Brit. should be reduced.—Biochem. J., Liverpool, 1906, v. 1, pp. 62–87.

Focke discusses the therapy of strophanthus and asserts that the observations on the action of strophanthus recorded by Haynes are in the main in accord with the observations recorded by German experimenters, but that his conclusions are erroneous.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 348–351.

Wells, G. Harlan, thinks strophanthus is especially indicated in cases where digitalis is not well borne by the stomach, in failing compensation associated with arterial sclerosis in increased arterial tension, and in cases of pulmonary œdema with irregular heart. . . . When given in full doses, it may produce diarrhœa.—Hahneman. Month., Phila., 1906, v. 41, p. 260.

STRYCHNINA.

The Ph. Brit. Committee of Reference in Pharmacy report on strychnine hydrochloride says the temperature for loss of water of crystallization is too low. The composition of the salt needs reinvestigation.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Herder, M., recommends calcium and barium-mercuric iodides as sensitive reagents for strychnine and its salts.—Arch. d. Pharm., Berl., 1906, v. 244, p. 120.

Wiebelitz, H., asserts that the addition of strychnine to strong sulphuric acid causes a partial decomposition of the strychnine and that this decomposition is the cause of the light yellow color usually produced. He suggests that the test be made more complete by prescribing actual quantities.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Hill, J. Rutherford, calls attention to the incompatibility of strychnine salts with medicated waters made with magnesium carbonate.—Pharm. J., Lond., 1906, v. 22, pp. 224–225.

Brown, Orville Harry, discusses a colloidal compound of strychnine and its pharmacology.—J. Biol. Chem., N. Y., 1906–7, v. 2, pp. 149–157.

v. Kétly, Ladislaus, discusses the use of strychnine in the treatment of a variety of forms of diabetes.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 98–104.

Giles, P. B., reports 9 cases of heat stroke in which he used strychnine with marked success.—Brit. Med. J., Lond., 1906, v. 2, p. 596.

Morgan, A. C., states that strychnine is always valuable as a heart tonic in pneumonia, combined with nitroglycerin if the arterial tension is high and with atropine if the tension is low.—N. York M. J., 1906, v. 84, p. 745.

Robinson, William J., states that strychnine is the remedy *par excellence* for loss of tone and functional atony of every character, but there are a number of disadvantages attending its use.—J. Am. M. Ass., 1906, v. 47, pp. 2145, 2146.

Wells, G. Harlan, finds strychnia a powerful stimulant to the heart muscle and its ganglia and to the vasomotor center; on account of its general tonic effect strychnia given in moderate doses is valuable in many forms of myocardial weakness associated with general malnutrition and depressed nervous conditions. He cautions against its continued administration in large doses for more than a few days, as the continued stimulation may exhaust the heart.—Hahneman. Month., Phila., 1906, v. 41, p. 261.

Additional references on the use of strychnine will be found in the Index Medicus and the J. Am. M. Ass.

STYRAX.

The Ph. Brit. Committee of Reference in Pharmacy report on storax says experiments should be made to determine whether purification by some other solvent (such as acetone) is not possible.

Proportion of cinnamic acid, acid value, and ester value should be stated.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Evans Sons Lescher and Webb assert that a sample labeled "Gum storax" was found to consist of red sawdust rubbed with storax, that it contained 2 per cent of cinnamic acid, and was soluble in alcohol to the extent of 47.5 per cent.—Analytical Notes, for 1906, E., L. & W., Lond., 1907, pp. 30, 31.

Marris, G. W., reports his analysis of 2 samples, 1 of only fair quality, the other containing, apparently, the stearin of cocoanut oil.—Pharm. J., Lond., 1906, v. 23, p. 721.

Hooper, David, discusses the use of storax, gives some figures to show the annual consumption at the present time, and records the analysis of several samples of varying origin.—*Ibid.*, v. 22, p. 107.

SULPHONETHYLMETHANUM.

The Ph. Austr. VIII includes trionalum, while the Ph. Belg. III includes trional as a synonym for methylsulphonalum in the French edition.

Riedel's Berichte (Berl., 1906, p. 24) asserts that the melting point of a recrystallized and carefully dried sample of sulphonethylmethane is between 76 and 77° C.

The death of a man is reported from trional, taken to induce sleep. The dose is not given.—J. Am. M. Ass., 1906, v. 46, p. 1628.

Broadbent, W., (Practitioner, Lond., July) states that sulfonal, veronal, trional, and such preparations are doing incalculable harm in the young.—*Ibid.*, v. 47, p. 463.

SULPHONMETHANUM.

The Ph. Austr. VIII includes sulfonalum, and the same title is also included in the Ph. Belg. III.

Lefeldt, Max, asserts that the designation "methylsulfonal" (Ph. Germ.) does not correspond with the actual composition of trional.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 339.

Lundström, E., discusses the chemistry involved in the synthesis of sulphonal.—Svensk. farm. Tidskr., 1906, v. 10, pp. 101–105.

Riedel's Berichte (Berl., 1906, p. 26) reports that carefully dried sulphomethane melts at 126° and in an air bath from 127 to 128° C.

Zörnlail, Alex., (Wien. med. Wochnschr., v. 56, p. 2454) reports a fatal case of poisoning by sulphonal.—Jahresb. ü. Tier. Chem. for 1906, Wiesb., 1907, v. 36, p. 794.

An editorial remarks that the number of deaths recorded from poisoning by sulphonal is sufficiently large, in the opinion of the council of the Pharmaceutical Society of Great Britain, to warrant the addition of the substance to Part II of the Schedule of Poisons;

but the pharmacy board of New Zealand takes a still more serious view of the matter, and it is reported that the board has recommended that sulphonal be placed in the first part of the Poison Schedule.—Pharm. J., Lond., 1906, v. 23, p. 450.

SULPHUR.

An editorial discusses the economic conditions in the sulphur market, refers to the rapid increase in the production of sulphur in Louisiana, and asserts that the capacity of the plant in 1906 was upward of 3,500 tons per day.—Oil, Paint, and Drug Rep., 1906, v. 69, May 14, p. 7.

Market conditions of Sicilian brimstone.—*Ibid.*, v. 70, July 2, p. 7.

The production and the use of sulphur in the United States.—*Ibid.*, v. 70, Sept. 10, p. 27.

Koch, Felix J., records some travel experiences in the " land of sulphur."—Western Druggist, 1906, v. 28, pp. 293–297, 365–367.

Miller, H. B., writing from Yokohama concerning sulphur in Japan, points out that sulphur is found in the vicinity of volcanoes mixed with clay and earthy matter from which it is separated by being heated in retorts. Upward of 22,000 tons are produced annually.—Oil, Paint, and Drug Rep., 1906, v. 70, July 16, p. 10.

Evans Sons Lescher and Webb assert that they have tested sulphur with satisfactory results, and point out that although samples had formerly reached them which were heavily contaminated nothing of this kind has been seen this year. The noncombustible residue usually amounts to 0.2 per cent.—Analytical Notes, for 1906, E., L. & W., Lond., 1907, p. 31.

Frerichs, G., suggests that sulphur be limited to a maximum of 1 per cent of residue.—Apoth. Ztg., Berl., 1906, v. 21, p. 938.

The Ph. Brit. Committee of Reference in Pharmacy report on sublimed sulphur says it always gives an acid reaction unless freshly washed and dried. The residue left in the ammonia test might be ammonium sulphate, and is no proof of the presence of arsenic or arsenium sulphide. The arsenic test is not delicate enough.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Baird, J. W., reports 12 samples of washed sulphur examined in 1904, 10 adulterated.—Proc. Massachusetts Pharm. Ass., 1906, p. 59.

Fay, Henry, reviews the methods of Lunge and Fresenius for determining the available and the total sulphur in pyrite and points out some of the precautions that are to be observed.—Tech. Quart., Bost., 1906, v. 20, pp. 27–33.

Acree, S. F., discusses sulphate and sulphur determinations.—J. Biol. Chem., N. Y., 1906–7, v. 2, pp. 135–143.

Brückner, Kamillo, discusses the probable deoxidizing action of sulphur on sulphates. Also considers the behavior of sulphur with chromates.—Monatsh. f. Chem., Wien, 1906, v. 27, pp. 47–58.

Brüning, Hermann, reviews some of the literature and reports experiments made to determine the behavior of sulphur with milk, preparations of milk, and the mucous membrane of the gastro-intestinal tract. He concludes that sulphur containing milk may be utilized to determine the usefulness of antiseptics, the latter preventing the formation of H_2S. The administration of sulphur or sulphur-containing preparations, particularly when administered in connection with milk, may lead to excessive and even dangerous generation of H_2S in the intestinal canal.—Ztschr. f. exper. Path. u. Therap., 1906, v. 3, pp. 156–170.

Collins, C. D., says that in pruritus vulvæ sulphur is indicated by an itching, worse at night, with burning heat in the skin. The parts become rough, scaly, and crusting; erysipeletous, with a tendency to small pustules and boils. Itching of voluptuous, tingling character. Worse at night by the warmth of the bed.—Trans. Am. Inst. Homœop., 1906, 62d sess., Part II, p. 287.

Hesse (Pop. Ztschr. f. Homoeop.) praises highly, as a prophylactic against Asiatic cholera, powdered sulphur on the inside of the shoes or stockings every three days.—Hahneman. Month., Phila., 1906, v. 41, p. 51.

SULPHUR PRÆCIPITATUM.

Francis, John M., says that the simple ignition test will cause surprise. Many manufacturers seem to have arrived at the conclusion that lime is an essential constituent of precipitated sulphur even after its manufacture is finished.—Bull. Pharm., Detroit, 1906, v. 20, p. 186.

Barnard, E. H., reports the analysis of 141 samples of precipitated sulphur, only 17 of which were pure. All other samples, or 88 per cent, contained large quantities of calcium sulphate. But few samples contained more than 55 per cent of sulphur, and in most of the samples the calcium sulphate content was about equal to that of sulphur.—Rep. Indiana Bd. Health, 1906, pp. 373–376.

Similar conditions were reported by Kebler, L. F., Proc. Am. Pharm. Ass.; Sayre, L. E., Bull. Kansas Board of Health; Caspari, Chas. E., Proc. Missouri Pharm. Ass.; Ohliger, Willard, Proc. Mich. Pharm. Ass.; and Baird, J. W., Proc. Massachusetts Pharm. Ass., all for 1906.

Liverseege, L. F., reports that the calcareous product is becoming extinct in England. Only two samples were found to be adulterated with calcium sulphate. These samples yielded 37 and 57 per cent, respectively, of ash, while 35 genuine samples contained from 0.05 to 0.95 per cent of ash.—Year Book of Pharmacy, 1906, p. 272.

SUMBUL.

Eberle, E. G., points out that extract of sumbul appears to be an unsatisfactory preparation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

Francis, John M., thinks the alcohol in the menstruum for fluid extract of sumbul insufficient to extract the resin properly.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Steele, J. Dutton, states that sumbul has been useful in temporarily relieving the discomfort attending gastric hyperacidity.—J. Am. M. Ass., 1906, v. 47, p. 498.

SUPPOSITORIA.

Cook, E. Fullerton, reports that William W. Foster, jr., found that the best method of preventing the adherence of cooled cacao butter base suppositories and their subsequent cracking when removed from the molds by force is by thorough cooling, provided the molds be clean, dry, and unscratched; if the molds be injured a 4 per cent alcoholic solution of castile soap, thinly spread upon the inner surface of the molds with a piece of absorbent cotton before cooling, is better than liquid petrolatum, lycopodium, or cornstarch.—Am. J. Pharm., Phila., 1906, v. 78, p. 417.

Taylor, S., suggests the addition of from 1 to 2 per cent of sodium stearate to the oil of theobroma. This addition, the author states, does not materially raise the melting point of the base, but does allow of the addition of up to 30 per cent of water.—Year Book of Pharmacy, 1906, pp. 262–264; also, Pharm. J., Lond., 1906, v. 23, p. 98. For discussion, see *Ibid.*, 118.

Cook, E. Fullerton, reports that Elmer E. Scatchard contributed a practical addition to the U. S. P. VIII process for the making of glycerinated gelatin. Instead of allowing the mass to cool in the dish, from which it is removed with considerable difficulty, he suggests that it be poured upon glass plates, slightly oiled with liquid petrolatum, and there allowed to cool. It may be removed from the plate without difficulty and cut into pieces for preservation in stock bottles. A general formula is given.—Am. J. Pharm., Phila., 1906, v. 78, p. 419.

SYRUPI.

Francis, John M., calls attention to the need of greater care in the preparation of syrups and especially to two essentials: None but the best of sugar is good enough; it should be clean, hard, and bright colored, and by all means tested for the presence of reducing sugars; it should be present in proper proportions to avail of its preservative action; if too thin, it readily ferments; if too thick, it crystallizes.

He considers the official syrups to have been improved.—Bull. Pharm., Detroit, 1906, v. 20, p. 230.

Caspari, Charles, jr., calls attention to the tendency manifested by syrups to spoil and points out some points useful in their preservation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 262.

An editorial suggests the more general use of glycerin in the official syrups to prevent fermentation.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 147.

Hérissey, H., notes that in a general way the preparation of the various syrups of Ph. Ndl. IV is very different from that of the corresponding French syrups.—J. de pharm. et de chim., Par., 1906, v. 23, p. 481.

Bougault, J., contrasts the American preparations, made by simply mixing the fluid extracts with sugar syrup, with those of the French Codex.—*Ibid.*, v. 23, p. 288.

Manseau presents a formula for syrup of lemon or syrup of orange in which he proposes the use of the rind of one orange or lemon with 30 grams of citric acid, 1,700 grams of sugar, and 1,000 grams of distilled water. The outer portion of the rind is to be mixed with a portion of the sugar and this with citric acid and remaining portions of the sugar dissolved in the distilled water.—Bull. Soc. de pharm. de Bordeaux, 1906, v. 46, pp. 200–202.

Caldwell, Paul, gives the approximate percentage of alcohol present in the U. S. P. VIII sirups.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

SYRUPUS ACIDI HYDRIODICI.

Francis, John M., does not understand why hypophosphorous acid was not included in the syrup of hydriodic acid as a protective agent, as it certainly is needed in this syrup as it is in syrup of ferrous iodide.

He commends the glycerole of hydriodic acid, or at least solutions made almost wholly of glycerin, sold in the American market as syrup, but thinks that, as a matter of common honesty, it should not be labeled " Syrup."—Bull. Pharm., Detriot, 1906, v. 20, p. 230.

SYRUPUS FERRI IODIDI.

Francis, John M., commends the addition of diluted hypophosphorous acid to the syrup of iodide of iron, as it is very prone to undergo discoloration unless it contains some such reducing agent.—Bull. Pharm., Detroit, 1906, v. 20, p. 230.

Wiebelitz, H., suggests the use of 1 per cent of citric acid as a preservative for syrup of ferrous iodide.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

Smith, F. A. Upshur, thinks it curious that the U. S. P. VIII contains no directions for the storage of the syrup of ferrous iodide. He considers that it should be kept in white glass bottles exposed to a strong light.—Pharm. J., Lond., 1906, v. 22, p. 85.

The Ph. Brit. Committee of Reference in Pharmacy suggests that the formula for syrup of ferrous iodide be revised and a better assay process included.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Philipp Röder, Wien, outlines a method for the valuation of syrup of ferrous iodide. Two samples examined contained, respectively, 5.35 and 4.98 per cent of ferrous iodide.—Pharm. Post, Wien, 1906, v. 39, p. 296.

Caldwell, Paul, recommends that in the making of syrup of ferrous iodide the hypophosphorous acid be directed to be added to the solution of the ferrous iodide in the presence of the uncombined iron, in place of being added to the finished product as directed by the pharmacopœia. He believes the resulting iron hypophosphite to be a better preservative than the free acid.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

Barnard, H. E., reports that of 56 samples of ferrous iodide analyzed 9, or 16 per cent, were below standard; 29 of the samples, more than 50 per cent, were evidently made to conform to the U. S. P., 1890.—Rep. Indiana Bd. Health, 1906, pp. 383, 384.

Brown, Linwood A., examined 14 samples of syrup of ferrous iodide and found that of this number only 3 came within 5 per cent of the standard set by the eighth revision of the United States Pharmacopœia. The strength found varied from 51 per cent to 210 per cent of the official strength.—Rep. North Dakota Agric. Exper. Sta., 1906, Part II, p. 150.

SYRUPUS FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Taylor, S., suggests a modification of the official Ph. Brit. directions for making syrup of the phosphates of iron, quinine, and strychnine.—Pharm. J., Lond., 1906, v. 23, p. 670.

The Ph. Brit. Committee of Reference in Pharmacy find that an assay process is desirable for syrup of phosphate of iron with quinine and strychnine and that the formula requires some slight alteration in detail.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

SYRUPUS FERRI SACCHARATI SOLUBILIS N. F.

F. S. H. points out that the formula for the syrup of soluble saccharated iron N. F. III remains the same as in the second edition, although the strength of the solution of iron chloride, U. S. P., has been materially weakened.—Bull. Am. Pharm. Ass., 1906, v. 1, p. 349.

SYRUPUS HYPOPHOSPHITUM COMPOSITUS.

Francis, John M., advises that pharmacists go slow on this syrup until some experience has been gained as to details of its manufacture.—Bull. Pharm., Detroit, 1906, v. 20, p. 230.

SYRUPUS RHEI ET POTASSII COMPOSITUS N. F.

Felter, Harvey Wickes, says that the National Formulary preparation has not become popular among Eclectic physicians; while there are many ways of preparing neutralizing cordial, the essential construction of the medicine is such that in any of these forms it still remains a prime favorite with eclectic physicians. He quotes the original formula, from Beach, as follows:

> Take of rhubarb, pulverized, salaeratus, pulverized, peppermint plant, pulverized, equal parts. To a large teaspoonful add half a pint of boiling water; when cool, strain, sweeten with loaf sugar, and add a tablespoonful of brandy. * * * Its operation and action appear to be specific, if not infallible, etc.—Eclectic Med. J., Cincin., 1906, v. 66, pp. 438–440.

TALCUM.

Francis, John M., thinks the majority of pharmacists will be surprised when reminded that talc is now officially recognized for the first time. He advises that it always be purchased by sample, owing to the great variety of grades found in the market; the finest and whitest is imported.—Bull. Pharm., Detroit, 1906, v. 20, p. 230.

Ohliger, Willard, reports talcum which contained impurities which were removed by sifting.—Proc. Michigan Pharm. Ass., 1906, p. 48.

TAMARINDUS.

Remeaud, Octave, presents a study of the composition of the pulp of tamarinds, including a detailed account of the composition of three samples.—J. de pharm. et de chim., Par., 1906, v. 23, pp. 424–430.

Wiebelitz, H., points out that the Ph. Germ. test for extractive should be carried out with at least 100 gm. of tamarind, as the great number of stones present can readily lead to misleading results with smaller quantities.—Pharm. Ztg., Berl., 1906, v. 51, p. 1004.

TARAXACUM.

Henkel, Alice, mentions *Taraxacum officinale* Weber., also known as *Taraxacum taraxacum* (L.) Karst., commonly known as taraxacum, dandelion, blowball, cankerwort. Naturalized from Europe; very abundant in lawns, meadows, and waste places throughout the

United States, with the exception of the South.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 69.

Francis, John M., recognizes the plausibility of the theory upon which sodium hydroxide is added as a preservative, but has not found the fluid unstable.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Taylor, S., quotes Lenton to the effect that the variations in the liquid extract of taraxacum are due to a want of explicit direction; he recommends repercolation with 30 per cent alcohol.—Pharm. J., Lond., 1906, v. 23, p. 669.

Fyfe, John William, says that taraxacum was regarded as one of the most valuable remedies in the materia medica. It exerts a sure and efficacious effect upon the liver and removes obstructions. It was also deemed an efficient remedy in diseases of the kidneys.—Electic Med. J., Cincin., 1906, v. 66, p. 319.

TEREBENUM.

Francis, John M., considers the pharmacopœial specification that terebene be completely inactive toward polarized light unreasonable.—Bull. Pharm., Detroit, 1906, v. 20, p. 231.

Patch, E. L., reports that three lots of terebene gave a colored residue ranging from 0.111 to 0.150 from 10 c. c.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

TEREBINTHINA.

Herty, Charles H., discusses the industrial and scientific aspects of the pine and its products and reviews the progress that has been made in the turpentine industry.—Chem. Eng., Phila., 1906–7, v. 5, pp. 229–235.

A news item describes some of the advances that have been suggested by the Forest Service to increase the yield of turpentine and prolong the life of the tree.—Oil, Paint, and Drug Rep., 1906, v. 69, Jan. 29, p. 55.

(See also *Ibid.*, v. 70, Dec. 31, pp. 7, 51.)

Schimmel & Co. discuss the several methods for collecting turpentine and point out the disadvantages of the "box" method.—Semi-Ann. Rep., 1906, Apr.–May, pp. 64, 65.

TEREBINTHINA CANADENSIS.

Henkel, Alice, mentions *Abies balsamea* (L.) Mill., also known as balsam-fir, and Canada balsam tree as occurring in damp woods from Newfoundland to the high mountains of southwestern Virginia, west to Minnesota, and northward.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1906, No. 89, p. 7.

Evans Sons Lescher & Webb report that of two consignments of Canada balsam examined one had an acid value of 84 and a saponification value of 91.9, and the other had an acid value of 83.97 and a saponification value of 88.—Analytical Notes for 1906, E., L. & W., Lond., 1907, p. 12.

TERPINI HYDRAS.

Robinson, Frank P., presents a formula for the preparation of terpin hydrate from oil of turpentine by nitric acid and hydrogen dioxide.—Bull. Pharm., Detroit, 1906, v. 20, p. 155.

Riedel's Berichte (Berl., 1906, p. 27) points out that on rapid heating terpin hydrate melts uniformly at 116° C. On drying, even over sulphuric acid, the substance loses water and melts at 101.5° C., or in an air bath at 102° C.

Utz asserts that terpin hydrate melts at 102° C. in place of 116°, as quoted in the Ph. Germ. IV.—Apoth. Ztg., Berl., 1906, v. 21, p. 930.

THYMOL.

Riedel's Berichte (Berl., 1906, p. 27) asserts that thymol recrystallized from glacial acetic acid and thoroughly dried, melts at 51° C.

The anæmia commission reports the use of thymol in anæmia (caused by "uncinaria") with excellent results.—J. Am. M. Ass., 1906, v. 46, p. 1231.

Quiart (L'Union Pharmaceutique) records the experiences of a number of years with thymol as an anthelmintic. Outlines methods for its administration.—J. de pharm. d'Anvers, 1906, v. 62, p. 822.

Cook, George W., considers thymol dissolved in oil of eucalyptus a valuable agent in the treatment, especially of the mild forms, of chronic blind abscesses (Western Dent. J.).—Dental Cosmos, Phila., 1906, v. 48, p. 1166.

Kirk., Edward C., recommends equal parts by weight of thymol and phenol crystals in the treatment of pulp cavities and as ideal for canal dressing, it being, he claims, sedative, nonirritant, and germicidal.—*Ibid.*, v. 48, p. 793.

Kirk yields to Herman Prinz's claim to originality in the above method.—*Ibid.*, v. 48, p. 1277.

Schimmel & Co. quote an assertion by Schill that thymol is a good remedy against gnats. It is used in the form of a solution of thymol in 50 per cent alcohol (2:100) which is rubbed on the hands, neck, and face by means of a cotton wool pad or a piece of woolen rag.—Semi-Ann. Rep., 1906, p. 92.

THYMOLIS IODIDUM.

The Ph. Belg. III includes thymol iodide as "Biiodobithymolum."

Niece, Frank E., presents a formula and outlines the method of making thymol iodide.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 151, 152.

Robinson, Frank P., presents a formula for the preparation of dithymol diiodide, similar to that of the French Codex, but producing a better, a more ether-soluble compound.—Bull. Pharm., Detroit, 1906, v. 20, p. 155.

Patch, E. L., reports on one lot of thymol iodide which contained soluble iodide and trace of free iodine.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

Cormimboeuf, H., outlines a method for determining iodide in thymol iodide.—Repért. de pharm., Par., 1906, v. 18, pp. 100, 101.

Fink, Emanuel, discusses the use of thymol iodide in the treatment of hay fever and points out the difficulties attending its use.—Therap. d. Gegenw., Berl., 1906, v. 47, pp. 163–169.

TINCTURÆ.

Francis, John M., considers the comments and protests with reference to the changes in strength of tinctures a most hopeful sign, as it proves that the pharmacists are becoming more alive to the value and authority of the U. S. P.—Bull. Pharm., Detroit, 1906, v. 20, p. 231.

Moerk, Frank X., calls attention to the fact that while nominally the tinctures of potent drugs represent 1 part of the drug in 10 of the finished product, in reality they represent but from 8.6 to 9.3 per cent of the active constituents.—Proc. Pennsylvania Pharm. Ass., 1906, p. 159.

Dohme, A. R. L., points out that percolated assayed drugs do not necessarily mean exhausted drugs and that therefore tinctures should be assayed irrespective of their being prepared from assayed drugs.

Similar opinion is expressed by H. A. B. Dunning, E. H. Gane, A. B. Lyons, and others.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 445.

Caldwell, Paul, gives the approximate percentage of alcohol present in the official tinctures.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

Beysen, Kurt, proposes that the Ph. Germ. include the following definition for tinctures: Tinctures are alcoholic, vinous, or aqueous extracts of vegetable or animal drugs and must contain the soluble constituents of the whole of the prescribed drug. When not otherwise directed they are to be prepared by extracting the coarsely powdered drug with the accompanying fine powder with the required solvent.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 330.

Utz believes that the pharmacopœia should direct the specific gravity of all tinctures and also the extract content.—Apoth. Ztg., 1906, v. 21, p. 931.

Evans, John, recommends the determination of the specific gravity by the Westphal balance, and of the extractive matter.—Apothecary, Boston, 1906, v. 18, p. 907.

Hérissey, H., asserts that the tinctures of the Ph. Ndl. IV, save special prescriptions, may be made either by percolation or maceration. Aside from the tinctures of potent drugs, a certain number of tinctures are of 10 per cent strength, but for the most part they are of 20 per cent. Only the tincture of musk is of 2 per cent.—J. de pharm. et de chim., Par., 1906, v. 23, p. 482.

The Pharmacopœia of Japan directs that tinctures, unless otherwise prescribed, are to be made by maceration, with frequent shakings, for 7 days in a shady place. They are then strained, expressed, allowed to stand, and finally filtered.—Ph. Japon. III, p. 335.

The inspectors of pharmacies and drug depots assert that the tinctures prepared by pharmacists themselves were generally found to be good, while commercial tinctures were inferior.—J. de pharm. d'Anvers, 1906, v. 62, p. 90.

Caspari, Charles, jr., calls attention to the possible changes in tinctures caused by sudden or repeated changes in temperature.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 261.

Smith, F. A. Upshur, points out that as a rule no directions are given in the U. S. P. VIII for storing tinctures. He believes it to be obvious that preparations of drugs require the same careful method of storage that is ordered in the case of the corresponding active principles.—Pharm. J., Lond., 1906, v. 22, p. 85.

"Gnomon" believes that tinctures made in relatively small quantities from the best material and by official processes are more trustworthy generally than similar preparations produced from less carefully selected materials and by more economical but less satisfactory methods.—*Ibid.*, v. 22, p. 88.

Alpers, W. C., recommends the employment of circulatory displacement in the making of the tincture of aloes, aloes and myrrh, asafetida, benzoin, cantharides, gambir compound, guaiac, myrrh, and tolu.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 507.

Herzog, J., presents a comprehensive review of the several methods that have been proposed for the production of tinctures and extracts. He reports a number of experiments and concludes that percolation offers the more desirable method for extracting drugs.—Arb. a. d. pharm. Inst. d. Univer., Berl., 1906, pp. 87–99. (See also Ber. d. pharm. Ges., 1905, pp. 107.)

Gardner, Hermann C. T., discusses the preparation of tinctures and the removal of alcohol from marcs by means of downward displacement with water.—Pharm. J., Lond., 1906, v. 23, pp. 662–664, 695–696. (For discussion see page 674.)

Weills, Isaac M., discusses the use of fluid extracts for preparing the tinctures of the pharmacopœia. He believes that the diluting of a standardized fluid extract will yield a tincture of uniform strength.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 79, 80.

Halliday, W. F., thinks that many druggists, in place of turning to the U. S. P. in making tinctures, will take the fluid extract bottle and, turning to the back of the bottle, there find the formula for the tincture. This he thinks the handiest nad quickest method, but he notes that the resulting tincture of aconite, for instance, would be 35 instead of 10 per cent.—Proc. North Dakota Pharm. Ass., 1906, p. 86.

Carmichael, T. H., points out that in the Homœopathic Pharmacopœia of the United States the modern methods of percolation and maceration are employed, and the fresh plant tinctures are so made as to represent a drug strength of one part of crude dried drug in every ten parts of tincture irrespective of the season (whether it be wet or dry). This uniform strength of one-tenth was carefully selected as the strongest justifiable. He further points out that this is also considered the best uniform strength by the United States Pharmacopœia.—Trans. Am. Inst. Homœop., 1906, 62d ses., p. 229.

For individual U. S. P. tinctures see under the drug.

TINCTURA ANTIPERIODICA N. F.

Caldwell, Paul, believes that a good tincture may be made from the formula for antiperiodic tincture by maceration, without the more laborious procedure prescribed. He also believes that the quinine sulphate might well have been changed to the bisulphate.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

Utech, P. H., suggests that the drugs for antiperiodic tincture N. F. be macerated for forty-eight hours in place of "digesting" the powder as directed in the National Formulary.—Proc. Pennsylvania Pharm. Ass., 1906, p. 81.

TINCTURA PERSIONIS N. F.

Ohliger, Willard, reports cudbear in some cases either extracted or originally of very poor quality. One sample was entirely devoid of coloring power.—Proc. Michigan Pharm. Ass., 1906, p. 47.

Dunning, H. A. B., suggests the use of powdered paper as a diluent for cudbear in making the tincture by percolation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 485.

TRAGACANTHA.

Philipp Röder, Wien, reports on two samples of tragacanth which contained 2.89 and 2.95 per cent of ash, respectively.—Pharm. Post, Wien, 1906, v. 39, p. 298.

Ohliger, Willard, reports tragacanth, powdered, adulterated with corn and wheat starch.—Proc. Michigan Pharm. Ass., 1906, p. 48.

TRITICUM.

Henkel, Alice, mentions *Agropyron repens* (L.) Beauv., also known as *Triticum repens* Beauv., commonly known as triticum, couch-grass, dog-grass, and quack-grass, as being found in cultivated ground from Maine to Maryland; west to Minnesota and Missouri; sparingly distributed in the South. Introduced from Europe.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 9.

Eberle, E. G., asserts that fluid extract of triticum could be made as well by digestion as by percolation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

TROCHISCI.

Hommell, P. E., says that of the nine official troches only two are employed therapeutically to any extent.—Proc. New Jersey Pharm. Ass., 1906, p. 108.

Beringer thinks the troches as a class are sadly in need of revision; there is no uniformity in size; they might have been classed at least into two distinct sizes. Hancock says they do not seem to give satisfaction.—*Ibid.*, p. 111.

Evans, John, outlines an analytical process for troches, used in the laboratory of Allen and Partners.—Apothecary, Boston, 1906, v. 18, p. 907.

ULMUS.

Henkel, Alice, mentions *Ulmus fulva* Michx., also known as *Ulmus pubescens* Walt., commonly known as ulmus, elm, slippery elm, red elm, moose-elm, and Indian elm, as growing on hills, along streams, and in woods from Quebec to North Dakota, south to Florida and Texas. More common in the western part of its range.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 72.

Blome, W. H., found powdered or ground elm bark to be a very scarce commodity. Of seven samples examined, foreign starch was present in three. Four of the seven were of little or no value as poultices or demulcents.—Proc. Michigan Pharm. Ass., 1906, p. 104.

UNGUENTA.

Francis, John M., declares that the official ointments have been possibly the most unsatisfactory class of products in our pharmacopœia. Many notable changes have been made which reflect great credit on the subcommittee in charge of this work.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

An editorial suggests the more general use of petrolatum in the official ointments, in place of benzoinated lard.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 147.

MacFadden, W. Lester, discusses in detail the subject of ointment making, under the several heads of: Hardening agents, emmollient agents, miscellaneous agents, the massage creams, and the manipulation of ointments.—Bull. Pharm., Detroit, 1906, v. 20, pp. 203–206.

Fisk, Frank E., discusses some of the problems involved in the use of fats and oils in the making of ointments.—Proc. Am. Pharm. Ass., 1906, v. 54, pp. 503–505.

Bradford, H. C., discusses ointments and salves, refers to their early use as cosmetics, and suggests modifications in connection with several official ointments.—Merck's Rep., N. Y., 1906, v. 15, pp. 162, 163.

Boa, Peter, dicusses the several pharmacopœial ointments and expresses the belief that the Ph. Brit. preparations are generally satisfactory.—Brit. & Col. Drug., Lond., 1906, v. 49, p. 277.

Kauffeisen, L., points out that the examination of ointments by means of the microscope is not without interest and that it can be made a valuable means for controlling the smoothness and homogeneity of these preparations.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 612–615, 630–634.

Matolcsy, Nikolaus, outlines a method for determining the specific gravity of ointments and plasters, by weighing the ointment or plaster in a container the capacity of which is known.—Pharm. Post, Wien, 1906, v. 39, pp. 377–379.

Hemm, Francis, quotes a table prepared by A. St. Ouge showing the amount of water absorbed by the various enumerated fats and fat-like substances used as ointment bases.—Proc. Missouri Pharm. Ass., 1906, p. 136.

Caspari, Chas., jr., points out that ointments on exposure to extremes of temperature undergo change, and calls attention to several precautions necessary for their preservation.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 262.

Vanderkleed, Chas. E., outlines a method for the assay of ointments containing extracts of belladonna, stramonium, or henbane, and a petrolatum base.—*Ibid.*, v. 54, pp. 422, 423.

UNGUENTUM AQUÆ ROSÆ.

Francis, John M., mentions this but to add a word of hearty commendation; he considers it worthy of adoption by any pharmacist.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Beard, E. G., suggests a modification of the process for the preparation of cold cream, using distilled water instead of rose water and perfuming with otto of rose or oil of geranium rose.—Proc. Mississippi Pharm. Ass., 1906, p. 42.

Taylor, S., says the Ph. Brit. formula is a failure; we need a good working formula.—Pharm. J., Lond., 1906, v. 23, p. 670.

Fullerton, James, recommends a formula for a petrolatum cold cream which has been thoroughly tried and exploited successfully in a commercial way.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50. p. 162.

UNGUENTUM DIACHYLON.

Cruse, E., reviews the various suggestions for the improvement of diachylon ointment and points out that diachylon ointment is not expected to be absorbed but is used solely for protection. On this basis he recommends that mineral oil be used in the making of this ointment, in place of the olive oil directed in the pharmacopœia.—Pharm. Ztg., Berl., 1906, v. 51, p. 906.

Ruth, F., discusses the preparation of diachylon ointment and outlines a method for the preparation of small quantities. Suggests that the occasionally complained of irritating properties of this ointment may be due to the contained oil of lavender, which latter, he believes, also acts as oxygen carrier and facilitates rancidity.—Pharm. Post, Wien, 1906, v. 39, p. 39; also p. 56.

An editorial discusses proposed variation from the official formula for diachylon ointment which have been proposed with the object of producing a more stable ointment. It is pointed out that while an ointment made with paraffin oil, for example, may be satisfactory, the dispensing of such a preparation is not permissible unless specifically sanctioned by the prescribing physician. Attention is also directed to the previously made statement that diachylon ointment should not be dispensed after being on hand from six to eight weeks.—Pharm. Ztg., Berl., 1906, v. 51, p. 30. (See also p. 190.)

UNGUENTUM HYDRARGYRI.

Francis, John M., thinks the pharmacist must exercise care to produce an ointment which shall assay 48 per cent Hg. Some little experimentation may be needed to make the ointment of proper consistency.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Kauffeisen, L., points out that mercurial ointment can be prepared extemporaneously by triturating 50 parts of mercury with 10 of lanolin and subsequently incorporating the mixture with the remaining fat.—Pharm. Ztg., Berl., 1906, v. 51, p. 759.

The inspectors of pharmacies assert that mercurial ointment has been found of inferior quality due to the use of poor lard or the inefficient extinction of the mercury.—J. de pharm. d'Anvers, 1906, v. 62, p. 84.

Rupp, E., outlines a method for the determination of mercury in mercurial ointment by dissolving the metal in nitric acid; the resulting filtered and cleared solution is then titrated with potassium sulphocyanide.—Arch. d. Pharm., Berl., 1906, v. 244, pp. 538, 539.

Sayre, L. E., reports that 9 samples of mercurial ointment examined varied from 53.9 to 37.7 per cent of metallic mercury.—Bull. Kansas Bd. Health, 1906, v. 2, p. 174.

Havenhill, L. D., reports two samples containing, respectively, 33 and 41 per cent of mercury; in neither was the fatty base of official quality.—Proc. Kansas Pharm. Ass., 1906, p. 36.

UNGUENTUM HYDRARGYRI AMMONIATI.

Morstatt, H., outlines a process for the preparation of the ointment of ammoniated mercury, freshly precipitated.—Apoth. Ztg., Berl., 1906, v. 21, p. 194.

Caldwell, Paul, suggests that instead of the hydrous wool fat, use the anhydrous and take the water (30 per cent) allowed in the hydrous and pour it upon the mercury salt and let it stand twenty-four hours. After this it may be incorporated with the base in the usual way.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

Eberle, E. G., also suggests the use of wool fat instead of hydrous wool fat. Rub the ammoniated mercury with a corresponding amount of water, incorporate the wool fat, and finally the white petrolatum.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 450.

UNGUENTUM HYDRARGYRI NITRATIS.

The inspectors of pharmacies report that ointment of mercury nitrate, which should be yellow, was usually found to be brown or gray, not sufficient care being devoted to its preparation or preservation.—J. de pharm. d'Anvers, 1906, v. 62, p. 84.

Taylor, S., says the balance of opinion is in favor of Squire's process, which yields an ointment with good keeping qualities.—Pharm. J., Lond., 1906, v. 23, p. 670.

UNGUENTUM HYDRARGYRI OXIDI FLAVI.

Kauffeisen, L., recommends the use of freshly prepared yellow oxide of mercury in the preparation of the ointment, but warns against replacing the water by washing with alcohol or ether.—Pharm. Ztg., Berl., 1906, v. 51, p. 759.

Schweiszinger, O., discusses the history of the ointment of yellow oxide of mercury prepared from freshly precipitated mercuric oxide.—Pharm. Zentralh., 1906, v. 47, p. 630.

Fleischer (Württb. med. Korrespbl.) outlines a method for the preparation of an ointment of yellow oxide of mercury from the freshly precipitated salt.—*Ibid.*, v. 47, p. 739.

Taylor, S., says the excellent results yielded by the formula lately published by Martindale quite outweigh the extra trouble. In fact, this is one of those refinements of pharmacy which might well occupy a whole evening's attention.—Pharm. J., Lond., 1906, v. 23, p. 670.

UNGUENTUM HYDRARGYRI OXIDI RUBRI.

Kauffeisen, L., asserts that for the production of a satisfactory, nonirritating ointment of red oxide of mercury the most satisfactory procedure is continued rubbing to insure complete and even incorporation of the active ingredient with the ointment base.—Pharm. Ztg., Berl., 1906, v. 51, p. 759.

UNGUENTUM RESORCINI COMPOSITUM N. F.

Caldwell, Paul, discusses the technique of making compound resorcin ointment and suggests that the resorcin be added to the melted paraffin and petrolatum before adding these to the remainder of the ointment.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

Schellentrager and Mulhan present a somewhat modified formula for this ointment, together with a method for its preparation.—Proc. Ohio Pharm. Ass., 1906, p. 47.

UNGUENTUM SULPHURIS COMPOSITUM N. F.

An abstract proposes the following modification for making Wilkinson's ointment: Lard 6 and tallow 6 are melted together in a suitable vessel and this mixture then added to a hot, previously melted portion of soft soap 12. The resulting mixture is allowed to cool somewhat, and the prepared chalk 1, sublimed sulphur 2, are gradually added, with constant stirring. Finally, when nearly cool, tar 6 is added.—Pharm. Ztg., Berl., 1906, v. 51, p. 30.

UNGUENTUM ZINCI OXIDUM.

MacFadden, W. Lester, in commenting upon the disadvantages of lard, says it would seem that inasmuch as the action of zinc ointment is soothing and protective the use of petrolatum as a base were a step ahead.—Bull. Pharm., Detroit, 1906, v. 20, p. 204.

The inspectors of pharmacies point out that while the ointment of zinc oxide is widely used it is rarely made in compliance with the requirements of the pharmacopœia.—J. de pharm. d'Anvers, 1906, v. 62, p. 84.

Cruse, E., asserts that the official, Ph. Germ. IV ointment of zinc oxide, made with lard, does not keep well, and suggests a base consisting of a mixture of glycerin, lanolin, and paraffin ointment.—Pharm. Ztg., Berl., 1906, v. 51, p. 906.

UVA URSI.

Henkel, Alice, mentions *Arctostaphylos uva-ursi* (L.) Spreng., commonly known as uva-ursi, bearberry, and upland cranberry, as a native of rocky or dry, sandy soils from the Middle Atlantic States north to Labrador, westward to California and Alaska.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 12.

Wgl., discusses the sophistication of uva ursi and outlines several tests that are designed to indicate the genuineness of uva ursi by chemical means.—Pharm. Zentralh., 1906, v. 47, p. 954.

Reichard, C., describes the color reaction of arbutin in nitric acid and explains its application.—Chem. Ztg., Cöthen, 1906, v. 30, pp. 790, 791.

Tunmann discusses the demonstration of arbutin in uva ursi leaves and the practical application of the nitric-acid test, proposed by Reichard, for the microchemical demonstration of arbutin.—Pharm. Zentralh., 1906, v. 47, pp. 945–947.

Thomann, Julius, calls attention to the work done by Tunmann in connection with uva ursi leaves and the possibility of detecting other leaves by microchemical means.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, pp. 727, 728.

VALERIANA.

Henkel, Alice, mentions *Valeriana officinalis* L., commonly known as valeriana, valerian, garden-valerian, and vandal-root, as a native of Europe; escaped from gardens to roadsides in New York and New Jersey.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 72.

Philipp Röder, Wien, reports on 6 samples of valerian which contained from 7.21 to 43.98 per cent of ash, or, aside from two grossly adulterated specimens, 9.89 per cent of ash. The 70 per cent alcohol extract amounted to from 17.64 to 24.03 per cent.—Pharm. Post, Wien, 1906, v. 39, p. 284.

Francis, John M., calls attention to recent German observations as to the keeping qualities of the fluid extract and of the tincture and recommends that until the question is settled the fluid extract and tincture be prepared in but small quantities and from the fresh drug.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Linke, R., reports finding a sample of tincture of valerian containing methyl alcohol. Points out the danger of purchasing preparations and the advantage of making them in the laboratory of the apothecary.—Apoth. Ztg., Berl., 1906, v. 21, p. 1075.

VANILLA.

Howell, E. M., gives an account of the origin, method of collecting and curing, and method of marketing the so-called "vanilla bean."—Pharm. Era, N. Y., 1906, v. 35, pp. 502, 503.

Gehe & Co. point out the marked reduction in the amount of vanilla produced in the Bourbon Islands and enumerate the yield of the several islands. They also discuss Ceylon vanilla, which is classed as being intermediate in value between the Bourbon and Tahiti variety, but lacking the pure vanilla perfume of the former.—Handels-Ber., Gehe & Co., 1906, p. 31.

An abstract from a British Colonial Office report for 1905, on the Seychelle Islands, includes some interesting matter relating to the production and export of vanilla.—Brit. & Col. Drug., Lond., 1906, v. 50, p. 195. (See also Oil, Paint and Drug Rep., 1906, Oct. 1, p. 17.)

Smith, Harold Hamel, discusses the problems of the Tahiti vanilla market. He says this vanilla lacks delicacy, its perfume has not the fragrance desired by the consumer; then it never presents the crystalline efflorescences so appreciated by the public.—J. d'Agric. trop., Par., 1906, v. 6, p. 75.

Gomolla, Richard, presents an illustrated article descriptive of the cultivation of vanilla in German East Africa. He discusses the plant and its habits, the conditions favorable to its cultivation, the care that is required, the average yield, method of collecting and preparing the fruit. Ztschr. f. Unters. d. Nahr.- u. Genussm., 1906, v. 12, pp. 642–659.

Kraemer, H., reports that whole vanilla beans have been marketed with the central pulpy portion pressed out.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

Hanus (Ztschr. f. Unters. d. Nahr.- u. Genussm., 1905) outlines a method for the estimation of vanillin in vanilla.—Pharm. Zentralh., 1906, v. 47, p. 153.

Schimmel & Co. discuss the method proposed by Jos. Hanus for the quantitative estimation of vanillin in vanilla extracts and point out that the method is useless if other aldehydes are present.—Semi-Ann. Rep., 1906, p. 92.

Circular No. 19 of the United States Department of Agriculture, Bureau of Chemistry, defines vanilla bean as the dried fruit of *Vanilla planifolia* Andrews, and requires that 100 cc. of vanilla extract contain the soluble matters from not less than 10 grams of the vanilla bean.

Barnard, H. E., reports that of 189 samples of vanilla extract examined 136, or 71.9 per cent, were found to be adulterated or below standard. Many druggists' samples were made from vanilla bean, but because of faulty methods of preparation are low in vanillin content and must therefore be classed as impure.—Rep. Indiana Bd. Health, 1906, pp. 263–269.

Thurston reports the examination of 7 samples of extract of vanilla, none of which conformed to the U. S. P. VIII standard.—Proc. Ohio Pharm. Ass., 1906, p. 69.

Mayer, Joseph L., discusses the analysis of vanilla extract and outlines a method. He thinks it unfortunate that the Committee of Revision should have omitted a quantitative method of analysis for vanilla extract.—Merck's Rep., N. Y., 1906, v. 15, pp. 160, 161.

Caldwell, Paul, says of tincture of vanilla: "In order to render the tincture of such consistency that it will filter freely, add 1 drachm of potassium carbonate to every 8 ounces of crushed bean and macerate in enough water to cover the mixture. This amount of alkali is not objectionable, as it has no appreciable effect upon the taste of the tincture."—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 159.

Collatz asserts that the reputed cases of poisoning by vanilla are probably due to the formation of poisonous albumin compounds that are produced by vanilla and the albuminous ingredients of the several foods in which vanilla is used as a flavoring agent.—D.-A. Apoth.-Ztg., N. Y., 1906–7, v. 27, p. 2.

VANILLINUM.

An abstract (from Ztschr. d. allg. österr. Apoth.-Ver., 1906) points out that vanillin may be differentiated from cumarin by heating with a mixture of phenol and sulphuric acid.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 630.

VERATRINA.

Naylor, W. A. H., reviews the chemistry of this substance and the Ph. Brit. requirements regarding it, and suggests that as it is so similar to aconitine in its effect its retention in the Pharmacopœia is of doubtful value. Should the authorities, however, decide to retain it, he suggests that cevadine be included to replace the present mixture of substances.—Yearbook of Pharmacy, 1906, p. 218; also Pharm. J., Lond., 1906, v. 23, p. 77.

Busquet, H., finds that the results obtained in different animals by the administration of this poison suggest immediately a comparison between veratrine and atropine.—Compt. rend. Soc. de biol., Par., 1906, v. 61, p. 89.

VERATRUM.

Henkel, Alice, mentions *Veratrum viride* Ait., commonly known as veratrum, American hellebore, swamp-hellebore, and green hellebore, as growing in swamps, wet woods, and meadows, Canada and Alaska, Minnesota south to Georgia.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 73.

An editorial notes that *Veratrum album* is mentioned in the Icelandic Pharmacopœia of the thirteenth century.—Chem. & Drug., Lond., 1906, v. 69, p. 969.

Bredemann, G., discusses the alkaloids of *Veratrum album* and records the results of experiments carried out by him in the isolation of these alkaloids. He concludes from his experiments that the veratrum alkaloids can be satisfactorily determined volumetrically.—

Pharm. J., Lond., 1906, v. 22, p. 283. (See also Apoth. Ztg., Berl., 1906, v. 21, pp. 41–45, 53–56.)

Francis, John M., considers the menstruum for the fluid extract stronger than necessary. The drug is comparatively rich in alkaloids and should be assayed and adjusted to standard.—Bull. Pharm., Detroit, 1906, v. 20, p. 12.

Hommell, P. E., thinks veratrum should be dropped, as it is inferior to aconite in febrile and inflammatory conditions.—Proc. New Jersey Pharm. Ass., 1906, p. 109.

Wood, H. C., jr., discusses the pharmacology of veratrum. He concludes that the activity of the drug is not due to veratrine, rubijervine, or protoveratrine, while the actions of jervine correspond more nearly with those of the drug than do those of any of the other known constituents, but there is apparently some unknown active substance present.—J. Am. M. Ass., 1906, v. 47, pp. 2061–2064.

Felter says specific veratrum meets the full, bounding, rapid pulse with powerful contractile action of the heart, increase of the temperature, and sometimes throbbing carotids.—Eclectic Med. J., Cincin., 1906, v. 66, p. 203.

Haines, Oliver L., indorses the recommendation of *Veratrum viride* as a remedy for the early stage of pericarditis.—Trans. Am. Inst. Homœop., 1906, 62d sess., Pt. I, p. 427.

For additional references on the use of veratrum see the Index Medicus, the J. Am. M. Ass., and Merck's Ann. Rep.

VIBURNUM OPULUS.

Henkel, Alice, mentions *Viburnum opulus* L., commonly called viburnum opulus, cramp-bark, high-bush cranberry, and squaw bush, as being found in low, rich woods and borders of fields from New Jersey, Michigan, and Oregon northward.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 74.

Young, R. A. (in Ohio Nat., 1906, *6:* 551, 552), gives a key to the Ohio viburnums in the winter condition.—Title only in Bull. Torrey Bot. Club, 1906, v. 33, p. 365.

VIBURNUM PRUNIFOLIUM.

Henkel, Alice, mentions *Viburnum prunifolium* L., commonly called black haw, sloe, and stag bush, as growing in dry woods and thickets and on rocky hillsides, Connecticut to Florida, west to Michigan and Texas. Most abundant in the South.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 74.

Ellingwood, Finley (Chicago Med. Times, Nov., 1905), thinks black haw and hydrastis, continued steadily for weeks, do more good than all other agents combined, without much regard to cause.—Abstr. in Eclectic Med. J., Cincin., 1906, v. 66, p. 93.

VINUM ALBUM.

Arauner, A., discusses the question of what is generally understood by the term "Medicinal Wines." He defines a number of commercial wines and gives the average composition of some of the better-known varieties.—Pharm. Prax., 1906, v. 5, pp. 145–149; also Pharm. Ztg., Berl., 1906, v. 51, pp. 459, 460.

Francis, John M., thinks the matter of price will determine the quality. California wines as a rule run of a lighter color and higher alcoholic percentage than other native wines. The average pharmacist pays too little attention to the peculiar fitness of certain wines for certain purposes.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Barnard, H. E., asserts that of 20 samples of wine examined, 12, or more than 50 per cent, never saw a grape. The first 7 samples analyzed were wholly artificial products made by soaking fruits, possibly raisins, fortifying the extracts with 12 to 15 per cent of alcohol, adding large quantities of glucose—in one instance over 20 per cent—and in addition sweetening with saccharin to further develop the sweet taste.—Rep. Indiana Bd. Health, 1906, pp. 334, 335.

Wiley, H. W., presents a review of the method of manufacture and the classification of wines in Germany.—Bull. Bur. Chem., U. S. Dept. Agric., No. 101, pp. 29–38.

Günther, Adolf, discusses the results of the examination of German wines for 1904 and presents the official statistics regarding the production and the composition of the wines of Prussia, Bavaria, Saxony, and other German States.—Arb. a. d. kais. Gesundheitsamte, Berlin, 1906, v. 24, pp. 347–439.

Ph. Japon. III describes wine as a beverage obtained by the alcoholic fermentation of the juice of grapes and specifies that wines should be pure and good in quality. The adulterated, imitated, or sour wines should not be used.—Ph. Japon. III, 1906, p. 363.

Billon, Ch., discusses the determination of fixed mineral acids in wines and presents an equation for the calculation of the alkalinity of the ash.—Ann. de chim. analyt., Par., 1906, v. 11, pp. 127–131.

Hubert, A., discusses the determination of free and combined tartaric acid in wines.—*Ibid.*, v. 11, pp. 1–5.

Roos and Mestrezat consider the determination of volatile acids in wines and fermented liquors generally of very great importance.—*Ibid.*, v. 11, pp. 41–51.

Hubert discusses the determination of the volatile acids in wines.—*Ibid.*, v. 11, pp. 245–248.

(For additional discussions, see *Ibid.*, v. 11, pp. 265, 291, 326–329, 372.)

Boetticher, H., describes a new apparatus for the estimation of the volatile acids of wines.—Ztschr. f. anal. Chem., Wiesb., 1906, v. 45, pp. 755–758.

Krug, Otto, points out some possibilities of error in the determination of citric acid in wines, particularly the mistaking of malic acid for the former.—Ztschr. f. Unters. d. Nahr.- u. Genussm., 1906, v. 11, pp. 155, 156.

Some additional remarks on the detection of citric acid in wines.—*Ibid.*, v. 11, p. 394.

Thomann, Julius, reviews the suggestion made by Vitali to use toluol as the extraction vehicle in testing for salicylic acid in wines.—Schweiz. Wchnschr. f. Chem. u. Pharm., 1906, v. 44, p. 790.

Mestrezat found a wine containing considerable amounts of arsenic. Upon investigation he learned that the vines had been treated with arseniate of soda (contre l'altise) and he discusses the dangers of such practices.—Ann. de chim. analyt., Par., 1906, v. 11, pp. 324–326.

An abstract from Bonfort's Spirit Circular asserts that the use of wine is a temperance measure and prevents the excessive use of distilled liquor.—Midland Drug., Columbus, 1906, v. 7, pp. 537, 538.

Miller, J. Martin, gives an account of the champagne industry of France, the restriction placed upon the industry by law, the annual production, and the export to several countries.—Sc. Am. Suppl., 1906, v. 61, pp. 25394, 25395.

Caldwell, Paul, presents a list of the official wines and gives the approximate alcohol content.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 434.

Hérissey, H., points out that the excipient for the wines of Ph. Ndl. IV is Malaga wine.—J. de pharm. et de chim., Par., 1906, v. 23, p. 482.

An unsigned review presents a study of the several methods of preparing medicated wines that are given in the newly published pharmacopœias, and compares these with the directions given in the Ph. Germ., IV.—Pharm. Ztg., Berl., 1906, v. 51, pp. 479–481, 491, 492.

VINUM CARNIS ET FERRI N. F.

Caldwell, Paul, points out that the process for making wine of beef and iron is not a very satisfactory one. He believes that the sherry wine should be detannated before it is used.—Drug. Circ. & Chem. Gaz., N. Y., 1906, v. 50, p. 393.

Kutscher, Fr., (Ztschr. f. Unters. Nahr.- u. Genussml., 1906, v. 10) reports some additional investigations on the composition of Liebig's meat extract, which, he finds, does not always have the same composition.—Chem. Centralbl., Berl., 1906, v. 77, II, p. 147.

Ohliger, Willard, reports beef extract made from meat furnished by one of the large Chicago packing houses, which turned decidedly red after a time, due to red coloring matter added, probably, to maintain the original flesh color of the meat. The extract gave tests for appreciable amounts of analine dye.—Proc. Michigan Pharm. Ass., 1906, p. 46.

VIRUS VACCINICUM.

Smith, Theobald, reports that from October 1, 1905, to November 30, 1906, 31,805 tubes of vaccine virus were distributed in the various cities and towns of Massachusetts by the State Board of Health.—Rep. Massachusetts Bd. Health, 1906, pp. 435, 436.

An editorial calls attention to the gross misstatements by anti-vaccinationists used as arguments against vaccination.—Brit. M. J., Lond., 1906; v. 1, p. 96.

Dock, Geo., reviews F. Blockman's work on accidental vaccination and the attention drawn to the dangers of vaccination.—N. York M. J., 1906, v. 83, pp. 11–12.

Blaxall and Fremlin (Pharm. J., Sept. 15, 1906, 305; from Lancet, Sept. 8, 1906, 669), report the result of sustained subjection of glycerinated calf lymph to temperatures below freezing point.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 954.

XANTHOXYLUM.

Henkel, Alice, mentions *Xanthoxylum americanum* Mill., also known as *Xanthoxylum fraxineum* Willd., commonly known as xanthoxylum, northern prickly ash, and toothache-tree, as common in woods and thickets, and along river banks from Virginia, Missouri, and Nebraska northward to Canada.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1906, No. 89, p. 76.

Gordin, H. M., reports a study of the crystalline principle found in prickly ash bark and particularly of the difference, if any, existing between xanthoxylin of the northern prickly ash and the corresponding principle found in the southern prickly ash bark.—J. Am. Chem. Soc., 1906, v. 28, pp. 1649–1657.

ZINCUM.

Coblentz, Virgil, says that while the presence of sulphates and chlorides may be ignored in the alkali salts, it must be restricted in such zinc salts as the bromide, iodide, and valerate, which are given in fair-sized doses, extending at times over greater periods.—Am. J. Pharm., Phila., 1906, v. 78, p. 395.

Cocking, T. Tusting, presents a paper supplementary to that of C. A. Hill (Chem. & Drug., 1905, v. 66, pp. 388–391) on "Lead in pharmaceutical chemicals." He gives a table (Chem. & Drug., Lond., 1906, v. 69, p. 507) showing the contamination of zinc and its compounds with lead.

	Per cent.
Zinc acetate	0.001 to 0.1
Zinc carbonate	.04 to .14
Zinc chloride	.02 to .04
Zinc sulphate	.0002 to .02
Zinc valerate	.002 to .003

Hill, C. A., adds a note as to the possibility of securing lead-free chemicals for the making of the necessary tests.—*Ibid.*, v. 69, p. 553.

Betrand and Javillier suggest a method, by the formation of calcium zincate, of precipitating quantitatively zinc from dilute solutions containing only 5:1,000,000 of the metal, and think that even then the limit of sensitiveness is not reached.—Bull. des sc. pharmacol., Par., 1906, v. 13, pp. 650–653.

ZINCI ACETAS.

Caspari, Chas. E., reports 4 samples of zinc acetate examined—3 U. S. P.; 1 contained chloride.—Proc. Missouri Pharm. Ass., 1906, p. 99.

ZINCI CHLORIDUM.

Wippern, Franz, points out that zinc chloride will dissolve clear in boiling distilled water and that dilutions may be made from a concentrated solution which will remain clear.—Pharm. Ztg., Berl., 1906, v. 51, p. 807.

Conrad, William, recommends the use of zinc chloride for the relief of pain or tenderness in the treatment of gingival recession and erosion cavities.—Dental Cosmos, Phila., 1906, v. 48, p. 560.

Robinson, A. R., states that zinc chloride produces a dry necrosis, has no selective action on the pathological tissues in cancer, causes too little inflammation, and therefore should not be used in cancer except preliminary to some other caustic or the X ray.—N. York M. J., 1906, v. 84, p. 1260.

Additional references to the use of zinc chloride will be found in the Index Medicus and the J. Am. M. Ass.

ZINCI OXIDUM.

Francis, John M., notes the several grades of zinc oxide obtainable, and says that while the chemical tests will render safe the use of a yellowish product, this is not wholly fitted for pharmaceutical uses;

for instance, in white ointments only the whitest oxide will prove satisfactory. Tests show that arsenic is frequently a constituent of the commercial grades.—Bull. Pharm., Detroit, 1906, v. 20, p. 232.

Vanderkleed, Charles E., points out that zinc oxide should be watched for undue amounts of chloride, which might prove to be irritating in ointments.—Proc. Pennsylvania Pharm. Ass., 1906, p. 124.

Patch, E. L., asserts that American samples of zinc oxide average 99.05 per cent ZnO, but frequently contain traces of iron and chloride.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 347.

Caspari, Chas. E., reports 3 samples of zinc oxide examined: 2 U. S. P., 1 contained chloride.—Proc. Missouri Pharm. Ass., 1906, p. 100.

ZINCI PHENOLSULPHONAS.

The Ph. Brit. Committee of Reference in Pharmacy report on zinci sulphocarbolas says the method of manufacture would not yield a pure product. The salt contains eight molecules of water of crystalization, not one, as given in the Ph. Brit.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Caspari, Chas. E., reports 6 samples of zinc phenolsulphonate examined—2 U. S. P.; 3 contained arsenic; 1 metallic impurities.—Proc. Missouri Pharm. Ass. 1906, p. 99.

Felter, Harvey Wickes, gives as the indications formulated by the Eclectic observers from their experience with zinc sulphocarbolate; tongue pallid, moist, pasty and dirty (Thomas); intestinal sepsis, with copious foul-smelling alvine discharges; tympanites: septic fever and hæmorrhage in typhoid fever, and other septic bowel disorders. (American Dispensatory.)—Eclectic Med. J., Cincin., 1906, v. 66, p. 194.

ZINCI SULPHAS.

Ohliger, Willard, reports zinc sulphate containing excess of chlorides and free acid.—Proc. Michigan Pharm. Ass., 1906, p. 48.

ZINGIBER.

Naylor, W. A. H., reviews the chemistry of ginger and concludes that for a more complete and much-needed valuation of ginger for pharmaceutical purposes a process is required that will be sufficiently accurate and easy of execution by the pharmacist for the separation of the volatile oil and gingerol free from the fatty and resinous substances that accompany them in the oleoresin.—Yearbook of Pharmacy, 1906, pp. 211–213; also Pharm. J., Lond., 1906, v. 23, p. 75.

Rusby, H. H., found a sample of exhausted, dried, and powdered ginger which was being offered as ginger.—Proc. Am. Pharm. Ass., 1906, v. 54, p. 337.

Evans, John, comments on the use of the microscope in the detection of adulteration. One of the most frequent adulterants is exhausted ginger, which must be detected by proximate analysis.—Apothecary, Boston, 1906, v. 18, p. 906.

Philipp Röder, Wien, reports examining a sample of ginger which contained 4.61 per cent of ash and yielded 3.62 per cent of extract to 70 per cent alcohol and 3.62 per cent of extract to 90 per cent alcohol. The Ph. Austr. VIII prescribes a limit of 5 per cent of ash, which Philipp Röder believes to be too low and quotes Hauke, who suggests 8 per cent as a fair limitation.—Pharm. Post, Wien, 1906, v. 39, p. 296.

The Ph. Brit. Committee of Reference in Pharmacy report on zingiber says the powder should not yield more than 5 per cent of ash and not less than 1.5 per cent of soluble ash or 5 per cent of alcoholic extract.—Chem. & Drug., Lond., 1906, v. 69, p. 865.

Vanderkleed, Chas. E., found African ginger substituted for Jamaica ginger.—Proc. Pennsylvania Pharm. Ass., 1906, p. 123.

Smith, Kline & French Co. report the following data from their examination of ground African ginger: Ash, 5.11 per cent; ash insoluble in hydrochloric acid, 2.1 per cent; ether extractive (non-volatile), 5.6 per cent; alcohol extractive, 7.8 per cent; lime (CaO), 0.6 per cent.—Lab. Rep., S., K. & F., 1906, p. 35.

The Helfenberger Annalen (for 1905, p. 131) records the amount of extract yielded by a sample of ginger to varying menstrua.—Pharm. Zentralh., 1906, v. 47, p. 875.

Beysen, Kurt, suggests that the Ph. Germ. directions for making tincture of ginger be made to require the preliminary treatment of 20 parts of the powdered ginger with 30 parts of boiling water, and when cool adding 70 parts of alcohol. A tincture made in this way, he asserts, will be brilliant and clear, despite the low alcohol content.—Ber. d. pharm. Gesellsch., Berl., 1906, v. 16, p. 332.

LIST OF HYGIENIC LABORATORY BULLETINS OF THE PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

The Hygienic Laboratory was established in New York, at the Marine Hospital on Staten Island, August, 1887. It was transferred to Washington, with quarters in the Butler Building, June 11, 1891, and a new laboratory building, located in Washington, was authorized by act of Congress March 3, 1901.

The following *bulletins* [Bulls. Nos. 1–7, 1900 to 1902, Hyg. Lab., U. S. Mar.-Hosp. Serv., Wash.] have been issued:

*No. 1.—Preliminary note on the viability of the *Bacillus pestis.* By M. J. Rosenau.

No. 2.—Formalin disinfection of baggage without apparatus. By M. J. Rosenau.

*No. 3.—Sulphur dioxid as a germicidal agent. By H. D. Geddings.

*No. 4.—Viability of the *Bacillus pestis.* By M. J. Rosenau.

No. 5.—An investigation of a pathogenic microbe (*B. typhi murium* Danyz) applied to the destruction of rats. By M. J. Rosenau.

*No. 6.—Disinfection against mosquitoes with formaldehyde and sulphur dioxid. By M. J. Rosenau.

No. 7.—Laboratory technique: Ring test for indol, by S. B. Grubbs and Edward Francis; Collodium sacs, by S. B. Grubbs and Edward Francis; Microphotography with simple apparatus, by H. B. Parker.

By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

Since the change of name of the Service the bulletins of the Hygienic Laboratory have been continued in the same numerical order, as follows:

*No. 8.—Laboratory course in pathology and bacteriology. By M. J. Rosenau. (Revised edition, March, 1904.)

*No. 9.—Presence of tetanus in commercial gelatin. By John F. Anderson.

No. 10.—Report upon the prevalence and geographic distribution of hookworm disease (uncinariasis or anchylostomiasis) in the United States. By Ch. Wardell Stiles.

*No. 11.—An experimental investigation of *Trypanosoma lewisi.* By Edward Francis.

*No. 12.—The bacteriological impurities of vaccine virus; an experimental study. By M. J. Rosenau.

*No. 13.—A statistical study of the intestinal parasites of 500 white male patients at the United States Government Hospital for the Insane; by Philip E. Garrison, Brayton H. Ransom, and Earle C. Stevenson. A parasitic roundworm (*Agamomermis culicis* n. g., n. sp.) in American mosquitoes (*Culex sollicitans*); by Ch. Wardell Stiles. The type species of the cestode genus *Hymenolepis;* by Ch. Wardell Stiles.

No. 14.—Spotted fever (tick fever) of the Rocky Mountains: a new disease. By John F. Anderson.

No. 15.—Inefficiency of ferrous sulphate as an antiseptic and germicide. By Allan J. McLaughlin.

*No. 16.—The antiseptic and germicidal properties of glycerin. By M. J. Rosenau.

*No. 17.—Illustrated key to the trematode parasites of man. By Ch. Wardell Stiles.

*No. 18.—An account of the tapeworms of the genus *Hymenolepis* parasitic in man, including reports of several new cases of the dwarf tapeworm (*H. nana*) in the United States. By Brayton H. Ransom.

*No. 19.—A method for inoculating animals with precise amounts. By M. J. Rosenau.

*No. 20.—A zoological investigation into the cause, transmission, and source of Rocky Mountain "spotted fever." By Ch. Wardell Stiles.

No. 21.—The immunity unit for standardizing diphtheria antitoxin (based on Ehrlich's normal serum). Official standard prepared under the act approved July 1, 1902. By M. J. Rosenau.

*No. 22.—Chloride of zinc as a deodorant, antiseptic, and germicide. By T. B. McClintic.

*No. 23.—Changes in the Pharmacopœia of the United States of America. Eighth Decennial Revision. By Reid Hunt and Murray Galt Motter.

No. 24.—The International Code of Zoological Nomenclature as applied to medicine. By Ch. Wardell Stiles.

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*No. 28.—A statistical study of the prevalence of intestinal worms in man. By Ch. Wardell Stiles and Philip E. Garrison.

*No. 29.—A study of the cause of sudden death following the injection of horse serum. By M. J. Rosenau and John F. Anderson.

No. 30.—I. Maternal transmission of immunity to diphtheria toxine. II. Maternal transmission of immunity to diphtheria toxine and hypersusceptibility to horse serum in the same animal. By John F. Anderson.

No. 31.—Variations in the peroxidase activity of the blood in health and disease. By Joseph H. Kastle and Harold L. Amoss.

No. 32.—A stomach lesion in guinea pigs caused by diphtheria toxine and its bearing upon experimental gastric ulcer. By M. J. Rosenau and John F. Anderson.

No. 33.—Studies in experimental alcoholism. By Reid Hunt.

No. 34.—I. *Agamofilaria georgiana* n. sp., an apparently new roundworm parasite from the ankle of a negress. II. The zoological characters of the roundworm genus *Filaria* Mueller, 1787. III. Three new American cases of infection of man with horsehair worms (species Paragordius varius), with summary of all cases reported to date. By Ch. Wardell Stiles.

*No. 35.—Report on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle. (Including articles contributed by Ch. Wardell Stiles, Joseph Goldberger, and A. M. Stimson.)

No. 36.—Further studies upon hypersusceptibility and immunity. By M. J. Rosenau and John F. Anderson.

No. 37.—Index-catalogue of medical and veterinary zoology. Subjects: Trematoda and trematode diseases. By Ch. Wardell Stiles and Albert Hassall.

No. 38.—The influence of antitoxin upon post-diphtheritic paralysis. By M. J. Rosenau and John F. Anderson.

No. 39.—The antiseptic and germicidal properties of solutions of formaldehyde and their action upon toxines. By John F. Anderson.

No. 40.—1. The occurrence of a proliferating cestode larva (*Sparganum proliferum*) in man in Florida, by Ch. Wardell Stiles. 2. A reexamination of the type specimen of *Filaria restiformis* Leidy, 1880=*Agamomermis restiformis*, by Ch. Wardell Stiles. 3. Observations on two new parasitic trematode worms: *Homalogaster philippinensis* n. sp., *Agamodistomum nanus* n. sp., by Ch. Wardell Stiles and Joseph Goldberger. 4. A reexamination of the original specimen of *Tænia saginata abietina* (Weinland, 1858), by Ch. Wardell Stiles and Joseph Goldberger.

*No. 41.—Milk and its relation to the public health. By various authors.

No. 42.—The thermal death points of pathogenic micro-organisms in milk. By M. J. Rosenau.

No. 43.—The standardization of tetanus antitoxin (an American unit established under authority of the act of July 1, 1902). By M. J. Rosenau and John F. Anderson.

No. 44.—Report No. 2 on the origin and prevalence of typhoid fever in the District of Columbia, 1907. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle.

No. 45.—Further studies upon anaphylaxis. By M. J. Rosenau and John F. Anderson.

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No. 58.—Digest of comments on the Pharmacopœia of the United States of America [Eighth Decennial Revision] and the National Formulary [Third

Edition] for the calendar year ending December 31, 1906. By Murray Galt Motter and Martin I. Wilbert.

In citing these bulletins, beginning with No. 8, bibliographers and authors are requested to adopt the following abbreviations: Bull. No. ——, Hyg. Lab., U. S. Pub. Health & Mar. Hosp. Serv., Wash., pp. ——.

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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States
Walter Wyman, Surgeon-General

HYGIENIC LABORATORY.—BULLETIN No. 59
DECEMBER, 1909

THE OXIDASES

AND OTHER OXYGEN-CATALYSTS CONCERNED IN BIOLOGICAL OXIDATIONS

By

J. H. KASTLE

WASHINGTON
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United States Public Health and Marine-Hospital Service.

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THE OXIDASES AND OTHER OXYGEN-CATALYSTS CONCERNED IN BIOLOGICAL OXIDATIONS.[a]

By Joseph H. Kastle,
Chief, Division of Chemistry, Hygienic Laboratory, U. S. Public Health and Marine-Hospital Service.

INTRODUCTION.

During the past eight years I have devoted a considerable part of my time to a study of the oxidases and of certain phases of biological oxidation, with the result that I have come to appreciate as never before the need of a somewhat more comprehensive and complete treatment of this subject than is ordinarily to be found in most treatises on fermentation. Furthermore, a study of the earlier literature of the subject has revealed certain rather curious mistakes, which probably found their way into the literature originally as the result of typographical errors, but which pervade the whole subject with an annoying persistency. During the past four years, as the result of easy access to the departmental libraries in this city, I have had unusual facilities for familiarizing myself with the literature of this subject, and it was partly with the view of giving to other workers in this field the benefits of my opportunities along this line, that this monograph has been written. No special claims are made for originality either in the mode of treatment of the subject, or in some cases even with regard to phraseology, my only object being to present the subject as accurately and comprehensively as possible within the time at my disposal. To this end I have made free use of such treatises on fermentation as "The soluble ferments and fermentation," by J. Reynolds Green (Cambridge Natural Science Manuals, London, 1899); "Die Fermente und ihre Wirkungen," by Carl Oppenheimer, (Leipzig, 1900); "Traite de Microbiologie," by E. Duclaux (Paris, 1898); "Biochemie der Pflanzen," by Fred. Czapek (Jena, 1905); "Theorie der Fermentwirkungen," by Moritz Traube (Berlin, 1858); "Les Enzymes et leurs Applications," by Effront (translation by Prescott, New York, 1902); "Recent advances in physiology and biochemistry," by Leonard Hill and others (London, 1906); "Das Sauerstoff-Bedürfniss des Organismus," by Paul Ehrlich (Berlin, 1885); "Les Oxydations de l'Organisme," by E. Enriquez and J.-A. Sicard (Paris, 1902); "Die Bedeutung der Katalyse für die Medicin," by H. Schade (Kiel, 1907): and "Kritische Studien über die Vorgänge

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[a] Manuscript submitted for publication October 12, 1909.

der Autoxydation," by C. Engler and J. Weissberg (Bräunschweig, 1904). I am especially indebted for much valuable information to a dissertation by Pierre Sée, entitled "Contribution a l'Etude des Applications Therapeutiques des Oxydases et des Metaux Ferments" (Thèse, No. 239, Faculté de Médicine de Paris, 1905), and to recent articles by Engler and Herzog, "Zur chemischen Erkenntnis biologischer Oxydationsreaktionen" (Hoppe-Seyler's Zeitschrift für physiologische Chemie, 1909, vol. 29, pp. 327–375), and to Moore and Whitley, "The properties and classification of the oxidizing enzymes and analogies between enzymic activity and the effects of immune bodies and complements" (Bio-Chemical Journal, 1909, vol. 4, pp. 136–167). In many instances in dealing with original contributions to the subject I have adhered as closely as possible to the words of the author in order that the exact sense and meaning of the original article might be preserved to at least as great an extent as possible within the limits of the present communication. Furthermore, no claim is made for the completeness of this production. It has been impossible, through lack of time and space, to refer to all original communications on the subject, even in the bibliography. Even the current numbers of the journals contain many contributions bearing on the subjects treated of in the following pages, and out of this vast and constantly growing literature I have been compelled to select what seemed to me the most essential to the proper presentation of the subject.

In the writer's opinion the subjects considered in the following pages are strictly germane in their general scope to the work of the Hygienic Laboratory. The oxidases and related oxygen-catalysts belong to the same group of bodies as the serums, viruses, toxins, and antitoxins. Any facts throwing light on the one class of substances will doubtless assist ultimately to a better understanding of this whole group of biologically active substances. Portier is of the opinion that the oxidases play an important rôle in the defense of the organism against pathogenic micro-organisms, and according to Sieber they are able to destroy toxins, such as the toxins of diphtheria and tetanus. Furthermore, they are of importance as enabling us to form correct conclusions regarding the condition and character of certain foodstuffs—as to whether they are cooked or raw—and in enabling us to determine, within certain limits of temperature, whether a given sample of milk has been pasteurized or not. For the biological chemist, the physician, and the sanitarian, all of these matters are of considerable importance.

I am greatly indebted for much valuable material to various authors, whose works I have freely consulted and made use of in the preparation of this monograph, and also to Mr. F. A. McDermott, one of the assistants in the division of chemistry of the Hygienic Laboratory, for much valuable assistance.

Chapter I.

THEORIES OF OXIDATION.

In the period which elapsed between the classic researches of Lavoisier on Combustion (1774–1785) and the discovery of ozone by Schoenbein in 1840, a number of interesting and important observations had accumulated in the literature concerning the influence exerted by one substance on the oxidation of another by air or oxygen. Thus in 1806 Désormes and Clement (137) pointed out that nitric acid is not the principal agent concerned in the complete oxidation of the sulfur in the leaden-chamber process for the manufacture of sulfuric acid, but its "base," nitric oxide (*le gaz nitreux*), which takes oxygen from atmospheric air in order to offer it to the sulfurous acid in a condition capable of accomplishing its oxidation. A few years later it was observed by Vogel (443) that hydrogen and oxygen combine at low temperatures under the influence of charcoal. Then followed the numerous and interesting observations by Sir Humphrey Davy (134), Edmund Davy (132–133), Erman (167), Pleischl (328), and others on the remarkable power of platinum and other metals of the platinum group, such as iridium, osmium, and palladium, to effect the slow combustion, or under certain conditions even the actual ignition, of combustible gases such as hydrogen, carbon monoxide, etc., in an atmosphere containing oxygen, and the rapid conversion of alcohol into acetic acid, observations which culminated in Davy's lamp without flame (*see* Erman 167), Doebereiner's lamp (141), and the rapid method for the production of acetic acid.

The effect of various substances on the oxidation of combustible gases and vapors was also exhaustively investigated by Dulong and Thenard (151–152), with the result that various metals, such as iridium, palladium, rhodium, gold, silver, mercury, nickel, cobalt, and iron, in spongy or pulverulent form, were found to accomplish the same changes as platinum, and that to a degree at least such changes can also be brought about by certain nonmetallic substances, such as carbon, pumice stone, porcelain, glass, and quartz crystals, at temperatures under 350° C., while salt, fluorspar, and marble did not appear to act to a sensible extent within these limits. These changes, they concluded, could not be ascribed entirely to electrical phenomena, as was at first supposed, and they explained them on the assumption of the condensation of large volumes of gas on the surface of the substance capable of causing the oxidation—as, for example, the condensation of oxygen upon platinum, whereby heat was liberated and the body (platinum) attained the temperature necessary to accomplish the oxidation.

The discovery of ozone by Schoenbein (367) in 1840 and the finding of this remarkable substance among the oxidation products of readily oxidizable substances gave a new impulse to the study of oxidation phenomena and led ultimately to a more careful study of the whole subject of induced oxidations and of the phenomenon of oxygen carrying. This distinguished observer seems to have been the first to clearly recognize that in the final products of chemical combination, particularly those in which oxygen is concerned, we see, as he put it, only the closing scene of a chemical drama which is in reality composed of several intermediate acts, and that for a correct understanding of such processes it is quite as essential to know these intermediate acts as it is to know the beginning and the end.

To the investigation of ozone and to the task of learning more of the initial and intermediate acts of the oxygen drama, Schoenbein set himself with remarkable assiduity and success. It is beyond the scope of this communication to attempt anything like a chronological account of the numerous investigations on the subject of ozone, which in themselves form one of the most interesting chapters in the history of chemical science. (*See* Engler and Weissberg[164].) It is sufficient to say in this connection that from the time of its discovery until its composition and nature were finally settled through the labors of Odling, Soret, and Andrews and Tait, Schoebein himself held different notions at different times respecting its composition. As the net result of his many researches on the subject, Schoenbein came to look upon ozone and the ozonides as containing an atom of negatively polarized oxygen, which in its conduct toward oxidizable substances was far more active than oxygen in its ordinary form, and as we would interpret these phenomena at the present day, he accounted for its production from ordinary oxygen through the action of electricity upon the supposition that as a result of the electrical discharge the ultimate particle (molecule) of oxygen is resolved into two atoms, one of which is negatively polarized and the other positively polarized, thus:

$$(O) = \oplus + \ominus \text{ or, } O_2 = \oplus + \ominus$$

The negatively polarized atom them combines with a particle of ordinary oxygen to form ozone, $O_2\ominus$, whereas the positively polarized atom (antozone) combines with water to form hydrogen peroxide, $H_2O.\oplus$. These two substances, ozone and hydrogen peroxide, were regarded as the prototypes of a whole series of compounds to which Schoenbein gave the name ozonides and antozonides, respectively.

According to Hagenbach (203), Schoenbein did not hold that the oxygen molecule consisted of two atoms. Therefore, according to Schoenbein, the chemical polarization of neutral oxygen is no true decomposition, but only a calling into being of two oppositely active states of the element—

$$(O) = \oplus + \ominus$$

The $\oplus$ combines with water to form H_2O_2, and the $\ominus$ goes partly to form ozone, but in greatest part to oxidize the metal or phosphorus.

Like ozone, the ozonides were believed to contain a part of their oxygen in a negatively polarized condition, whereas the antozonides were supposed to contain a part of their oxygen in a positively polarized condition. Like ozone itself, the ozonides were supposed to contain a part of their oxygen in an intensely active condition. On the other hand, in antozone and the antozonides the antozonic oxygen was supposed to be less active chemically than the active oxygen in ozone and the ozonides, at least in most of its chemical relations, and to exhibit chemical activities of a different order. The following is a list of some of the common ozonides and antozonides included in this classification:

$O_2.\ominus$,	ozone.	$\oplus$,	antozone.
$PbO.\ominus$,	lead peroxide.	$H_2O.\oplus$,	hydrogen peroxide.
$MnO.\ominus$,	manganese peroxide.	$BaO.\oplus$,	barium peroxide.
$HCl.\ominus$,	hypochlorous acid.	etc.	
etc.			

This view regarding the nature of ozone and antozone was apparently in harmony with a great many facts, among which may be mentioned:

1. Modes of formation from ordinary oxygen by the action of electricity and as a result of the autoxidation of readily oxidizable substances such as phosphorus, its production in the electrolysis of water and as the result of heating various oxides and peroxides and in the decomposition of highly oxygenated compounds by acids.

2. The greater oxidizing power of ozone and the ozonides as compared with the oxidizing power of antozone and the antozonides. Thus it was proven by Schoenbein that ozone and the ozonides can accomplish the oxidation of a number of metals, guaiacum, etc., which are not acted upon by hydrogen peroxide or other antozonides.

3. The mutual decomposition of ozone and the ozonides by antozonides resulting in the formation of ordinary oxygen. Such decomsitions are those met with in the decomposition of hydrogen peroxide by lead and manganese dioxides and by potassium permanganate, and also the remarkable decomposition of ozone itself by hydrogen peroxide, whereby water and ordinary oxygen are formed.

4. The apparent occurrence of antozone in nature in certain varieties of fluorspar, and its apparent formation (or the actual formation of hydrogen peroxide, an antozonide) by the action of an acid on an antozonide like barium peroxide.

While the differences existing between the so-called ozonides and antozonides and also their mutual decomposition, can be explained upon grounds[a] other than those involving the idea of oppositely electrified oxygen atoms, Schoenbein's theories respecting the nature of this interesting group of substances were more or less in harmony with the dualistic theory of Berzelius and with the fact that the molecule of oxygen consists of two atoms. Their principal interest in this connection is that erroneous as they were in some particulars, they afforded a satisfactory explanation of oxygen activation. A few examples will serve to make this clear: When a solution of indigo blue is exposed to oxygen or atmospheric air it suffers no change. On the other hand, as is well known, phosphorus is readily oxidized under these conditions. And now, what is more remarkable, if indigo be brought in contact with slowly oxidizing phosphorus, not only does the phosphorus continue to be oxidized but under these new conditions the indigo is oxidized as well. In other words, oxidizing phosphorus has the power to excite or induce the oxidation of a substance which alone is incapable of undergoing oxidation by simple contact with oxygen or atmospheric air. As shown by Schoenbein, however, when phosphorus is slowly oxidized in the air ozone is produced and it is the latter substance which oxidizes the indigo. When a solution of potassium iodide and starch or a suspension of guaiacum resin in water is shaken with air, no change of color occurs. If, however, as shown by Schoenbein (380), a drop or two of oil of bitter almonds be added to these solutions and the solutions afterwards shaken with air, each of them becomes blue in color, due in the first case to the oxidation of the potassium iodide with the setting free of iodine and the formation of the blue iodide of starch, and in the second case to the oxidation of the guaiacum with the production of guaiacum blue. According to Schoenbein, the oil of bitter almonds ozonized the air and the resulting ozone oxidized these substances which are not oxidizable by oxygen in its ordinary form.

He also made the interesting observation that certain of the higher fungi, as well as other plants, contain substances which apparently have the power of ozonizing the air to a remarkable degree, thereby accomplishing the oxidation of substances not oxidizable by ordinary

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[a] Mendelejeff (299) divides the peroxides into two classes, 1, superoxides, in which the oxygen atoms are directly united to one another as well as to the oxidized element, and 2, polyoxides, in which the oxygen atoms are not directly united with one another. The superoxides yield hydrogen peroxide when dissolved in acids; the polyoxides do not. Similar views are held by Traube and by Richarz (349).

oxygen, and in certain instances resulting in the development of characteristic vegetable colors (^{378}). He proved, further, that just as a large number of substances have the power of activating the oxygen of the air, so also an even larger number have the power of activating the oxygen of hydrogen peroxide and other antozonides. Thus while hydrogen peroxide and old oil of turpentine are without action on guaiacum or a solution of potassium iodide and starch, the oxidation and bluing of these reagents are readily accomplished by these oxidizing agents through the action of platinum black, extract of malt, the red coloring matter of the blood, and the juices and extracts of many plants, for the reason that, according to Schoenbein (^{383}), they are converted into ozonides, in the same way that an ozonide, like lead peroxide, results from the action of lead acetate on hydrogen peroxide.

He also proved that ozone is formed during many processes of combustion, an observation which led to the conclusion that every combustion is accompanied by the formation of ozone, and finally to the view that no oxidation can proceed of itself without the previous conversion of the common inactive oxygen of the air into active oxygen or ozone. In this manner he readily accounted for the phenomenon of oxygen carrying, and arrived at the further conclusion that through the agency of living things and the organic matter on the surface of the earth, the inactive oxygen of the air is constantly being transformed into ozone. This gradual formation of ozone through these agencies was deemed sufficient to account for the slow oxidations continually taking place on the surface of the earth, and in speaking of the oxygen-carrying power of certain substances contained in the blood of animals, which like phosphorus and oil of bitter almonds can activate the inactive respired oxygen, he says that "as a matter of fact, without the presence of such substances as convert ordinary oxygen into ozone, animals would be suffocated in the midst of an ocean of the purest but inactive oxygen as quickly as in a vacuous space." (Schoenbein (^{380}).)

Indeed, upon every hand, apparently, facts and observations multiplied, indicating the importance of ozone in the economy of nature. Hare (^{205}) observed its production as the result of rubbing a piece of flint. For example, the odor of ozone is very evident when flint is struck with a piece of steel. Brame (^{93}) detected ozone in rain water. Scoutetten ($^{394,\ 395,\ 396,\ 397}$) observed its production in the evaporation of impure waters. As a matter of fact ozone became the chemical fad of the day, with the result that its importance in nature was greatly overestimated. Thus during the years 1866–67 daily observations were made on the amount of ozone in the atmosphere of Paris and other localities, and everywhere men were busily engaged in studying its relation to health and disease. Its absence from the atmosphere of certain localities, or its presence therein in diminished amounts was associated with several violent outbreaks of Asiatic cholera that occurred during this period, and according to Doctor Moffatt (303), an English physician, the approach of an ozone period, during which the quantity of ozone in the atmosphere suffers a considerable increase, is followed by a corresponding increase in the luminosity of the glowworm and of certain phosphorescent protozoa, and even of phosphorus itself, when exposed to the air; and in man by a decided increase in the output of phosphates in the urine. Further, according to Doctor Moffatt, the advent of an ozone period was found to be marked by the approach of thunderstorms and unsettled weather conditions generally, and by a marked increase in the number of cases of toothache, neuralgia, apoplexy, etc. Finally, as the result of a large number of observations extending over a period of ten years, the most exact agreement was established between the warnings of the admiralty cautionary telegrams, as the British weather forecasts were then called, and the readings of the Doctor's ozonometer. The Doctor himself had evidently fallen a victim to ozone.

Despite, however, the great number of faulty and imperfectly controlled observations on this remarkable substance and the erroneous theories arising therefrom, the fact remains that this remarkably active form of oxygen is produced under a great variety of conditions, and that it is responsible for the oxidation of many substances not ordinarily oxidized by atmospheric oxygen (*see* Wurster (464)); and the fact that it is formed as a by-product in certain processes of autoxidation affords a simple explanation of oxygen carrying on the part of such substances as give rise to ozone during autoxidation.

From the ozone theory of Schoenbein as a point of departure, our theoretical conceptions regarding processes of autoxidation and the phenomenon of oxygen-carrying have been developed mainly along three different lines. Briefly stated these conceptions are: (1) The ionization theory of Van 't Hoff; (2) the theory of Hoppe-Seyler; and (3) the peroxide theory of Traube, Engler, Bach, and Manchot.

Van 't Hoff 's theory of oxygen-activation rests upon the assumption that in slow oxidation, such as that met with in the gradual oxidation of phosphorus, the oxidizable substance enters into combination, not with molecular oxygen, but with the very small amounts of atomic (ionic) oxygen which are constantly being produced from molecular oxygen in the sense of the equilibrium $O_2=2O$, and that in a gaseous system such as that furnished by acetic aldehyde and gaseous oxygen, the velocity of the reaction should be exactly proportional to the square root of the oxygen pressure.

The idea that molecular oxygen dissociates as the result of electrification and under the influence of heat and chemical action, is by no means a new one, nor did it originate with Van 't Hoff. As a matter of fact, it had been promulgated by Clausius (119, 120, 121) upon theoretical grounds and as affording a simple explanation of the differences between active and common oxygen, as early as 1857 to 1863, and has since been employed by other physicists (among them Schuster, Von Helmholtz, Richarz, Thomson, and others), as affording a simple explanation of the phenomena observed in the electrification of gases, including oxygen, and in the condensation of aqueous vapor in the steam jet as the result of the oxidation of various substances in close proximity thereto. Thus Clausius (119) in a communication entitled "Ueber die Art der Bewegung, welche wir Wärme nennen," had put forward the suggestion that in common oxygen the atoms are not detached, but combined in twos to form molecules, a conclusion which also derived support from the views of Gerhardt on the constitution of gaseous molecules. He reached the conclusion therefore that the active oxygen which common oxygen sometimes contains and which at this time was not distinguished from ozone, consists not of atoms combined in pairs, but of single atoms distributed among the molecules of the element in its ordinary form, and in a later communication on the difference between active and common oxygen (121) this author reiterates the view that common oxygen consists of paired atoms, and active oxygen of unpaired atoms, and further that the two atoms which go to form ordinary oxygen are in oppositely electrified states. Hence, according to Clausius, the molecule of ordinary oxygen is diatomic, containing one electropositive and one electro-negative atom. On the other hand, active oxygen consists of unpaired atoms which may exist either free or loosely bound together (*lose gebunden*). If electro-negative, these atoms form ozone; if electro-positive, antozone.

Long afterwards it was pointed out by Schuster (392) in connection with his investigations on the electrification of gases that the passage of electricity from one molecule to another in a gas is always accompanied by an interchange of atoms composing the molecule. According to this author, physicists of the Faraday-Maxwell school had long considered it probable that the conduction of electricity through gases is due to something similar to the electrolytic conduction in solutions, or, in other words, to the migration of ions under the influence of the current.

Similarly, according to Von Helmholtz and Richarz (208) the interesting phenomena observed during the electrification of a steam jet and the influence of certain chemical reactions on condensation occurring in the jet, can only be explained on the supposition that molecular oxygen or the gaseous substances in the immediate vicinity of the jet are dissociated to a greater or less extent into free atoms or ions, or into molecular groups containing free valences, and that these are responsible for the phenomena observed. It has been observed by these and other investigators that when a jet of steam emerges from a small orifice into dust-free air, there is very little if any condensation to be observed within half an inch or so of the orifice. On the other hand, if an electrode from which electricity is escaping be placed near the origin of the jet, dense condensation occurs right up to the orifice, and the jet itself appears colored, the color being due to the scattering of light by a great number of very small particles of water, the diameter of which is very small compared with the wave length of light.

According to J. J. Thomson (422), the electricity which escapes into the gas is carried by the charged atoms of the gas, and since in the region immediately around these atoms there will be a very intense electric field there will be a tendency for the steam to deposit in these regions. Thus around these charged atoms there will be very small drops of water, which will scatter the blue light more than the red, so that the jet when seen by transmitted light will appear reddish.

Von Helmholtz and Richarz (208) found further that condensation in the steam jet is also brought about by chemical action going on in its neighborhood. The reactions investigated were of the most varied character, involving such processes as the combination of nitric oxide and oxygen, ammonia, and hydrochloric acid, the oxidation of phosphorus, sulphur, and other readily combustible substances. All of these were found not only to effect the condensation of live steam, but also to cause the condensation of other vapors, such as those of alcohol and acetic acid. As a matter of fact so universal is this influence that Von Helmholtz and Richarz proposed to employ the steam jet as a means of detecting ionic dissociation in gases. Thus Von Helmholtz (207) found that condensation is effected in the steam jet by various glowing metals, such as platinum foil which had been heated to redness and which had not been artificially electrified. Similarly other metals such as silver, iron, copper, etc., after heating in the flame, color the steam jet for a long time. This is also shown in a high degree by all glowing organic bodies, such as wood, paper, tobacco, and especially by glowing sulphur. It was also proved that the production of smoke has nothing to do with the phenomenon observed. Tobacco smoke, especially, was observed to be without influence. Von Helmholtz and Richarz (208) found that condensation in the steam jet could be brought about by a piece of glowing phosphorus at a distance of several decimeters away, and that at this distance it acted remarkably powerfully, but less actively, on the vapors of alcohol, anilin, formic, and acetic acids. They also proved that the thick white clouds which are produced when moist phosphorus is exposed to the air or oxygen do not exhibit this phenomenon when the glowing phosphorus is quenched. So, also, the oxidation products of phosphorus already prepared had no influence on the condensation.

On the other hand, the active agent produced during the slow oxidation of phosphorus diffuses with considerable velocity, even against a current of air. Potassium and sodium burning in contact with water also exert an influence on the steam jet through great distances. As has been observed in the case of phosphorus, the resulting cloud, which consists of finely divided potassium or sodium oxide or hydroxide, is of itself inactive. It is also known that potassium and sodium glow on their freshly cut surfaces as the result of autoxidation. Hence all these phenomena are analogous to those observed in the burning of phosphorus.

According to these observers, it can readily be understood that in all oxidations occurring in atmospheric air there are produced so many substances that it is often difficult or impossible to obtain experimental proof by the exclusion of all other causes, that the action on the steam jet is only brought about by ions, especially those of active oxygen. Of the three substances, however, which are always produced during combustions in air, namely ozone, nitrous acid, and hydrogen peroxide, none were found to have any action on the steam jet.

In this connection it is of interest to note that Meissner (297) as early as 1863 had observed that under the excitation of oxygen by electrical induction there is produced, besides ozone, still another substance, which exerts a highly remarkable action on water vapor. Further investigations led him to believe that this substance was Schoenbein's antozone.

According to Von Helmholtz and Richarz (208), in all such oxidation processes as effect a condensation of aqueous vapor in the steam jet, the oxygen is dissociated into single atoms (ions), 0^{+}_{+} and 0^{-}_{-}, or into groups of atoms such as $-O-O-$. In terms of the electro-chemical theory both of these kinds of particles have free valences and are carriers of an excess of positive or negative electricity, and hence serve to conduct the current through the gas during electrification, or, as explained by Thomson (see p. 16), they cause a condensation of aqueous vapor when they come in contact with the steam jet. According to Von Helmholtz and Richarz (208), chemists have ascribed to active oxygen only a momentary existence; on the other hand, Clausius (121), on purely physical grounds, postulated the existence of dissociated atoms of oxygen at least as a transitional form enduring certainly for a short time, and if we judge from their conduct toward steam these particles of active oxygen exist for a sensible interval. By means of tetramethyl-p-phenylene-diamin, which is colored blue by contact with monatomic oxygen (antozone), Wurster (464) was able to obtain evidence of the existence of the dissociation products of oxygen in the vicinity of gas flames. Thus Wurster's reagent is instantly colored intensely blue in the Bunsen burner flame; more slowly, but still visibly, in the luminous zone of flames and combustible gases, and also in the flame of burning alcohol. Similarly it was observed by Von Helmholtz (207) [a] that Wurster's paper is colored blue in the neighborhood of a glowing platinum spiral, pointing to the presence of active oxygen in the surrounding atmosphere.

It has also been shown by Elster and Geitel (158) that the electrification of gases is brought about by glowing bodies. They (159, 160, 161, 162) likewise observed that air in which moist phosphorus is oxidizing conducts the electric current, while ozone does not conduct it. Hence they conclude that this conduction is accomplished by ions, or split oxygen molecules, and that the production of ozone must result from the previous splitting of the oxygen molecule. That ozone differs essentially in its conduct from atomic oxygen is also indicated by the fact that ozone itself has no effect on the steam jet, whereas decomposing ozone, like decomposing oxygen, affects it most actively. (*See also* Von Helmholtz and Richarz (208), pp. 194–195, and also Meissner (296).

It is evident, therefore, from these observations and others of similar import, that the dissociation of oxygen, whereby active or ionic oxygen is produced under a great variety of conditions, had been recognized for some time before it was employed by Van't Hoff in explanation of oxygen activation. In reality the idea that in oxygen gas we have an equilibrium represented by the equation, $O_2 \rightleftarrows 2O$, dates from the time of Clausius. On the other hand, we are indebted to Van't Hoff and his coworkers (214, 236), especially to Ewan (169), for experimental proof that in the oxidation of acetic aldehyde the velocity of the reaction is as indicated by the above equation, proportional to the square root of the oxygen pressure, and to Van't Hoff himself for experimental proof than an atom of oxygen is rendered active for every two atoms of phosphorus oxidized, irrespective of the nature of the acid of phosphorus produced.

The fact that oxygen can distribute itself equally between two oxidizable substances, one of which is autoxidizable, while the other is not, is supported by a vast amount of experimental evidence, all of which, to a degree at least, supports Van't Hoff's hypothesis. Thus, to take an actual case studied by Jorissen (234, 235, 236). 131.5 milligrams of tri-ethyl phosphine were found to require 17.8 milligrams of oxygen to completely oxidize it in the sense of this equation,

$$(C_2H_5)_3P + O = (C_2H_5)_3PO,$$

whereas when this same amount of this compound was oxidized in the presence of 2 grams of sodium indigo-sulfonate, 35.3 milligrams of oxygen were consumed, or approximately twice as much. Similar results were obtained by this observer with propionic and benzaldehydes. (*See also* Van't Hoff (215).

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[a] See also Gorup-Besanez (196).

So also Meyer and Recklinghausen (301) and Hirtz and Meyer (212), in their study of the oxidation of hydrogen and carbon monoxide by means of potassium permanganate, have made the interesting observation that approximately as much oxygen is liberated in gaseous form as is absorbed by the reducing substance during the oxidation. These authors are therefore of the opinion that these phenomena probably stand in close relation to the phenomena described by Van't Hoff and his coworkers. The fact that ordinary oxygen dissociates at least to a slight extent into positive and negative ions, even at ordinary temperatures, enables us, according to Van't Hoff, to understand why the oxidation of one substance promotes the oxidation of another. All ions of one kind enter into combination with the autoxidizable substance during the process of autoxidation, thereby leaving the ions of the opposite kind free to combine with a second substance, the acceptor, which ordinarily in the absence of a carrier, will not combine with oxygen at all. Thus in the oxidation of indigo by oxidizing phosphorus, we would have, according to Van't Hoff:

$$O_2 = \oplus + \ominus,$$

and

$$P + \oplus = PO,$$

and

$$\text{Indigo} + \ominus = \text{Isatin};$$

or in general,

$$O_2 = \oplus + \ominus,$$

and

$$A + \oplus = AO,$$

and

$$B + \ominus = BO.$$

According to this view neither A nor B can combine with molecular oxygen, but since this dissociates to a slight extent, even under ordinary conditions, and since $\oplus$ can combine with A, it leaves the other ion, $\ominus$, free to combine with B.

The assumption, however, that the oxygen molecule dissociates into two oppositely polarized atoms is by no means rendered necessary by these facts alone, since the equal distribution of oxygen between two oxidizable substances, one of which functions as the autoxidator and the second only in the capacity of acceptor, can, as we shall see, be equally well if not better explained on the assumption that the autoxidizable substance combines with a molecule of oxygen to form an unstable peroxide, which in turn gives up half of its oxygen to the acceptor, thus:

$$A + O_2 = AO_2$$

and

$$AO_2 + B = AO + BO,$$

and certainly for most, if not all, of the actual cases thus far investigated, such an assumption is, as we shall see, more in harmony with the facts, since the formation of such peroxides as AO_2 rests on indisputable experimental evidence.

From his studies on the electrification of gases, Schuster (392) assumes that under the influence of the electric current the molecules of gaseous substances are broken up at the negative pole. A number of chemists in attempting to account for the activation of oxygen have thought it necessary to assume the decomposition or disruption of the oxygen molecule through the action of oxygen carriers. Thus in 1870, Loew (276) advanced the view that in slow and rapid oxidation the splitting of the oxygen molecule into its atoms occurs. Fudakowsky (177) concurs in this view.

From his study of fermentation, more especially of those changes occurring in putrefaction and anaerobic fermentation, Hoppe-Seyler (217) in 1878, arrived at the notion that oxygen is rendered active through the agency of active (nascent) hydrogen, which in all processes of this kind appropriates to itself an atom of oxygen to form water, thereby leaving the other atoms of oxygen free or in the active condition. Thus,

$$\mathrm{H}+\mathrm{H}+\mathrm{O}_2=\mathrm{H}_2\mathrm{O}+\mathrm{O}$$

and

$$R+\mathrm{O}=R\mathrm{O},$$

where R represents a substance which can not ordinarily combine with molecular oxygen. In many processes of putrefaction and anaerobic fermentation, he observed that hydrogen is a constant product. Furthermore, he found it to be *active*, in the sense that it has the power of accomplishing the reduction of many substances not ordinarily reducible by molecular hydrogen. In other words, Hoppe-Seyler (217) assumes that the nascent hydrogen splits the oxygen molecule, forming water and liberating atomic oxygen, which can then combine with easily oxidizable substances, or if no such substances be at hand, with water to form hydrogen peroxide, or with oxygen to form ozone, or with carbon monoxide to form carbon dioxide, as was shown by Baumann (39).

In the field of pure chemistry many facts of similar import were already known, so that in seeking for an explanation of his own results, Hoppe-Seyler found many analogies to draw upon. For example, as early as 1853, Osann (314,315,316) had made the observation that carbon and platinum which had been charged with hydrogen at the cathode in the electrolysis of dilute sulfuric acid, could effect the reduction of silver compounds in solution, etc., and somewhat later Beketoff (42) had shown that copper could be reduced from solutions of copper sulfate and silver from solutions of silver nitrate by passing hydrogen through such solutions containing a piece of platinum foil. On the other hand, such solutions, in the absence of platinum, suffered no reductions in the current of hydrogen alone. Then followed the beautiful discovery of Graham ($^{197-198}$) in 1866–68, that platinum and particularly palladium, and other metals to a slight extent, have the power of absorbing considerable amounts of hydrogen under the influence of moderate amounts of heat, or as the result of electrolysis. Furthermore, the hydrogen in these metallic combinations was recognized as active, in the sense that it could reduce iodine to hydriodic acid, ferric salts to ferrous salts, etc., changes which can not be effected by ordinary molecular hydrogen in the cold. According to Graham, the hydrogen under these conditions becomes polarized, its affinity for oxygen thereby being greatly increased. Such hydrogen, for example, was found to combine with oxygen even in the cold, with the production of water. Now in the course of his own investigations Hoppe-Seyler found that freshly prepared palladium hydride has the power of reducing copper sulfate to metallic copper, that it decolorizes a solution of indigo, and reduces potassium permanganate in neutral solution to manganese dioxide, or in acid solution to a manganous salt; that it converts quinone into quinhydrone and changes oxyhemoglobin to methemoglobin. He found further that these powerful reductions are brought about only when the palladium hydrogen compound is fresh; if allowed to stand it loses these properties, while it is still found to contain hydrogen.

These reducing actions correspond entirely to those exhibited on dissolving zinc or tin in dilute acids; in other words, they are effected by nascent or active hydrogen. According to Hoppe-Seyler the most interesting reduction which can be effected by active hydrogen is that of molecular oxygen to water, whereby $-OH$ or $-O-O-H$, and finally water and active oxygen, are formed successively. He found further that if one shakes some palladium foil saturated with hydrogen with a dilute starch paste containing potassium iodide and air, there is produced in a few moments a dark-blue solution of the iodide of starch. In other words, through the influence of the hydride of palladium, potassium iodide is oxidized by the oxygen of the air, a change which ordinarily takes place only with extreme slowness. If now the foil be boiled with water and heated to redness to expel the hydrogen, it no longer has the power to form the iodide of starch when shaken with a solution of potassium iodide and starch in contact with air.

Similarly, indigo is oxidized to isatin and ammonia to ammonium nitrite, benzene to phenol and toluene to benzoic acid, when these several substances in aqueous solution are shaken with air and palladium hydride. All of these changes go to show that we have here to deal with very vigorous oxidations, and it can not be doubted that they are brought about indirectly by active hydrogen. According to Hoppe-Seyler there is no probability of another explanation than that the active hydrogen renders the oxygen active, and since it, the hydrogen, combines with oxygen to form water, the process can scarcely be conceived otherwise than that when active hydrogen appropriates unto itself one atom of oxygen of the oxygen molecule to form water, it sets free the other atom of oxygen, thereby rendering it active, and that just as the free atom of hydrogen can not remain free, so this atom of oxygen can not remain free, and hence when no other oxidizable substance is present, it unites with the water to form hydrogen peroxide, or with molecular oxygen, O_2, to form ozone. The action of hydrogen upon indifferent oxygen corresponds to the action thereupon of many other substances having a strong affinity for oxygen, such, for example, as magnesium, phosphorus, etc. Hence it is that when magnesium burns in the air nitrous acid is produced (Kämmerer [237]), and in the slow oxidation of phosphorus one atom of oxygen is rendered active for every two atoms of phosphorus oxidized. This latter change Hoppe-Seyler represented in the following manner:

$$2P + 3H_2O + 2O_2 = 2(PO_3H_3) + O,$$

so that for every two atoms of phosphorus oxidized at least one atom of oxygen is rendered active. According to Hoppe-Seyler, the observation by Schoenbein that hydrogen peroxide is formed by shaking zinc dust or iron powder with air and water can scarcely be interpreted otherwise than as resulting from the reduction of indifferent oxygen by the metal. Thus in the oxidation of iron in the presence of water we would have, according to Hoppe-Seyler, the following reaction:

$$Fe + O]:[O + H_2O = FeO + H_2O_2.$$

According to this author, however, none of these processes exhibit these changes as clearly and as simply as palladium hydride. Hoppe-Seyler saw, therefore, in this remarkable compound the chemical prototype of those complex unstable hydrogen compounds resulting from the anaerobic changes occurring in living matter, the decomposition of which gives rise to active hydrogen, and upon the conduct of palladium hydride this author based his conclusions respecting animal oxidation. During putrefaction, hydrogen is produced, and while in the absence of air powerful reductions occur, in the presence of air, powerful oxidations also occur in the putrefying liquid, particularly in the upper or exposed portions thereof. He was also of the opinion that similar changes occur in all living cells. The weak point in this theory of oxygen-activation is that it accounted for the formation of hydrogen peroxide in certain oxidations on the supposition that this compound is formed by the oxidation of water by an atom of active oxygen. Thus he explained the formation of hydrogen peroxide during the oxidation of metals in the following manner:

$$M + O_2 = MO + O,$$

and

$$H_2O + O = H_2O_2.$$

The principal objections which have been urged against this theory are, first, that it fails to take into account the formation of peroxides other than hydrogen peroxide as the result of processes of autoxidation, and, second, that it accounts for the formation of hydrogen peroxide in processes of autoxidation on the assumption that this compound results from the oxidation of water. It is now known that many peroxides other than hydrogen peroxide are produced during processes of autoxidation, and it was pointed out by Weltzien (446, 447) as early as 1860 that hydrogen peroxide can not be regarded as oxidized water. (*See also* Bach (18.) While it was afterwards claimed by Richardson (346, 347, 348) that water is oxidized during the oxidation of ether by oxygen in sunlight, apparently the precise conditions for accomplishing this oxidation have never been described, and Dunstan and Dymond (153) have shown that hydrogen peroxide is never produced by the action of oxygen on water under the influence of light and heat, even in the presence of dilute sulfuric acid. We know now that hydrogen peroxide is formed during the autoxidation of various substances, sometimes as the primary product of the oxidation of labile hydrogen atoms or hydrogen ions; more frequently as a secondary product resulting from the hydrolysis of another peroxide previously formed during the autoxidation, but never by the oxidation of water.

In a series of remarkably interesting and suggestive communications extending over a period of eleven years, from 1882 to 1893, and published for the most part in the Berichte der Deutschen Chemischen Gesellschaft, Mauritz Traube (431) laid the foundations of the peroxide theory of oxidation and enriched the nomenclature of the subject with many valuable terms, such as "autoxidation," "autoxidizable," "holoxide," etc. The clue to an understanding of Traube's peroxide theory of oxidation is to be found in the fact that water is necessary for most if not all oxidations proceeding spontaneously at ordinary temperatures and that hydrogen peroxide is produced as one of the products in all or at least in nearly all of those oxidations that are effected by molecular oxygen. He (433) made the interesting observation that pure metallic sodium retains its bright luster for forty hours in an atmosphere of dry oxygen, whereas it is instantly tarnished the moment that a trace of moisture is admitted.

He also discovered that in perfectly pure air-free water, metals like zinc and iron retain their luster undiminished, whereas if air be admitted they soon rust. Evidently, therefore, two factors are concerned in the rusting of metals, viz, water and oxygen.

It was also recognized about this time that water is essential to the oxidation of combustible gases. Dixon (140) had observed that a mixture of perfectly dry carbon monoxide and oxygen does not explode under the influence of the electric spark, nor do they combine when passed over red-hot platinum gauze, and Traube (434) himself made the observation that a flame of burning carbon monoxide is extinguished on being brought into perfectly dry air. He therefore reached the conclusion that "no substance can act upon dry oxygen at ordinary temperature." (Traube (433), p. 1881.) Other chemists, among them Nef (311) and Armstrong (13), have arrived at essentially similar conclusions respecting the necessity for water in many such processes of oxidation, and recently Dunstan, Jowett, and Goulding (154) have found that both water and oxygen, the former in the liquid condition, are necessary for the rusting of iron. Cushman (128) also, in a recent communication on the "Corrosion of Iron," states that while not agreed as to the mechanism of the process, all investigators are agreed that both oxygen and water are essential to the rusting of iron.

That hydrogen peroxide is formed during the oxidation of oxidizable substances by molecular oxygen was known even to Schoenbein (*see* Traube (431), supra), and since his time instances of its formation during oxidation had greatly accumulated in chemical literature. When, for example, finely divided zinc is shaken with air and water, the metal is gradually oxidized and hydrogen peroxide is found in considerable quantities in the solution. These observations on the production of hydrogen peroxide as the result of oxidation by molecular oxygen acting in the presence of water were greatly extended by Traube. Thus he (432) observed its production in large amounts at the cathode during electrolysis when oxygen or air is passed through the solution surrounding the negative pole, whereas it is never produced by the action of molecular hydrogen on the oxygen liberated at the anode. Schuller (391) had shown that hydrogen peroxide results from the burning of hydrogen, and on repeating these experiments Traube (435) succeeded in obtaining as much as 0.0108 gram of hydrogen peroxide by the burning of 1 liter of hydrogen. Traube (434) also made the interesting observation that hydrogen peroxide is produced by allowing a flame of burning carbon monoxide to impinge on the surface of water. These and many facts of similar import led him to believe that in all oxidations it is the molecule of oxygen and not the atom which first enters into combination with the autoxidizable substance.

To Traube, therefore, we owe the introduction into the science of a number of distinctly new ideas respecting oxidation phenomena. These are as follows:

First. That in all processes of autoxidation the oxygen molecule as a whole combines with the oxidizable substance, or with the hydrogen of water under the influence of the oxidizable substance, to form a peroxide (holoxide). Thus when hydrogen burns in air or oxygen, hydrogen peroxide is the primary product of the oxidation, the formation of water resulting from the reduction of the peroxide by the action of the hydrogen; thus:

$$H_2+O_2=H_2O_2,$$

and

$$H_2O_2+H_2=2H_2O.$$

Second. That water actively participates in all or at least in the greater number of autoxidations, and that hydrogen peroxide is formed as a primary product of such autoxidations. When, for example, zinc oxidizes at ordinary temperatures in the presence of water the following changes occur:

$$Zn+\begin{matrix}HO\\HO\end{matrix}\Bigg]\begin{matrix}.\\.\end{matrix}\Bigg[\begin{matrix}H\\H\end{matrix}+O_2=Zn(OH)_2+H_2O_2.$$

Similarly, according to Traube, traces of moisture are necessary for the burning of carbon monoxide for the following reasons:

$$CO+\begin{matrix}HO\\HO\end{matrix}\Bigg]\begin{matrix}.\\.\end{matrix}\Bigg[\begin{matrix}H\\H\end{matrix}+O_2=H_2CO_3+H_2O_2,$$

and

$$CO+H_2O_2=H_2CO_3,$$

and

$$2H_2CO_3=2CO_2+2H_2O.$$

Third. That the phenomenon of oxygen-carrying is due primarily to the oxidation of the second oxidizable substance, the acceptor, by the hydrogen peroxide resulting from the oxidation of the autoxidizable substance (the carrier) in the presence of water. When, for example, palladium hydride is shaken with air and water large amounts of hydrogen peroxide are formed. If, however, a second oxidizable substance is present, such as carbon monoxide or potassium iodide, it, as well as the hydrogen of the palladium hydride, is oxidized for the reason that under the influence of the palladium these are oxidized by hydrogen peroxide; thus:

$$\begin{matrix}Pd_2H\\Pd_2H\end{matrix}+\begin{matrix}HO.H\\HO.H\end{matrix}+O_2=4Pd+2H_2O+H_2O_2,$$

and

$$CO+H_2O_2=H_2CO_3,$$

or

$$2KI+H_2O_2=2KOH+I_2.$$

Fourth. Contrary to the views of Hoppe-Seyler it is not the oxygen molecule which is decomposed in autoxidations, but the molecule of water, whereby atomic hydrogen is formed, which then combines directly with the molecular oxygen to form hydrogen peroxide. Digramatically the essential points of difference between these two theories of oxidation may be represented as follows:

$$M+\mathrm{O}]:[\mathrm{O}+\mathrm{H_2O}=M\mathrm{O}+\mathrm{H_2O_2}\ \text{(Hoppe-Seyler),}$$

and

$$M+\begin{matrix}\mathrm{HO}\\ \mathrm{HO}\end{matrix}\Bigg]\vdots\Bigg[\begin{matrix}\mathrm{H}\\ \mathrm{H}\end{matrix}+\mathrm{O_2}=M(\mathrm{OH})_2+\mathrm{H_2O_2}\ \text{(Traube):}$$

The weak point in Hoppe-Seyler's theory is that it explains the formation of hydrogen peroxide by the oxidation of water. On the contrary, everything points the other way, viz, that water results from hydrogen peroxide by loss of oxygen, either as the result of decomposition or through the action of oxidizable substances.

The objection to Traube's theory is that it has not been possible to prove the presence of hydrogen peroxide among the products of all autoxidations. Thus Cushman (128) obtained no evidence of it in his recent study of the corrosion of iron. Traube, however, explains its absence in certain autoxidations on the ground that it is decomposed as fast as formed by the other substances produced during the oxidation. Thus in the case of the slow oxidation of iron it is probable that the hydrogen peroxide resulting from the first phase of the oxidation is partly consumed in the further oxidation of the ferrous hydroxide to iron rust. It should also be borne in mind that hydrogen peroxide is also decomposed into water and oxygen by most, if not all, of those substances whose oxidation it can accomplish, so that, all things considered, it is not surprising that it should occasionally be found to be absent from solutions in which autoxidation processes are taking place.

During recent years the peroxide theory of oxidation has been considerably extended through the labors of Bach, Engler, and Manchot, and their coworkers in this field. In the main the work of these several observers has consisted in the extension and elaboration of Traube's peroxide theory of oxidation. Thus in 1897 Bach (18) investigated the slow oxidation of a large number of substances and arrived at the conclusion that readily oxidizable substances combine with partially dissociated molecular oxygen, $-\mathrm{O}-\mathrm{O}-$,[a] to form peroxides, and that these latter substances when once formed promote and accelerate the oxidation of any other less readily oxidizable substances that may happen to be present. He also came to the conclusion that the oxidizing ferments of the blood are in reality readily oxidizable substances, having a special aptitude for forming peroxides. Similar conclusions have been reached by other chemists respecting the nature of the plant oxidases.

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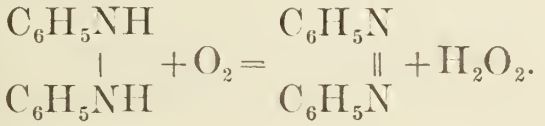
[a] *See* von Helmholtz and Richarz (208).

According to Ostwald (317) Bach's theory of slow oxidation derives support from the energy relations existing between the combining substances and the intermediate and final products of the combustion. He (Ostwald) is also of the opinion that the production of unstable intermediate products is not be looked upon as an uncommon occurrence, but rather as the rule, and that as a general thing in chemical processes it is not the most stable products which are first produced, but ofttimes the most unstable.

More recently Manchot and Herzog (282, 283) have quantitatively studied the oxidation of indigo-white, hydrazobenzene, and a number of other complex organic compounds in alkaline solution, by air or oxygen. All of their results have gone to show that as much oxygen may be obtained from the metallic peroxides resulting from the oxidation as enters into the oxidation of the oxidizable compound itself. In other words, they found that one-half of the total oxygen consumed in such processes went to oxidize the autoxidizable substance, while the other half went to form hydrogen peroxide. Thus in the case of hydrazobenzene we would have



$$\begin{array}{c} C_6H_5NH \\ | \\ C_6H_5NH \end{array} + O_2 = \begin{array}{c} C_6H_5N \\ \| \\ C_6H_5N \end{array} + H_2O_2.$$

As the oxygen molecule is composed of two atoms, he also reached the conclusion that a molecule of oxygen either united with the oxidizable substance to form a primary oxide, which is subsequently decomposed by water into a simpler oxide and hydrogen peroxide, or, as in the case of indigo-white, the molecule of oxygen unites with the hydrogen of the leuco-compound, forming indigo and hydrogen peroxide. If the oxidation take place in a solution of barium hydroxide, the hydrogen peroxide is removed as fast as formed in the form of barium peroxide, equivalent amounts of indigo and barium peroxide being formed, thus:

$$In H_2 + O_2 + Ba(OH)_2 = In + BaO_2. + 2H_2O.$$

In case the hydrogen peroxide is not removed in some insoluble combination, it reacts with a second molecule of indigo-white, in which case we would have ultimately two molecules of indigo formed, thus:[a]

$$In H_2 + O_2 = In + H_2O_2,$$

and

$$In H_2 + H_2O_2 = In + 2H_2O.$$

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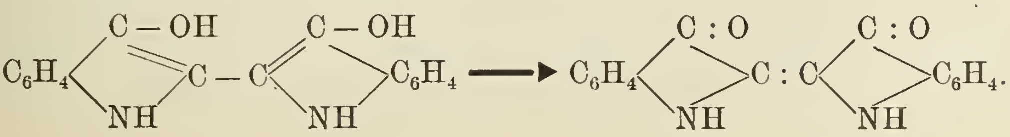
[a] Falk (170) in discussing the oxidation of indigo-white has offered the interesting and plausible suggestion that indigo-white may be looked upon as a phenol, which on oxidation passes to a quinone, thus:



These experiments afford quantitative proof of the peroxide theory of oxidation.

A similar case has been studied by Bamberger ([34]), who showed that when an aqueous solution of phenylhydroxylamin is exposed to the air it is oxidized to nitrosobenzene with the formation of hydrogen peroxide, thus:

$$C_6H_5NHOH + O_2 = C_6H_5NO + H_2O_2.$$

Thus three grams of phenylhydroxylamin in 40 grams of water yield, after treatment with a current of air for seventy hours, 2.5 grams of azoxybenzene.

Finally, during the last ten or twelve years Engler and his coworkers ([164, 165]) have done a great deal to extend the peroxide theory of oxidation. According to these authors every oxidation consists primarily in the union of molecular oxygen with the substance undergoing the oxidation, and that, contrary to Traube, the primary product of the autoxidation is not necessarily hydrogen peroxide but a peroxide of the substance undergoing oxidation. Thus when rubidium burns in air it is converted quantitatively into rubidium peroxide—

$$Rb + O_2 = RbO_2,$$

and, as shown by Baeyer and Villiger ([33]), when benzaldehyde is exposed to oxygen or air it is first converted into benzoyl-hydrogen peroxide, thus:

$$C_6H_5CHO + O_2 = C_6H_5CO.O.OH.$$

Engler and his coworkers have also pointed out that hydrogen peroxide, so frequently encountered in processes of autoxidation, may be produced in several entirely different ways; first, as the primary product of the autoxidation—as, for example, the burning of hydrogen or by the action of oxygen on the hydrogen liberated at the cathode during electrolysis, or in the oxidation of substances like indigo-white and hydrazobenzene, which contain labile hydrogen atoms, thus:

$$\begin{matrix} H- \\ H- \end{matrix} + \begin{matrix} -O \\ -O \end{matrix} = H_2O_2,$$

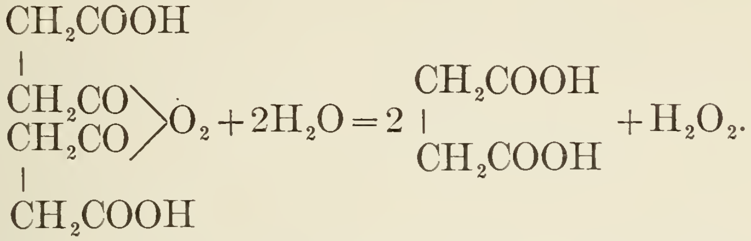
and

$$InH_2 + O_2 = In + H_2O_2;$$

or, as Traube pointed out, it may result from any autoxidation in which water is essential to the oxidation; thus:

$$Zn + \left.\begin{matrix} HO \\ HO \end{matrix}\right]\vdots\left[\begin{matrix} H \\ H \end{matrix}\right. + O_2 = Zn(OH)_2 + H_2O_2.$$

According to Engler, the true autoxidator in such processes is the hydrogen ion, while he looks upon the zinc as the pseudo-autoxidator. Secondly, as pointed out by Engler, hydrogen peroxide is frequently a secondary product resulting from the decomposition or hydrolysis of the primary peroxide by the action of water. Thus, Clover and Houghton (122) have observed that succinic peroxide acid is readily hydrolyzed by water, yielding succinic acid and hydrogen peroxide, in the sense of the equation—



$$\begin{array}{l} CH_2COOH \\ | \\ \left.\begin{array}{l} CH_2CO \\ CH_2CO \end{array}\right\rangle O_2 + 2H_2O = 2 \begin{array}{l} CH_2COOH \\ | \\ CH_2COOH \end{array} + H_2O_2. \\ | \\ CH_2COOH \end{array}$$

Finally, Engler and Weissberg (164), have laid considerable stress upon the idea that dissociation or the liberation of free valences, both in the oxygen molecule and in the substance undergoing autoxidation, are necessary for autoxidation processes, and in this way they explain the effect of heat and light in accelerating oxidations and also account for the ease with which unsaturated organic compounds undergo oxidation. They assume, with von Helmholtz and Richarz (208) and Bach (18), a partial dissociation of the oxygen molecule, resulting in the complex $-O-O-$, thereby enabling them to account for the direct addition of the whole molecule of oxygen to the oxidizing substance.

In the light of these considerations the phenomenon of oxygen-activation is easily explained. According to Engler and his followers it is due primarily to the oxidation of the second substance—the acceptor—by the peroxide (moloxide) resulting from the autoxidation of the carrier. Thus, when an autoxidizable substance, *A*, finds itself in contact with oxygen and a second oxidizable substance, *B*, the following changes would occur:

$$A + O_2 = AO_2,$$

and

$$AO_2 + B = AO + BO.$$

In this way a substance incapable of combining directly with oxygen may be oxidized through the intervention of another substance, and a given quantity of oxygen equally distributed between them. To take the case of the oxidation of benzaldehyde and the changes which may be accomplished through the oxidation of this compound at ordinary temperatures in the air. When exposed to the air this compound is converted into benzoyl-hydrogen peroxide (*see* Baeyer and Villiger (33))—

$$C_6H_5CHO + O_2 = C_6H_5CO - O - O - H.$$

If allowed to remain in contact with water, benzoyl-hydrogen peroxide is hydrolyzed with the production of benzoic acid and hydrogen peroxide—

$$C_6H_5CO.O.OH + HOH = C_6H_5COOH + H_2O_2.$$

On the other hand, if allowed to remain in contact with a second molecule of benzaldehyde, it oxidizes the second molecule of the aldehyde with the production of two molecules of benzoic acid,

$$C_6H_5CO.O.OH + C_6H_5CHO = 2C_6H_5COOH;$$

or finally, if an oxidizable substance, such as indigo, be present, it oxidizes the indigo with the production of benzoic acid and isatin, thus—

$$C_{16}H_{10}N_2O_2 + C_6H_5CO.O.OH = 2C_8H_5NO_2 + 2C_6H_5COOH.$$

Hence when a solution of indigo is shaken with benzaldehyde both are oxidized, whereas the indigo alone is unchanged by molecular oxygen.

CHAPTER II.

THE OXIDIZING FERMENTS.

In its present shape, therefore, the peroxide theory of oxidation accounts for the phenomena of autoxidation and oxygen carrying upon the supposition that spontaneously oxidizable substances have the power of combining with partially dissociated molecules of oxygen to form peroxides. These peroxides may then react either with additional amounts of the autoxidizable substance itself or with some other substance to form simpler oxides. Thus, it may happen that as the result of its oxidation one substance, *A*, may effect the oxidation of a second substance, *B*, which latter is not directly oxidizable under ordinary conditions. In this way the modern theory of oxidation affords a simple explanation of the formation of peroxides and of the phenomenon of oxygen carrying.

The numerous applications of this theory are by no means confined to the inorganic world. In the life cycle of the plant and animal we meet with many changes which, in so far as oxygen is involved, find their simplest explanation in terms of this hypothesis. The affinity for oxygen which is displayed not only by the warm-blooded animals, but even by plants, is often remarkable. That such is the case may be gathered from the fact that Phipson (320) in 1896 employed one of the higher fungi, *Agaricus atramentarius*, as an agent wherewith to effect the analysis of atmospheric air. It has so happened, therefore, that in the history of our science both a mouse and a mushroom have been employed as oxygen absorbents wherewith to determine the quantity of oxygen in atmospheric air. During the absorption of oxygen by plants various substances are produced which are capable of effecting oxidations which ordinarily can not be brought about by molecular oxygen alone, such, for example, as the bluing of guaiacum, the conversion of hydroquinone into quinone, the liberation of iodine from potassium iodide, etc. Like many of the chemical agents of the living cell, these powerful oxidizing substances are characterized by great instability. They are destroyed by heat and mineral acids and by various poisons, such as hydrogen cyanide, sulphur dioxide, phenylhydrazin, etc. It is claimed by some observers that they act catalytically, and hence are believed to partake of the nature of ferments. These substances are the *oxidases*,[a] or oxidizing ferments,

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[a] The following general references to the literature of this subject will be found of interest in this connection: Remarques sur les matières oxydantes, que l'on peut rencontrer chez les êtres vivants, by Bourquelot (85); Ueber Oxydationsfermente, by

and closely associated with this remarkable group of substances are the *peroxidases* and *catalases*, which have the power of decomposing hydrogen peroxide or rendering active the oxygen which it contains.

While in many instances, as pointed out by Wender (448), the precise rôle of these catalysts in the life of the cell has not as yet been determined, it is known that they are very widely distributed in the plant and animal kingdoms and that they are concerned in many important bio-chemical processes. Thus, according to Tolomei (423) and Martinand (286) the oxidation of the coloring matter of the grape and the production of those aromatic substances which confer upon old wine its delightful aroma and taste is due to the action of oxidases which are present in the grape and in the yeast. Aso (15) has shown that oxidases are concerned in the curing of tea. They probably also play a part in the curing of tobacco, and in the change of color of any vegetable tissue from green to brown, which results finally in the production of humus substances. According to Grüss (201), the oxidases play an important rôle in the formation of starch grains. Hahn (204) found an oxidase in *Arum maculatum* which had the power of oxidizing grape sugar and which apparently assists in intramolecular respiration, and Raciborski (337) is of the opinion that the vegetable oxidases play the same rôle in the vasculiferous plants as that played by hemoglobin in the higher animals and hemocyanin in the lower animals, viz, that of the oxygen-laden vehicle of respiration. Woods (462) has shown that oxidases are responsible for the etiolation of green leaves.

Palladin (317a) and also Miss Wheldale (449a) are of the opinion that anthocyanin, the red pigment of certain flowers, results from the action of an oxidase on some colorless, chromogenic substance contained in the flower.

The oxidases are by no means confined to the plant, but are found in many animal tissues, where they are assumed to play an equally important rôle in oxygen metabolism. Thus, Dubois (147) attributes the phosphorescence of phosphorescent animals and plants to the action of an oxidase to which he has given the poetic name of "Luciferase," and this same observer (148) has traced the formation of a purple dye by the mollusc *Murex brandaris*, to the action of an oxidase which he calls "Purpurase." Carnot (111) found that the saliva and other secretions contain certain oxidases. Portier (330) has pointed out that oxidases are concentrated in the epidermal and exposed structures of

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Steudel (411); Zur chemischen Erkenntnis biologischer Oxydationsreaktionen, by Engler and Herzog (163); Contribution a l'Etude des Applications Therapeutiques des Oxydases et des Metaux Ferments, by Pierre Sée (398); Die Bedeutung der Katalyse für die Medicin, by H. Schade (360); Les Oxidations de l'Organisme, by Enriquez and Sicard (166); Ueber die Oxydationsfermente der Leber, by Jacoby (224); Die Oxydasen, by Neumann Wender (448); The Properties and Classification of the Oxidizing Enzymes, and Analogies between Enzymic Activity and the Effects of Immune Bodies and Complements, by Moore and Whitley (306); Les Ferments Oxydants, by Chodat (116).

the organism. He is of the opinion, therefore, that their physiological rôle both in animals and plants is one of defense against invasion by micro-organisms. In this connection Sieber (402) has shown that the oxidases have the power of destroying toxins. According to her observations, the fibrin of the blood of a normal horse gives no oxidase reactions, whereas the fibrin obtained from the blood of a horse immunized against diphtheria gives a blue coloration with guaiacum, indicating the formation of oxidases in the blood as the result of immunization. As we shall see, one of the oxidases, tyrosinase, is the active agent in the production of melanins, and hence of profound significance in its relation to certain pathological conditions of melanogenesis in man. In this connection Hougonenq and Paviot (220) claim to have found that certain malignant tumors give the guaiacum reaction. Still other facts of interest, pertaining to the occurrence of the oxidases or to their mode of action, are set forth in the following pages.

THE GUAIACUM REACTION.

Our first knowledge of the oxidizing ferments is closely associated with what is known as the guaiacum reaction, viz, the production of a blue coloring matter when gum guaiacum or its tincture is treated with certain oxidizing agents. According to Binz (68) our knowledge of guaiacum dates back to the sixteenth century when in 1508 it was first imported into Spain from Santo Domingo as a remedy for syphilis by Consolvus Ferrand, himself a syphilitic, soon after which it became known all over Europe as an antisyphilitic. (*See* Monograph of Ulrich von Hutten, De Guajaci Medicina et Morto Gallico; Liebermann, Mainz, 1519, p. 74).

That guaiacum resin becomes bluish-green in color on standing in the air and light and the liquid around the stoppers of bottles containing tincture of guaiacum generally acquires a bluish-green color are matters of everyday experience to those who have ever had occasion to use these substances. In 1804 Wollaston (461) was the first to show that this color change on the part of guaiacum is brought about by the air under the influence of light. According to this author, rays of light which cause the emission of oxygen by silver chloride cause its absorption by gum guaiacum. A few years later William Brande (94) showed that guaiacum becomes blue in pure oxygen gas more rapidly than in air.

Shortly afterwards a number of interesting observations on the bluing of guaiacum were made by the French pharmacists. Thus it was pointed out by Boullay (73) that a mixture of simple sirup, distilled water, gum arabic, and tincture of guaiacum takes on the color of a suspension of verdigris, and further that certain dentifrices containing guaiacum, when taken into the mouth, become intensely blue or green. This change of color had been attributed to impurities in the mouth cavity; he proved, however, that gelatin and albumin produced similar changes of color with alcoholic guaiacum. He therefore reached the conclusion that this change of color is without doubt due to the albumin of the saliva, since no change of color is observed if the mouth be deprived of saliva by previous washing with water. Similarly, according to Marc (285), it was pointed out by Goettling that a mixture of guaiacum resin, gum arabic, sugar, and water of peppermint becomes sensibly blue; that certain acids impart a bluish tint to guaiacum resin, and that this same change is brought about by sweet spirits of niter.

In 1810 Planche (326) in a note on the sophistication of Jalap Resin and a means of recognizing the same, calls attention to the fact that guaiacum resin takes on an intense blue color when exposed for a few minutes to the vapors of nitric acid, and further that the fresh root of the horse-radish also has the power of turning the tincture of guaiacum resin blue. In order to show this, he says, it is only necessary to plunge a little piece of the fresh root into a glass containing the tincture of guaiacum, when little by little the liquid acquires the color of indigo in sulfuric acid. In 1819 Taddey (sometimes spelled Taddei) (416), having had occasion to knead together several species of gum resins and resins proper with different sorts of flour, observed that the mixture of wheat flour and guaiacum becomes blue, especially after water has been added to the mixture exposed to the air. At his suggestion Rudolphi (416) followed up the investigation of this subject. He found that a mixture of guaiacum resin with pure starch does not develop a blue color when moistened and exposed to the air, nor is this blue color developed by other vegetable materials which do not contain *zimôme*, the name proposed by Taddei for the constituent of gluten insoluble in alcohol. He also observed that guaiacum is not colored, or at least only slowly, by flours poor in gluten and that it is not colored by those flours in which the gluten has suffered any great alteration. He observed further that when gluten or pure *zimôme* is mixed with guaiacum it develops a superb blue color instantly, but that such a mixture only develops this color in atmospheric air. Rudolphi therefore proposed to make use of guaiacum as a reagent for judging of the purity and quality of different kinds of wheat flour, and conversely, he recommended wheat flour as a reagent for testing the purity of guaiacum resin.

In 1820 Planche (327) undertook to determine the nature of the substance which produces the blue coloration with guaiacum. He conceived the idea that air and light had nothing to do with the bluing of guaiacum for the reason that if this change of color is due solely to the action of air and light, why is it, he asks, that when guaiacum resin is mixed with certain substances it is colored blue or green, whereas when mixed with other substances its natural color is not altered? In attempting to answer this question he was led to test the conduct of a large number of substances toward guaiacum, among them a large number of roots, fresh and dried, several gums, milk, soap, etc. Among the fresh roots tested the following were found by this observer to blue guaiacum: Comfrey (*Symphytum consolida*, L.), dandelion (*Leontodon taraxacum*), common iris (*Iris germanica*), chicory (*Cichorium intybus*), thistle (*Eryngium campestre*), white water lily (*Nymphyaea alba*), potato (*Solanum tuberosum*), bryony (*Bryonia dioica*), elecampane (*Inula helenium*), marshmallow (*Althea officinalis*), carrot (*Daucus carota*), licorice (*Glycyrrhiza glabra*), turnip (*Napis sativa*), burdock (*Arctium lappa*), colchicum (*Colchicum autumnale*), soapwort (*Saponaria officinalis*), scurvy grass (*Cochlearia officinalis*), fumitory (*Fumaria officinalis*), figwort (*Scrophularia officinalis*), sorrel (*Rumex acetosa*), viper's grass (*Scorzonera hispanica*), asparagus (*Asparagus officinalis*), borage (*Borago officinalis*), angelica (*Angelica archangelica*), onion (*Allium caepa*), wild radish (*Cochlearia armoracia*, L.), little radish (*Raphanus sativus*). The fresh root of the chicory, especially in the fall of the year, was found to give with guaiacum a magnificent blue color. So also the fresh root of the water lily produced a very intense coloration at first, which faded rapidly on standing. For the most part the dried roots gave no color with guaiacum. Neither did the fresh roots of the following plants: Patience (*Rumex acutus*, L.), male fern (*Polypodium filix mas*), strawberry (*Fragaria vesca*). Furthermore he found that light was without influence on the development of the blue color of guaiacum by roots capable of effecting this change. Thus the parsnip caused the bluing of guaiacum in the dark. Similarly when guaiacum and white soap were mixed together there resulted a greenish mass which finally took on the color of verdigris, and the interior of the mass acquired a deep blue color. Obviously the light could not have been responsible for this increase of the color in the interior portions of the mixture. He also observed that milk has the power of bluing guaiacum, and that this change of color takes place in a vacuum. He concludes, therefore, that in the bluing of guaiacum by milk, air is not responsible for the change of color. On boiling, however, milk lost its power to blue guaiacum, and in general, those substances, gums and plant roots, which have the power of bluing guaiacum, lose this power by heat. Thus the potato, parsnip, and beechnut (*Fagus castanea*), cooked in closed vessels in their own juices, do not react with either the powdered resin or the tincture. He therefore concluded that the substance or substances causing the bluing of guaiacum are volatile and possibly condensable. He was therefore led to test the conduct of the distillate obtained from milk toward guaiacum, with the result, however, that no change of color was produced. He therefore had to renounce the idea that the principle responsible for the bluing of guaiacum is volatile. He was led to believe, therefore, that this particular species of cyanogen (*cyanogene*), which is responsible for the bluing of guaiacum, whatever its nature, is absorbed by certain substances which in its ordinary state permit of this action, but that when exposed to certain temperatures it enters into new combinations and obeys other laws which do not permit of its coloring guaiacum.

To anyone at all familiar with the oxidizing ferments it is evident how close Planche came to the discovery of this remarkable group of substances. As a matter of fact he seems to have been the first to encounter them, and when he proved that heat destroys the power of milk and certain plant juices to blue guaiacum, he discovered one of their most remarkable characteristics, and had the state of knowledge regarding oxidation and fermentation been at this time what it was in the time of Schoenbein and Traube, there is scarcely room for doubt that he, and perhaps Taddei also, would have recognized the true nature of these substances and the part which they play in oxidation processes.

From the time of Planche to that of Schoenbein and Traube there appears to have been but little advance in our knowledge of the guaiacum reaction, except the discovery of various substances, organic and inorganic, which effect this change of color to a greater or less extent. Thus Regimbau, (340, 341) in letters to Planche, described the bluing of pills containing guaiacum resin, mercuric chloride, and white soap, and advanced the view that this bluing was due to the liberation of chlorine from the mercuric chloride, a view which Planche pointed out as erroneous; and Lodibert (274) reported results with dentifrices similar to those observed by Boullay (73). Pelletier and Deville (318) also published a paper on guaiacum in 1844, in which, however, there is nothing of any particular interest.

The further elucidation of the guaiacum reaction and the final discovery of the oxidizing ferments awaited the discovery of ozone and the renewed interest in the general subject of fermentation awakened by the writings of Pasteur and Liebig. In this connection it will be recalled that ozone was first recognized as a definite substance by Schoenbein (368, 369). In 1845 Schoenbein (370) showed that guaiacum is colored blue by ozone. The interest attaching to Schoenbein's earlier observations on the bluing of guaiacum by ozone is such in this connection that I shall present the subject in practically the author's own words. In his "Note on guaiacum resin" he goes on to say that—

> It has long been known that guaiacum resin under certain conditions becomes blue and that chlorine has the power of producing this change of color. I have found that bromine and iodine produce the same change. In consequence of the close similarity which chlorine, bromine, and iodine exhibit to ozone, one would naturally

expect that the latter substance would blue guaiacum resin, and my experiments have shown that such is really the case. If one brings a strip of filter paper which has been saturated with guaiacum tincture into strongly ozonized air, prepared by means of phosphorus, the paper at once takes on a blue color. As a matter of fact, guaiacum resin is as sensitive a reagent for ozone as the potassium iodide and starch mixture. If one allows the strips to remain for a somewhat longer time in the ozonized atmosphere, the color changes from blue to yellowish brown, as is the case with chlorine. Ozone therefore conducts itself towards guaiacum resin in precisely the same way as chlorine. It is scarcely necessary to point out that ozone produced by the other two methods, namely, by the electrolysis of water and by the action of the electric discharge on air or moist oxygen, acts in the same way toward guaiacum. Since the bluing of guaiacum undoubtedly depends on the action of oxygen, and since free oxygen does not act on the resinous mass, this element must first be gotten into a state of chemical activity in order to oxidize the guaiacum. This condition seems to be called forth even by sunlight. It is not known, however, whether dry oxygen can act on the water-free resin in the sunlight. It may well be that in the absence of water the guaiacum resin can, as is the case with other organic substances, take up oxygen at ordinary temperatures to a slight extent. Be this as it may, it is nevertheless a fact that the oxygen which is in association with certain other substances has such chemical activity that it can act upon guaiacum, or upon a substance with which it is in combination, at ordinary temperatures. If one believes, as indicated by the older theories, that chlorine, bromine, and iodine are the peroxides of murium, bromium, and iodium, one must believe that there exists in these compounds an equivalent of oxygen which is in this chemically active state, and that it is this oxygen which calls forth the above-described color change in guaiacum resin. If, as we hold, ozone is to be looked upon as a compound of oxygen with water, it is the chemically excited oxygen of this compound which blues the guaiacum. As I have elsewhere pointed out, compounds of certain of the metals act upon guaiacum in the same way as do chlorine and ozone. For example, if one mixes pure lead or manganese peroxide in water with a solution of guaiacum, the latter is instantly colored blue just as if brought into chlorine water. It is remarkable, and so far as I know a new fact, that guaiacum which has been blued in this way loses its color again if it is introduced into an atmosphere containing hydrogen sulfide or sulfur dioxide, or when added to a solution of stannous chloride; under these conditions the oxygen in combination with the guaiacum appears to be again removed. Finally, I have observed that all those substances which color a potassium iodide solution yellow to brownish red, or blue the potassium iodide and starch mixture—that is, all substances which have the power to cause the separation of iodine; for example, chlorine, bromine, ozone, nitrous acid, and the peroxides of manganese, lead, and gold—have also the power to blue the tincture of guaiacum. Conversely, those substances which have the power to remove the yellow color from potassium iodide solutions and the blue color from the potassium iodide and starch mixture—for example, hydrogen sulfide, sulfur dioxide, and stannous chloride—have also the power to destroy the blue color of guaiacum resin.

In a further note on guaiacum resin Schoenbein ([371]) shows that guaiacum is also blued by the products of the slow combustion of ether, for the reason that an ozonid is produced. Schoenbein ([372]) next makes use of the bluing of guaiacum as a reaction for indicating the presence of an electric current, he ([373]) having observed that strips of paper saturated with tincture of guaiacum are colored blue when exposed to the oxygen liberated from water by electrolysis and to the ozone produced by the electric discharge in air or oxygen. In 1847 Schoenbein (374) seems to have published a résumé of his work on the bluing of guaiacum up to that time, mentioning the reduction of the blue compound by hydrogen sulfide and other reducing agents, and the general similarity between guaiacum-blue and the blue iodide of starch. In other still later communications on guaiacum resin (375,376), he calls attention to the considerable number of substances which have the power to blue guaiacum, among which may be mentioned chlorine, bromine, iodine, ozone, certain peroxides such as those of manganese and lead, silver oxide, and acetate, cupric chloride, ferric chloride, mercuric chloride, potassium ferricyanide, the bichromates and permanganates, and even finely divided platinum. He also points out that guaiacum which had been blued by any one of these substances gradually loses its blue color on standing, but that this may be restored by adding fresh quantities of the reagent. This may be repeated a certain number of times, but finally a colorless or brownish product of the resin is obtained which is no longer capable of being blued by ozone or similar substances.

He calls attention to the fact that the blue color of guaiacum is destroyed by phosphorus, the metals, hydrogen sulfide and selenide, sulfurous acid and hyposulfites, ferrous and stannous salts, and by acids and alkalis. He also points out that the majority of those substances capable of bluing guaiacum contain their oxygen in the peculiarly active condition in which this element is met with in ozone. In other words, these substances contain *oxylisirten* or *erregten* oxygen, or can give rise to the same. He points out a number of analogies between guaiacum blue and the iodide of starch, as to color, general methods of formation by the action of oxidizing agents, conduct towards reducing agents, etc., and he reached the conclusion that the blue material resulting from the action of ozone on guaiacum is a compound of ordinary guaiacum with a hydrogen peroxide (ozone), of much the same nature as the loose chemical combination met with in the iodide of starch. He goes on to say further that—

> I need scarcely remark that for those who with De la Rive and Berzelius look upon ozone as nothing but modified oxygen, it is only necessary to assume that guaiacum blue consists of a loose combination of ordinary guaiacum and this uncommon oxygen. In other words, that it possesses the nature of an organic peroxide which contains at least a part of its oxygen in the chemically excited or active condition in which it is met with in hydrogen peroxide, ozone, and manganese dioxide.

Finally, he explained the spontaneous decolorization of guaiacum blue and its ultimate conversion into a substance no longer capable of yielding the blue compound by treatment with ozone or other oxidizing agents, upon the supposition that the chemically active oxygen in loose combination in the blue resin can exist for only a short time as such in this compound and that this form of oxygen at ordinary temperatures, or even at 0°C., acts slowly on the oxidizable constituents of the resin, probably extracting hydrogen and possibly carbon, and thereby altering the original composition of the guaiacum.

Schoenbein (377) next turned his attention to the bluing of guaiacum by those substances contained in the fresh tissues of plants, and in 1848 he gave to the chemical world the results of his first researches in this highly fruitful field of investigation in a communication entitled "On certain chemical reactions of the potato." In this paper he refers to the observations of Planche[a] and Taddei on the bluing of guaiacum by many roots and tubers, and to the fact that the latter appeared to consider air as necessary for the reaction. His own experiments indicate that there is unevenly distributed throughout the potato some substance having the power of bluing guaiacum, the most rapid bluing being produced by the under side of the potato peel and at the points where the "eyes" or sprouts occur. According to Schoenbein, the starch and expressed juice of the potato, however, do not possess this power to the slightest degree, and, upon boiling, all parts of the potato entirely lose their power to blue guaiacum. On the other hand, the freshly cut peel of the potato blues guaiacum as quickly as does manganese dioxide or lead peroxide, and the blue solution shows all of the properties of that obtained by the latter method, fading slowly in the air at ordinary temperature, and rapidly upon boiling being decolorized by hydrogen sulfide and other reducing agents and precipitating a blue resin when added to water. He observed also that the potato, like the other substances having the power to blue the guaiacum resin and tincture has the power of decomposing potassium iodide with the liberation of iodine, the latter reacting with the starch of the potato to form the blue iodide of starch. For these reactions Schoenbein offers two alternate explanations; either that the potato contains a substance analogous to the peroxides, ozone, etc., or that it contains a substance having the power of activating the oxygen of the air, and thus rendering it capable of producing these phenomena.

On the other hand, Nasse and Framm (310) (*see also* Nasse (309)) claim that fresh extracts that have been completely freed of oxygen by the prolonged action of hydrogen or carbon dioxide still give a blue

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[a] In all of Schoenbein's original communications on this subject, this author (Planche) is referred to under the name of "Blanche." Thus a good deal of confusion has been introduced into this literature, and this is met with repeatedly, even in recent writings on the subject. Thus this error is repeated by Nasse and Framm in an article entitled "Bemerkungen zur Glykolyse" (Pflüger's Archiv., 1896, vol. 63, p. 207), in which the mechanism of the guaiacum reaction is discussed; and very recently again by Engler and Herzog, in "Zur Erkenntnis der biologischer Oxydationsreaktionen" (Hoppe-Seyler's Zeitschrift für physiologische Chemie, 1909, vol. 59, p. 357). For the benefit of those who may be interested in the historical development of this subject, the writer is glad to be able to correct this error.

color with guaiacum. Hence, according to these authors, the bluing of guaiacum by plant extracts and ferments, such as diastase and emulsin, is due not to an oxidation of the guaiacum by the oxygen of the air, but to a hydrolysis (*hydroxylirung*) of the guaiacum by the plant extract or ferment. Bertrand (51), however, is of the opinion that the bluing of the guaiacum is due to the combined action of oxygen and laccase, and Kastle and Loevenhart (244) were unable to obtain any evidence of the bluing of guaiacum by the freshly abraded surface of the raw potato in an atmosphere of hydrogen, carbon dioxide, or nitrogen. On the other hand, in air or oxygen, the freshly abraded surface of the potato was always found by these observers to develop a blue color instantly on the application of tincture of guaiacum.

OXYGEN-EXCITERS AND OXYGEN-CARRIERS ("SAUERSTOFFERREGERN" AND "SAUERSTOFFTRÄGERN," *Schoenbein*).

In 1855 Schoenbein (378) made a study of the spontaneous bluing of certain fungi. The results of these interesting observations were given to the world in a communication entitled "Ueber die selbst Bläuung einiger Pilze und das Vorkommen von Sauerstofferregern und Sauerstoffträgern in der Pflanzenwelt," and also in a letter to Faraday on "Ozone and ozonic actions in mushrooms." The titles of these two communications give a good idea of their contents. In brief his results were as follows: It had long been recognized that certain varieties of the higher fungi, notably the *Boletus luridus*, have the remarkable property of rapidly turning blue when the head or stem is broken or bruised in any way. Schoenbein now conceived the idea that in such color changes we have to do with phenomena similar to the bluing of guaiacum by the fresh tissue of the potato and other fresh roots. As a matter of fact he found this species of boletus to contain a colorless principle easily soluble in alcohol, and exhibiting the closest analogy to guaiacum, in that all oxidizing agents which blue a tincture of the latter also blue an alcoholic solution of the chromogenic substance of the mushroom, and, further, that all deoxidizing agents which discharge the color of guaiacum blue also discharge the color of the blued fungus extract. From these observations he was led to conclude that the chromogenic principle of the fungus, like guaiacum, is capable of combining with ozonized oxygen, $\mathring{O}$, whereas it is not affected by ordinary oxygen (O).

The fact that the alcoholic solution of this coloring principle of the Boletus is not spontaneously colored by atmospheric air, but is colored by air in the parenchyma of the fungus, led him to suspect that there exists in the fungus another substance endowed with the property of exalting the chemical power of ordinary oxygen, thereby causing this element in its active form, $\mathring{O}$, to associate itself with the coloring matter of the fungus. As a matter of fact, he found in the expressed sap of this and other fungi, notably in *Agaricus sanguineus,* an organic matter which has this remarkable power of transforming ordinary oxygen (O), into ozonized oxygen, $\overset{\circ}{O}$, and of forming with the latter a compound analogous to lead peroxide ($PbO+\overset{\circ}{O}$), which readily gives up this active oxygen, $\overset{\circ}{O}$, to a number of easily oxidizable substances, both organic and inorganic, among them guaiacum and the chromogenic substance of *Boletus luridus.* He observed, further, that after having been deprived of its active oxygen, this peculiar compound may be charged with it again by simply passing a current of air through its solution. He then goes on to say that this peculiar substance may well be compared with nitric oxide, which enjoys to a remarkable extent the power of instantaneously transforming inactive oxygen, (O), into active oxygen, $\overset{\circ}{O}$, thereby forming a peroxide containing $\overset{\circ}{O}$, and from which this peculiar form of oxygen may easily be transferred to a multitude of oxidizable substances. In other words, in addition to the chromogenic substance which it contains and through whose oxidation it ultimately becomes blue, the *Boletus luridus* and other fungi, notably the *Agaricus sanguineus,* contain a substance capable of ozonizing the oxygen of atmospheric air; in other words, they contain a *Sauerstofferreger,* or oxygen-exciter. This substance enters into a loose combination with the ozone thus produced, forming therewith a compound analogous to a peroxide containing active oxygen, which in turn is capable of giving up its active oxygen to guaiacum or to the chromogenic substance contained in the fungus itself, thus turning it blue. In other words, the substance responsible for the bluing of the chromogenic substance contained in the boletus is not only a *Sauerstofferreger* but also a *Sauerstoffträger,* or a true carrier of oxygen.

Schoenbein was also impressed with the instability of these remarkable *Sauerstofferregern* and *Sauerstoffträgern* of the plant world. Thus he points out that on heating to boiling an aqueous solution of the fungus which has the power of deeply bluing a tincture of guaiacum, the solution not only loses this power, but was also found to lose the power of ever again becoming an oxygen-exciter or carrier, no matter how long it was kept in contact with atmospheric air. Finally he goes on to say that these substances which have the power of bringing into activity the inactive oxygen of the air must play an important rôle in the oxidation processes of vegetable materials, and that it is not an unwarrantable supposition that in the animal world as well there exist substances capable of ozonizing atmospheric oxygen at ordinary temperatures, thereby promoting the oxidation of other animal substances, and in a later article (380, 386) on the conduct of oil of bitter almonds to oxygen, in which he proved that this compound belongs to the class of ozonizing substances, he says that new observations have made it in a high degree probable that there exist in the blood of animals substances having the power to change the respired inactive oxygen in a similar way to that accomplished by phosphorus and oil of bitter almonds—that is, substances which render the oxygen active, whereby the oxidation phenomena observed in the life cycle are brought about. He adds, further, that without the presence of such substances as convert (O) into $\overset{\circ}{O}$ the animal would be suffocated in the midst of an ocean of the purest, but inactive, oxygen as quickly as it would be in a vacuum.

Schoenbein's remarkable observations in this field, however, did not end here. From his extended investigations on ozone and hydrogen peroxide he had reached the conclusions that oxygen can exist in three forms, viz, common oxygen, which he represented by O or (O), ozone, Θ or (Θ), and antozone, $\oplus$ or ($\oplus$); and that deriving from these three modifications of oxygen, respectively, we have three classes of oxides, viz, (1) ordinary oxides, such as water; (2) ozonides, which included most if not all of the peroxides of the heavy metals, such as manganese dioxide and lead peroxide, and (3) antozonides, like hydrogen peroxide and barium dioxide

O	Θ	$\oplus$
HO (old formula),	$MnO + \Theta$,	$HO + \oplus$,
CaO,	$PbO + \Theta$,	$BaO + \oplus$,

Of these several forms of oxygen, the ozonic modification was the most active. He had observed, further, that just as the common oxygen is transformed into ozone through the influence of ozonizers, such as phosphorus, platinum, etc., so the oxygen of the antozonides $\oplus$ may be transformed into the ozonic modification, Θ, by the action of certain substances such as platinum or lead salts, etc., and that finally as a result of the neutralization of their electrically opposite potentials, an ozonide reacts with an antozonide with the production of common oxygen. Thus ozone and hydrogen peroxide give rise to common oxygen and water:

$$\Theta + HO + \oplus = HO + 2O.$$

He found, for example, that guaiacum blue results from the action of finely divided platinum on tincture of guaiacum and air or hydrogen peroxide, whereas neither of these substances can effect this alteration in the color of the guaiacum, or can do so only with extreme slowness, when used alone. It had been previously observed by Thenard that hydrogen peroxide is decomposed by finely divided platinum into water and common oxygen. All of these facts found a simple explanation in terms of Schoenbein's theory. According to this theory, neither common oxygen nor antozone nor an antozonide can blue guaiacum, for the reason that the resin only combines with the ozonic form of oxygen, Θ. On the other hand, ozone or any ozonide can accomplish this change for the reason that any of these substances can supply Θ, and platinum can accomplish this oxydation by common oxygen or hydrogen peroxide for the reason that it can transform common oxygen or the $\oplus$ of an antozonide into ozone, Θ. This theory also enabled one to understand the catalytic decomposition of hydrogen peroxide by platinum into water and common oxygen, since the ozone resulting from the action of the platinum on the antozonide would react with another portion of the antozonide, giving rise to water and common oxygen (382):

$$\mathrm{Pt}+\mathrm{HO}+\oplus=\mathrm{Pt}+\mathrm{HO}+\Theta,$$

and

$$\mathrm{HO}+\Theta+\mathrm{HO}+\oplus=2\mathrm{HO}+2\mathrm{O}.^{a}$$

In 1857 Schoenbein published a paper on "Chemical contact actions"(379), in which he discusses the action of various oxygen-carriers and oxidizing agents on guaiacum, and states that blood corpuscles separated from fibrin and serum and dissolved in water give the guaiacum reaction strongly in the presence of hydrogen peroxide, as does also the gluten of wheat, but that both are inactive in the absence of the peroxide. He regards this oxygen-carrying power of blood corpuscles as important to respiration. In this article he also gives the results of experiments with platinum and guaiacum. Three years later he (381) called attention to the fact that iron salts act toward a mixture of guaiacum and hydrogen peroxide in much the same way as do blood corpuscles and that the activity of the blood corpuscles toward guaiacum is proportional to their content of hemoglobin, and that it therefore seemed not improbable that the guaiacum reaction of blood is dependent on the iron content of the pigments. This, he says, is a matter of importance to physiological chemists.

In view of his previous work on the presence of oxygen exciters and oxygen carriers in certain of the higher fungi and in the potato, it was only natural that it should have occurred to Schoenbein, especially in the light of the earlier observations of Planche, that substances capable of bluing a mixture of hydrogen peroxide and guaiacum and of decomposing hydrogen peroxide into water and common oxygen should be widely distributed in the plant and animal kingdom. The results of his investigations on the decomposition of hydrogen peroxide by plant and animal extracts and ferments and on the bluing of guaiacum by hydrogen peroxide through the agency of organic

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[a] A good discussion of Schoenbein's ozone and antozone theory is to be found in his paper on the "Conduct of blood toward oxygen" (384), a translation of which is given in the Medical Press and Circular, June 20 and July 4, 1866, and in Day's paper (135) on "Polarized or allotropic oxygen," in the Australian Medical Journal, vol. 12, 1867, pp. 141–149.

materials were first presented in a paper entitled "Ueber die katalytische Wirksamkeit organische Materien und deren Verbreitung in der Pflanzen- und Thierwelt" ([383]) in 1863. He calls attention to the fact that in 1863 the group of phenomena called by Berzelius "catalytic actions" were as yet but very imperfectly understood, especially such as are concerned with changes in the composition of organic compounds brought about by the action of ferments, such as the alcoholic fermentation and the conversion of starch into sugar through the action of diastase. He was therefore inclined to the opinion that the decomposition of hydrogen peroxide into water and common oxygen by the action of platinum and similar metals may be regarded as the prototype of all catalytic phenomena. Indeed, as he points out in a later part of this article, Berzelius had already compared the decomposition of hydrogen peroxide by the noble metals to the fermentation of grape sugar by yeast. It was therefore with the view of throwing still further light on the causes of catalysis in general that these studies on the decomposition of hydrogen peroxide by substances of animal and vegetable origin were first undertaken. He observed that platinum and the noble metals generally rapidly blue a tincture of guaiacum containing hydrogen peroxide, and that a certain amount of the hydrogen peroxide present is decomposed into water and common oxygen. It follows from this that the power of these substances to catalyze hydrogen peroxide is so intimately associated with their power to blue the tincture of guaiacum containing hydrogen peroxide that both properties are referable to the same cause, and it was for this reason that a tincture of guaiacum containing small amounts of hydrogen peroxide proved to be a valuable reagent in the investigation of these phenomena. By means of it he proved that these catalytic agents have the widest possible distribution in vegetable and animal tissues. Among the substances tested with the guaiacum hydrogen peroxide reagent were a number of the common enzymes, such as diastase, emulsin, myrosin, rennin, etc., yeast, gluten, and over 100 species of plants, including certain fungi and molds, and also a number of seeds and substances of animal origin, such as fibrin, red blood corpuscles, and saliva. Without exception, all of these substances were found by him to actively decompose hydrogen peroxide, and with only two exceptions, yeast and rennin, all of them likewise gave rise to the production of guaiacum blue. Schoenbein ([387]) therefore concluded that the power to decompose hydrogen peroxide and to blue guaiacum thereby is intimately associated with the specific activity of the unorganized ferments and with such vital phenomena as the sprouting of seeds, etc., inasmuch as all of these biologic properties are lost by heating to 100° C., by exposure to hydrogen sulphide, and also, as shown in a later paper ([385]), by exposure to hydrocyanic acid.

In still another communication in the year 1863, on "The conduct of blood toward oxygen" (384), he points out that ozone and hydrogen peroxide are formed simultaneously in a large number of slow oxidations, such as the oxidation of phosphorus in a moist atmosphere. In a large number of cases, however, only hydrogen peroxide is met with as the by-product of the oxidation, as, for example, in the oxidation of metallic substances, pyrogallic acid, etc.; and in still another large group of cases neither ozone nor hydrogen peroxide are produced, for the reason, probably, that the latter oxidations are accomplished by common oxygen without activation in any way. He then goes on to say that the view has long been prevalent that in all oxidations resulting in the formation of ozone or hydrogen peroxide the conversion of common inactive oxygen, (O), into ⊕ or Θ takes place. The former, ⊕, then unites with water to form hydrogen peroxide, HO + ⊕, whereas the latter, Θ, is either consumed at once in the oxidation or appears as ozone. Indeed, according to Schoenbein, Θ is ozone. He therefore arrived at the conclusion that the neutral oxygen which is taken into the body during respiration must obviously suffer such a change of state before it can accomplish the oxidations ordinarily taking place in the animal organism, and since both ozone and hydrogen peroxide result from the oxidation of many substances, he expected to find these substances in the blood of animals. As a matter of fact, however, although he employed the most delicate reagents in testing for these substances in the blood, he was unable to find a trace of either ozone or hydrogen peroxide therein. In this connection he points out, however, that Hiss had shown that ozone readily oxidizes the albumin and fibrin of blood and also the blood corpuscles, and that long ago Thenard had shown that fibrin readily decomposes hydrogen peroxide into water and common oxygen, and he himself had shown that blood corpuscles obtained from defibrinated blood also rapidly decompose hydrogen peroxide, and that a solution of defibrinated blood of such dilution as to no longer exhibit the characteristic color of blood rapidly blues tincture of guaiacum containing hydrogen peroxide. He concludes, therefore, that while the common oxygen consumed in respiration is resolved into ⊕ and Θ, the latter, Θ, is at once consumed in oxidations, and that the former, ⊕, unites with water to form hydrogen peroxide (HO + ⊕); which, however, is rapidly decomposed by the red blood corpuscles into water and common oxygen. This again enters into the ordinary cycle of changes met with in the absorption and utilization of the respired oxygen, viz, into the formation of ⊕ and Θ, so that ultimately all of the oxygen would be gotten into a form available for oxidations, viz, Θ.

It should likewise be borne in mind that the blood corpuscles not only have the power of decomposing hydrogen peroxide into water and common oxygen, but also of ozonizing the oxygen, ⊕, which it contains, after the manner of a lead salt, as indicated by the fact that a solution containing the peroxide and red blood corpuscles rapidly blues a tincture of guaiacum. In the light of these facts, therefore, one can readily understand, he says, why the red blood corpuscles have the power of rapidly decomposing hydrogen peroxide, nor should one be inclined to look upon this as a useless property, since the blood corpuscles also have the power of ozonizing a part of the oxygen of the peroxide after the manner of platinum or a lead salt. According to Schoenbein, therefore, the red blood corpuscles, by virtue of their activating and catalyzing properties, play an important rôle in all processes of oxidation occurring in the organism of the higher animals, inasmuch as it is scarcely conceivable that their oxidizing power should be confined entirely to guaiacum resin or pyrogallic acid.

So far as the historical development of the subject is concerned, the work on the oxidases is approximately divisible into three periods. The first period begins with the earlier observations by Planche, Taddei, and Schoenbein, on the bluing of guaiacum. The second period has to deal with the work of Moritz Traube. The third period begins with the work of Yoshida and Bertrand on laccase, and includes all recent investigations on the subject. Obviously, as is the case with all things historically considered, the work of each of these periods overlaps somewhat the work of the other periods.

To review briefly the salient facts brought to light during the first period, we note that Wollaston was the first to call specific attention to the bluing of guaiacum and to the part played by air and light in effecting this change. William Brande also ascribed this change of color to oxygen, and succeeded in showing that pure oxygen gas effects the change somewhat more rapidly than atmospheric air. Then followed the earlier observations of Planche, that guaiacum is rapidly blued by the vapors of nitric acid and also by the fresh root of the horse-radish. This last-mentioned observation, made in 1809, marks the first recognition of a change brought about by an oxidizing ferment, although the ferment-like nature of the substance causing the change was not definitely recognized until many years afterwards. Other French observers noted a bluing of guaiacum by gums, such as gum arabic, and also by saliva. Taddei showed that under the influence of air and moisture the gluten of wheat flour blues guaiacum, and Planche showed that this reaction is characteristic of the roots of a large number of plants, and also of fresh milk, and, further, that the power to blue guaiacum on the part of these substances was lost on boiling. Thus, without fully appreciating its significance, this observer discovered one of the most characteristic properties of the oxidases as a class, viz, the loss of oxidizing power on boiling. Planche however failed to recognize the part played by atmospheric oxygen in these changes, and attributed the bluing of guaiacum by plant tissues to a peculiar unstable principle which he called *cyanogene.*

After the work of Priestley and Lavoisier, the greatest impetus to a better understanding of the processes of oxidation was given by the discovery of ozone by Schoenbein in 1840. We have seen that this observer recognized this active variety of oxygen among the products of slow oxidation, and that he explained the phenomenon of oxygen carrying as due to the production of ozone or of an ozonide. He greatly extended our knowledge of the bluing of guaiacum, and also the earlier observations of Planche on the presence of oxygen exciters in plants and animals, and he accounted for the remarkable oxidizing activity of such substances on the supposition that they, in common with platinum, nitric oxide, and other oxygen carriers, ozonize the air, combining with the ozone thus produced to form an active ozonide, which in turn can give up its oxygen to other less readily oxidizable substances. These were his *Sauerstofferregern* and *Sauerstoffträgern.* They are what we to-day term the oxidases, or oxidizing ferments. Through the action of these substances on certain chromogens he was able to explain the changes of color observed in the growth and decay of certain species of the higher fungi, and similar changes occurring in certain fruits, such as take place in the apple when peeled or crushed. He also recognized the wide distribution of substances capable of decomposing or catalyzing hydrogen peroxide and of greatly activating the latent oxidizing powers of this substance; and all of these facts he was able to explain more or less satisfactorily in terms of his theory respecting the relation existing between common oxygen, ozone, and antozone, according to which ozone and antozone were oppositely electrified; that under the influence of various substances, like platinum, etc., common oxygen and antozone or an antozonide could be transformed into ozone or an ozonide, and finally that ozone could react with an antozonide, such as hydrogen peroxide, to form common oxygen. In this connection it may be observed that no one can read the writings of Schoenbein without being impressed with the great wealth of his observations, and his theory regarding the nature of ozone will always serve to remind the thoughtful student of chemistry how clearly and apparently how accurately a great variety of phenomena can ofttimes be explained by an hypothesis altogether erroneous in its premises.

It is evident, therefore, that during the first period, covering approximately the first six decades of the nineteenth century, the presence of oxygen activators and carriers in the plant and animal world had been recognized, and the more important characteristics of the oxidases and peroxidases had been discovered, so far as we have an accurate knowledge of these properties to-day, and yet the terms "oxidase" and "oxidizing ferment" had not up to this time been introduced into the science, the nearest approach to them being the use of the terms *Sauerstofferreger* and *Sauerstoffträger* employed in the later writings of Schoenbein, and the recognition of the fact by this author that the power to activate oxygen and hydrogen peroxide is more or less intimately associated with the zymotic activity of the unorganized ferments and with vital phenomena generally. He accounted for all of these phenomena on the supposition that by means of various substances and under various influences the oxygen of the air becomes ozonized.

In the meantime other chemists and physicists (see Soret (405), Andrews and Tait (12), Brodie (102), Odling (313)) had gradually come to distinguish more clearly between the three forms of oxygen, viz, ordinary oxygen O_2, ozone O_3, and active (atomic) oxygen, O (antozone). The result has been that Schoenbein's original views regarding the manner in which the *Sauerstofferregern* and *Sauerstoffträgern* effect the activation of ordinary atmospheric oxygen, and the transfer of oxygen to other less readily oxidizable substances thereby, have been considerably modified and our knowledge of what we know as the oxidizing ferments considerably extended.

OXIDIZING FERMENTS ("VERWESUNGSFERMENTE" AND "OXYDATIONSFERMENTE," *Traube*).

During the second period of the development of this subject our knowledge of processes of slow oxidation and oxygen-activation, as well as of fermentation in general, was considerably extended through the labors of Moritz Traube. It remained for Traube to introduce into the science the term "oxidizing ferment" (*Oxydationsferment*) as a generic term for the unstable *Sauerstofferreger* and *Sauerstoffträger* of Schoenbein, which were found by Planche and Schoenbein to be so widely distributed among plants and animals.

In 1858 Traube (425) gave to the world his "Theory of Fermentation" (Theorie der Fermentwirkungen, von Moritz Traube, Berlin, Ferd. Dümmlers Verlagsbuchhandlung, 1858). A brief outline of this theory is also given in a paper published in Poggendorf's Annalen (426), and later he developed his ideas in a series of articles in the Berichte der Deutschen Chemischen Gesellschaft. In paragraph 175, page 61, of Traube's "Theorie" it is stated that an essential distinction between putrefactive and vital ferments—that is, those present in the living organism—does not appear to exist.

In this treatise and in his later papers he developed the idea that the ferments are not bodies in a state of decomposition which impart decomposition to other substances, as had been supposed by Liebig, but are, in all probability, chemical compounds originating from proteids which, while not as yet isolated in pure condition, have, without doubt, as have other compounds, a definite chemical composition, and which, through the exercise of definite chemical affinities, produce alterations in other compounds. He held also that Schwann's hypothesis, as subsequently developed by Pasteur, namely, that fermentation is the result of the action of the life phases of lower organisms is insufficient, and that rather the converse of this hypothesis is really correct, namely, that the ferments are the causes of the important bio-chemical processes and are not confined to the lower organisms, but are present also in the higher forms of life. (*See* Traube's "Theorie," supra, paragraph 175, p. 61.) In this connection he pointed out that the ferments are produced at ordinary or slightly elevated temperatures from the decomposition of protein substances by the action of water, probably under the influence of oxygen. Thus fresh meal prepared from dry grain contains no diastase. If, however, the grain acts upon water in a limited supply of air, chemical changes occur and diastase is generated. (Par. 172, p. 60, Traube's "Theorie.") He also pointed out that in many instances at least, the ferments are ideal catalysts, acting as chemical go-betweens between free or combined oxygen and the fermentable substances. Thus the blood is an ideal carrier of free oxygen, in that in the lungs it becomes saturated with oxygen, which is used for the purpose of direct oxidation in the capillaries, from which it is returned to the lungs to recombine with oxygen.

He was led to believe further, as a logical corollary of his theory, that various organic and inorganic substances other than those elaborated in the living cell may under certain conditions function as ferments. That such is the case is shown by the fact that platinum is a carrier of oxygen; that is, it may exert the same sort of action as the *Verwesungsfermente* (oxidizing ferments), and that in indigo-sulphuric acid we have a substance capable of exhibiting changes altogether analogous to certain kinds of fermentation. Later he ([428]) showed in this connection that platinum black at 150° to 160° C. decomposes solutions of sugar with the production of carbon dioxide and of a light oil, which gives the iodoform reaction.

Briefly put, Traube's theory of fermentation is based upon two distinct chemical propositions; first, that the ferments are definite chemical compounds elaborated from proteid as a result of the combined action of heat, water, and oxygen, and present not only in the lower organisms but also in the tissues of the higher forms, where they are responsible for bio-chemical processes; second, that the ferments are powerful reducing agents and oxygen carriers, capable in their capacity of chemical go-betweens (*Vermittler*) of effecting the transfer not only of free oxygen to easily oxidizable substances but also the transfer of combined oxygen from one compound to another.

He was led to divide ferments into three classes:

(*a*) *Verwesungsfermente,* those which combine loosely with free oxygen, forming unstable compounds which give up their oxygen to other less readily oxidizable substances.

(*b*) *Reductionsfermente,* those which combine with the oxygen of water, the hydrogen going to effect the reduction of the passive body.

(*c*) *Hochstes Faulnissfermente,* those which cause putrefactions in which hydrogen is set free.

He was led to believe further that all of these ferments have the power of carrying to other substances the oxygen with which they have combined, thereby becoming reduced and gotten into the condition whereby they can again combine with fresh quantities of oxygen and again carry it to oxidizable substances. In this way they are able to carry free and combined oxygen in practically unlimited quantities to other substances, and in that way bring about gradual decay (*Verwesung*) and fermentation proper (*Gährung*). (Traube, [425, 426].) In the one case (*Verwesung*) the oxygen required for the oxidation comes from the air; in the other case (*Gährung*) it comes from the water. Hence in all true fermentations water acts not merely as a solvent, but actively participates in the process. In this discussion, however, we are primarily concerned only with his first class of ferments, viz, the *Verwesungsfermente.* These he divided into two groups: *Vitale,* those met with in the higher life forms, and *faulige,* putrefactive, those concerned in the change and decay of dead material. In the first class he placed the guaiacum bluing ferment of the potato and the red coloring matter of blood. In the second class he placed the ferments concerned in the transformation of alcohol into acetic acid and the nitrogenous compounds of dung into nitrates. As nearly as I have been able to determine, the term "*Verwesung,*" as employed by Traube in this connection, seems to have been borrowed from the writings of Liebig, and in terms of the present nomenclature employed for processes in which the oxidizing ferments are concerned, it is practically untranslatable. As ordinarily employed, it signifies putrefaction or decay. In reality, as employed by Liebig, it referred primarily to the spontaneous decay of vegetable matter, whereby this sort of material is ultimately converted into brown mold or humus-like substances. Other English writers have encountered this difficulty in dealing with this word and its derivatives. Thus in translating Liebig's Agricultural Chemistry Gregory was forced to coin the word *eremacausis* (from the Greek, meaning "slow-burning") as the equivalent of *Verwesung,* the introduction of this term being made with Liebig's consent. In his earlier writings on the subject Traube made constant use of the term *Verwesungsfermente* as signifying the oxidizing ferments, to the exclusion of practically all other names for these substances. In Paragraph 132, page 49, of his "Theorie," it will be seen, however, that he employs the term "*Sauerstoffübertragenden Fermente*" (oxygen-carrying ferments) for the vegetable oxygen carriers described by Planche and Schoenbein, and later, in 1874, in an article on the conduct of yeast in oxygen-free media (^{429}), referring to his earlier work, he says:

> I have given several examples to show that there are substances (in animal and vegetable tissues) which, like platinum, nitric oxide, and indigo-sulphuric acid, carry free oxygen to other substances and thereby accomplish their oxidation. (*Sauerstoffübertrager, oxydationsfermente.*)

It was in his later writings (^{430}), however, especially in his controversy with Hoppe-Seyler that he insists upon the use of the term *Oxydationsfermente* (oxidizing ferments) as preferable to the term *Verwesungsfermente,* which latter term he had previously employed as signifying those ferments which possess the power of taking up free oxygen and carrying it to other passive substances, thereby accomplishing the oxidation of the latter.

As the result of their action, the oxidizing ferments suffer no chemical alteration, playing merely the part of go-betweens in oxidation, in that they alternately combine with oxygen and give it up to other substances. Obviously, according to Traube, free oxygen is essential to their action. In this connection his earlier observations on the oxidizing ferments of the potato are of interest. He showed that if thinly cut potato peel is rubbed up in a mortar with a small amount of distilled water, a solution is obtained which blues guaiacum intensely. If the blue solution thus obtained be allowed to stand in a reagent glass it bleaches, except on the upper surface where it is in contact with the air. On shaking with air, however, the whole solution again acquires a deep blue color, which on standing again bleaches. This alternate bluing of the solution by shaking with air and subsequent decolorization of the lower layer of the solution upon standing was observed upon one and the same solution for a period of fourteen days, indicating that the potato peel contained a true oxygen carrier through the instrumentality of which the oxygen of the air was transferred first to the guaiacum and subsequently to other substances. He also showed that the potato loses its power to blue guaiacum at 80° C., and that the unstable oxygen carrier which it contains is soluble in dilute alcohol. He points out that a body of such remarkable chemical conduct and of such wide distribution in the plant kingdom must play a significant rôle in the growth of vegetation. Similarly, he also recognized the red coloring matter of the blood as a powerful oxygen carrier, and was led to regard muscular activity as a respiratory act in which the muscle fiber functions as an oxidizing ferment in that it unites with the oxygen supplied by the blood to form an unstable compound, which in turn gives up its oxygen to other less readily oxidizable compounds contained in the muscle fluids both in rest and active work, resulting finally in the production of animal heat and work. In other words, muscular activity and the production of animal heat were accomplished, like all *Verwesungsprocessen*, through the action of *Verwesungsfermente* (oxidizing ferments) on the free oxygen of the air. (Traube (427, 430).)

In plants, under the influence of oxidizing ferments as go-betweens, oxygen accomplishes the conversion of soluble carbohydrates into cellulose, and in animals it converts soluble proteids into ferments. He goes on to say further that the lessons to be learned concerning oxygen are only limited by those to be learned of organic life itself.

OXIDASES (Laccase, *Bertrand*).

A new impulse to the study of the oxidases was given by the beautiful researches of Yoshida, and later by those of Bertrand, on the changes occurring in the sap of the lac tree, *Rhus vermicifera*, and allied species. It had long been known to the Japanese that the milk-like sap of the lac tree dries and hardens on exposure to the air and turns brown and finally black, thereby yielding a lustrous, translucent varnish, which is highly prized on account of its luster and stability. In 1883 Yoshida (467) for the first time undertook an accurate investigation of these interesting changes. He found that the lac tree yields a strongly corrosive sap, which he called "urushi;" this he found to consist essentially of four substances, viz., water, urushic acid, $C_{14}H_{18}O_2$, gum, and a peculiar diastatic matter which possesses the power of transforming the urushic acid into oxy-urushic acid, $C_{14}H_{18}O_3$, through the action of the oxygen of the air, in the presence of moisture. He found that this nitrogenous compound loses this property when heated to 63° C. He was therefore led to conclude that in this substance we have an enzyme which has the power of carrying oxygen to the urushic acid, thereby transforming it into oxy-urushic acid which is the basis of lac varnish. He also showed that urushic acid can be transformed into oxy-urushic acid by chromic acid.

Eleven years later a more exhaustive investigation of the changes occurring in the sap of the lac tree was undertaken by the French chemist Bertrand (48, 49), with the result that Yoshida's previous results were confirmed. According to Bertrand, the changes observed when the fresh juice of the lac tree is allowed to stand in the air are brought about by the oxygen of the air under the influence of an oxidizing ferment (*diastase oxydante*) to which he gave the name of laccase. After boiling laccase loses the power of bringing about these changes. Hence he regards laccase as the provocative agent of the oxidation, and found it not only in the fresh juice of the lac tree but also in gum arabic and gum senegal. According to Bertrand, the oxidizable substance present in the juice of the lac tree and which

Yoshida had called urushic acid, shows many resemblances to the polyatomic phenols. He therefore called this substance "laccol," and in view of this analogy he was led to study the conduct of laccase toward a number of the polyatomic phenols and related compounds with the result that he found many of these to be oxidized under these conditions. Thus, hydroquinon is converted by laccase into quinon and quinhydron, with the absorption of oxygen (50). Thus, a 1 per cent solution of hydroquinon alone or with boiled laccase does not absorb oxygen from the air nor is it altered in any way. In the presence of a small amount of laccase, however, such a solution absorbed 25.4 c. c. of oxygen in three hours. With tannin and pyrogallol the oxidation was always attended with the disengagement of considerable amounts of carbon dioxide. Thus, in two experiments oxygen was absorbed and carbon dioxide disengaged in the following amounts:

	Oxygen Absorbed.	Carbon dioxide disengaged.
(1)	23.3 c. c.	13.7 c. c.
(2)	29.8 c. c.	16.4 c. c.

He also found guaiacum to be a useful reagent for laccase, and by means of it he was able to detect the enzyme in many plants, such as potatoes, apples, peas, quinces, lucerne, clover, asparagus, turnips, chestnuts, and various rhizomes (57).

Bertrand and Bourquelot (63), by the use of guaiacum, found laccase in a large number of species of mushrooms. Out of 18 species examined at this time only two, *Polyporus sulfureus* Bull. and *Squamosus* Huds., were found not to give the guaiacum reaction. Hence laccase is not confined to the chlorophyllous plants, but occurs in the nonchlorophyllous plants also.

The oxidations occurring in the juice of the apple, observed in cider-making, were also studied about this time by Lindet (271). This author also claims to have reached the conclusion, as early as 1893, that a soluble ferment governs this oxidation, and in a later article he (272) concludes that the changes of color occurring in fresh cider are due to the oxidation of tannin by a ferment, of the type of laccase, contained in the tissues of the apple.

In the course of his investigations Bertrand found that laccase always contains small amounts of manganese and that its oxidizing power is proportional to the amount of manganese present; and further that oxidations accomplished by laccase are greatly accelerated by small amounts of manganese salts and that no other metal is capable of accelerating the oxidation brought about by laccase.

In the course of these investigations the old observations by Schoenbein (378) that various fungi become colored in the air was also confirmed by Bertrand and Bourquelot (64). They arrived at the notion that the change of color is brought about by an oxidizing ferment which they held to be identical with laccase. The chromogen of the blue substance was later isolated by Bertrand and called boletol (60). On the other hand it was known that certain fungi become red and then black (not blue) on exposure to the air. In such fungi Bertrand and Bourquelot (64) found tyrosin. Now, since this compound is not oxidized by laccase but is oxidized by the fresh extract of those fungi in which it occurs, they ascribed its oxidation to a second oxidizing ferment which they called "tyrosinase." Bourquelot found tyrosinase in many plants, including the potato and sugar beet.

From these observations Bertrand was led to regard laccase as one of a group or class of oxidizing ferments to which he gave the general name of "oxydases." Thus in an article on the relationships existing between the constitution of certain organic compounds and their oxidizability under the influence of laccase he (52) says in footnote 2, on page 793:

> I propose to apply the generic term *oxydases* to soluble oxidizing ferments in order to distinguish them from the true diastases (ferments) which produce double decomposition with the fixation of water.

To Bertrand, therefore, we owe the introduction into the science of the term *oxydase*.

Boutroux (92) has objected to the use of the term *oxydase* as proposed by Bertrand for such oxygen carriers as laccase and that contained in bran, on the ground that the termination *-ase* has been employed exclusively to indicate a hydrolytic ferment, and for the further reason that the formation of such a word as *oxydase* is contrary to the general rule governing the nomenclature of enzymes, according to which the stem of the word thus employed designates the substances upon which the enzyme exerts its action; thus *maltase* signifies the ferment which hydrolyzes maltose. On the other hand it should be borne in mind that this nomenclature for the unorganized ferments has never been rigorously applied, as indicated by the use of the terms *invertase* and *diastase*. Furthermore, the term *oxydase* was well chosen, since these ferments all act upon oxygen or a peroxide, and such terms as *laccase* and *tyrosinase*, etc., serve to differentiate the oxydases from one another and likewise indicate the substances upon which the oxygen acts.

As is the case with other soluble ferments, the oxidases have probably never been obtained in a condition of purity. Indeed, we have no reliable criteria whereby to judge of their purity, and hence but little is known regarding their composition. From the fact that laccase always contains manganese, and that a salt of this metal greatly increases the activity of the oxidase, Bertrand reached the conclusion that laccase consists of manganese in combination with a proteid radicle. The former functions in the capacity of a co-ferment, whereas to the latter the laccase owes its zymotic characteristics, such as destructibility by heat, poisons, etc.

According to Portier (330), the following properties are characteristic of an oxidase:

(1) The power to oxidize certain substances in the presence of free oxygen, gaseous or dissolved.
(2) The power to cause the absorption of oxygen during oxidation.
(3) Destruction by heat.
(4) Nondialyzability.

According to Bourquelot (84), the oxidases belong to the class of enzymes and possess the following characteristics common to enzymes in general:

(1) Catalytic power, viz., power to effect the transformation of an indefinite amount of material by means of an infinitesimal quantity of the ferment.
(2) Like other ferments, their activity is subject to regular and constant influence by heat, increasing in oxidizing power with rise in temperature to 42°–45° C. (optimum temperature), then falling off in activity with further rise to 60°–70° C., and finally completely destroyed at 100° C.
(3) Insolubility in alcohol.
(4) Solubility in water, even after precipitation by alcohol and desiccation.
(5) Adsorption by precipitates (colloids).
(6) Absence of power to dialyze.

In addition to these general characteristics, they possess, according to this author, the following properties properly belonging to the oxidizing ferments:

(1) Power of accomplishing oxidation by means of gaseous or dissolved oxygen.
(2) The accompaniment of the oxidations accomplished by them with a notable absorption of oxygen.

Duclaux (150, vol. 2, p. 565), has defined oxidases as substances which at ordinary temperatures and under physiologic conditions, carry oxygen rapidly to substances upon which, without the intervention of oxidases, ordinary oxygen would act very slowly.

The oxidases are very readily soluble in water; they are also readily soluble in glycerin, but in other organic solvents thus far investigated they seem to be insoluble. Thus I (238) have found the oxidase of *Lepiota americana* to be very soluble in water, glycerin, 40 per cent formaldehyde, and mixtures containing water and alcohol, but insoluble in ethyl, amyl, and allyl alcohols. This fungus also gave up its oxidase to a preservative solution containing equal quantities of water and alcohol to which a small amount of formaldehyde had been added. Some observations seemed to show that it was soluble in toluene to some extent. It has also been my own experience that aqueous solutions of the oxidases are very unstable even in the presence of mild antiseptics. Thus aqueous extracts of the potato soon lose their power to blue guaiacum, even when preserved under antiseptic conditions. Bourquelot observed that an aqueous extract of *Russula delica* when preserved with chloroform first loses its power to oxidize tyrosin, then guaiacol, and finally, after eight weeks, its power to oxidize guaiacum. I have found aqueous extracts of *Lepiota americana* to oxidize guaiacum at the end of eighteen weeks. Bertrand found tyrosinase to be very unstable. On the other hand, according to Bourquelot (75), aqueous solutions of tyrosinase to which chloroform had been added were found to be active at the end of two or three months.

In glycerin the oxidizing ferments are much more stable. Thus Gessard (181) has found that a solution of tyrosinase in glycerin, obtained from mushrooms by Bourquelot's method, is stable, and in his work he employed such an extract which had retained its activity for ten months. Bourquelot (81) found that glycerin extracts of *Lactarius velutinus* retained their oxidizing properties for a year or longer. In the course of my own work on this subject I have found that glycerin extracts of *Lactarius piperatus* and *Lactarius volumen* prepared in the summer of 1905, both of which, in the fresh state, were found to be quite active toward guaiacum and tyrosin, were still active toward these substances in the summer of 1909.

As a general thing, the oxidizing power of an oxidase is not confined to one particular oxidizable substance. Thus laccase has been found to oxidize not only laccol, the oxidizable principle of the juice of the lac tree, but also to oxidize guaiacum, guaiacol, hydroquinone, phenolphthalin, and a large number of phenols and aromatic amino compounds. (See pp. 59–61.) So also tyrosinase oxidizes not only tyrosin but also a large number of related compounds. (See pp. 81–84.) In the same way an oxidase which will oxidize benzaldehyde to benzoic acid will also oxidize salicylic aldehyde, benzyl alcohol, and related substances. On the other hand laccase will not oxidize tyrosin, nor will tyrosinase oxidize guaiacum or phenolphthalin. So in the same way many animal tissues which have been found to oxidize salicylic aldehyde are without effect on guaiacum, hydroquinone, and tyrosin. While thus not absolutely confined in their action to any one particular oxidizable substance, the oxidases exhibit a certain degree of specificity in the sense that they are more or less limited in their action to certain groups of substances which are more or less closely related chemically.[a]

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[a] From his studies on the spontaneous oxidation of the sugars, Mathews (289) concludes that two distinct groups of substances have been confused under the name of *oxidases;* one group, the oxidases proper, activates oxygen more or less generally toward all oxidizable substances, while the other group of ferments, which are more specific in their action, activates certain oxidation processes, such as the oxidation of sugars, by causing a dissociation of the sugar molecule. For the latter he proposes the name *metabolase*, since they hasten metabolism. According to this author the failure on the part of the organism to burn glucose under certain conditions is probably not due to the absence of oxidases, but to the loss of its power to dissociate glucose into easily oxidizable substances.

CLASSIFICATION OF THE OXIDASES.

Various attempts have been made from time to time by different observers to effect a classification of the oxidases. None of these are altogether satisfactory, but are probably as good as can be made in the present state of our knowledge of these substances.

According to Grüss (200) there are three classes of oxidases in the higher plants, namely α-oxidases, β-oxidases, and γ-oxidases. The α-oxidases (1) act directly upon guaiacum and tetramethyl-para-phenylene diamin with the fixation of oxygen; (2) they are soluble in glycerine and are partially precipitated from their solutions by acetate of lead, and are easily destroyed by alcohol; (3) they are found in the parenchymatous tissue of the potato and in most dicotyledenous plants. The β-oxidases (1) activate the oxygen of peroxides, and hence they only blue guaiacum or act upon tetramethyl-para-phenylene diamin in the presence of hydrogen peroxide or a similar substance: (2) they are soluble in glycerine and are precipitated from their solutions by alcohol and ether without being destroyed; (3) they have been found in the resting, mature tubers of the potato. The γ-oxidases (1) also activate the oxygen of peroxides, and hence only blue guaiacum or act upon tetramethyl-para-phenylene diamin in the presence of hydrogen peroxide; (2) they are not destroyed even by boiling alcohol, and in order to demonstrate their presence the tissue must be boiled in alcohol for a short time before adding the hydrogen peroxide and oxidase reagent; (3) they have been found in old wounds in plants such as the potato, in the diastase of the barley grain, in association with cytase, in the leptome of growing roots, in *Astragallus glycophylloides*, etc.

Grüss has also classified certain of the vegetable oxidases according to differences in conduct toward certain oxidase reagents. Thus he observed that certain oxidases can act upon tetramethyl-para-phenylene diamin, but not upon guaiacum, whereas other vegetable tissues are capable of oxidizing both. He therefore divided the oxidases into two groups: (1) the guaiacum-oxidases, and (2) the amino-oxidases. An example of the latter is furnished by the oxidase of yeast. In this connection Rey-Pailhade (342) was able to find only two kinds of oxidases in plant tissues, (1) those which oxidize guaiacum and (2) those which only oxidize Röhmann-Spitzer's reagent (α-naphthol and para-phenylene diamin). The first is identical with Bertrand's laccase; the second with the indophenol-forming oxidases which occur so generally in animal tissues. In this connection Pohl (329) found certain plant extracts to give the indophenol reaction, but to be incapable of oxidizing formaldehyde.

Rosell (352) distinguishes between extra-and intra-cellular ferments, and divides the oxidases into the following groups:

(1) Aldehydases (Jacoby), such as salicylase, etc.
(2) Indophenol-oxidase (Spitzer), found in aseptic pus (Achalme).
(3) Guaiacum oxidase (Schoenbein), found in plant tissues.
(4) Hydrogen peroxide ferment (Rosell), peroxidase (Linossier), indirect oxidase (Bourquelot), and possibly includes catalase under this head.
(5) The glycolytic ferment (Lepine).
(6) The purin oxidase (Spitzer).

The following classification of the oxidases and other oxygen-carriers concerned in biological oxidations would seem to be more in line with present requirements:

(1) Laccase; ferments oxidizing guaiacum, guaiacol, hydroquinone, phenolphthalin, tannin, etc., directly by means of atmospheric or dissolved oxygen and without the intervention of hydrogen peroxide. According to Bach and Chodat, laccase consists of a peroxidase, together with an oxygenase (a peroxide). In this connection, see also a recent communication by Moore and Whitley (306).
(2) Tyrosinase; ferments acting on tyrosin and related substances.
(3) Aldehydase; ferments oxidizing aromatic aldehydes and related compounds.
(4) Indophenol oxidase (Spitzer), ferments oxidizing a mixture of α-naphthol and para-phenylene diamine to indophenol and other substances.
(5) The purin oxidases.
(6) Glycolytic ferments, causing the disappearance of sugar from animal tissues.

In addition to the oxidases proper, we have among related ferments and carriers the following:

(1) Peroxidases; oxidizing oxidase reagents only in the presence of a peroxide, such as hydrogen peroxide. These are the indirect oxidases (Bourquelot) and the β-oxidase of Grüss. According to Moore and Whitley (306) the peroxidase is the only type of enzyme concerned in oxidizing processes occurring in living cells and tissues.
(2) Catalases (Loew). These ferments actively decompose hydrogen peroxide, but are incapable of effecting the oxidation of oxidase reagents by means of the peroxide.
(3) Oxygen carriers (not true ferments). This class includes such substances as the iron-containing pigments of the blood, hemocyanin, and the γ-oxidases of Grüss. They activate the oxygen of a peroxide, but differ from the true peroxidases in having greater stability. (*See* Kastle (240).)

Whether the laccase, tyrosinase, aldehydase, etc., obtained from different vegetable and animal sources are really in all cases the same substances can not be determined with certainty in the present state of our knowledge respecting these substances. As already indicated, a very large number of plant tissues contain an oxidase capable of bluing guaiacum and oxidizing hydroquinone; whether this is the same chemical substance which is responsible for these oxidations in all cases can not be definitely decided. For certain reasons it would seem probable that the substances responsible for such oxidations, in case there were several, are at least closely related chemically. On the other hand, certain facts are known which would seem to indicate that they might have the greatest diversity of composition and yet all be capable of activating oxygen toward guaiacum, hydroquinone, etc. From what is known regarding the effect of manganese on laccase, it would seem that almost any colloidal solution of manganese might exhibit essentially the same reactions as laccase. (See pp. 122–131.)

The conduct of the oxidases and peroxidases toward a large number of substances has been investigated by Bertrand, and also by Bourquelot and others. In this connection Bertrand (52) has studied the influence of the chemical constitution of certain organic compounds on their oxidizability by laccase.

Thus, he has shown that the oxidizability of the polyatomic phenols by laccase depends upon the relative ease with which they are converted into quinones. In this respect they conform in general to the findings of the Brothers Lumière (279) respecting the action of such substances as photographic developers. Thus, para-amido-phenol is an excellent developer and is also readily oxidizable by laccase, whereas meta-amido-phenol is not a photographic developer and is not acted upon by laccase. Similar results have been obtained with para-phenylene diamin and meta-phenylene diamin. On the other hand, the aromatic monophenols and monamins are not as a rule easily oxidized by laccase; the only substances easily oxidized by laccase are those of the benzene series containing hydroxyl or amino groups in the ortho or para positions. This rule defines the oxidizing power of laccase and serves to distinguish this soluble oxidizing ferment from the oxidases which attack compounds of different chemical constitution.

Bourquelot (74) has also investigated the action of the oxidizing ferments found in *Russula delica*, namely, laccase and tyrosinase, on a large number of compounds. He found the oxidizing power of this mixture of oxidases to be dependent upon the reaction of the medium. Thus, a solution of anilin was scarcely oxidized at all, owing to its alkalinity, while in the presence of small amounts of acetic acid the oxidation proceeded rapidly up to a certain limit of acidity, beyond which it was again checked, owing to the presence of an excess of acid. He found that the mixture of oxidizing ferments from *Russula delica* is capable of oxidizing a large number of phenols (77, 79) and aromatic amino compounds (82), among which may be mentioned phenol, the cresols, xylenols, thymol and carvacrol, alpha- and beta-naphthol, also the ethers of various phenols (79), anisol, phenetol, guaiacol, acetyl-guaiacol, veretrol, eugenol, acetyl-eugenol, vanillin, and vanillic acid; and by means of aqueous extracts of *Russula delica* and *Lactarius velutinus* he was able to obtain powerful oxidations with anilin, sulfate of anilin, methyl-, ethyl-, and diethy-anilin, meta- and para-toluidin, the xylidins, naphthylamin, and veratrylamin.

According to Bertrand and Bourquelot (64, 78) tyrosin is the best reagent for tyrosinase.

OXIDASE AND PEROXIDASE REAGENTS.

Under this head are given the names of the greater number of reagents which have been actually employed in the study of oxidases, peroxidases and other oxygen catalysts occurring in the living organism. As will be seen the greater number of these substances belong to the aromatic series, and on oxidation by the oxidase or peroxidase give rise to a colored substance: thus, guaiacum is converted into guaiacum blue, phenolphthalin into phenolphthalein, which is red in alkaline solution, the leuco-base of malachite green into malachite green, guaiacol into guaiacol-tetraquinone $[C_6H_3(OCH_3)O]_4$, which is red in color. No attempt has been made to classify these reagents either as to chemical constitution or according to the nature of the substance which they yield on oxidation by the oxidase or peroxidase.

Table of oxidase and peroxidase reagents.

Name of substance.	References.
Guaiacum	51, 74, 135, 136, 332, 377, 384, 417, 418, 419.
Guaiaconic acid	142, 362.
Guaiacol	75, 76.
Hydroquinone	48, 49, 76.
Aloin	238, 251, 363, 364.
Phenolphthalin	240, 247, 334, 335, 336.
Ethyl-phenolphthalin	238, 245.
Leuco-rosolic acid	245.
Leuco-base of malachite green	11, 104, 105, 131, 193.
Tyrosin	64, 77, 78.
Benzidin	11, 390.
Pyrogallol	30, 31.
Potassium iodide and starch	19, 377, 379, 414.
Tetramethyl-para-phenylene diamin	464.
Para-phenylene diamin	444.
Para-diethyl-para-phenylene diamin	437.
a-naphthol	77, 194.
a-naphthyl amin	390.
Vanillin	210, 266, 390, 453.
Phenol	11, 76.
Pyrocatechin	11.
Ortol	43.
Amidol	258.
Tannin	272.
Salicylic aldehyde	5, 225, 291, 292, 366.
Benzyl alcohol	366.
Formic aldehyde	329.
Arsenious acid	408.
Pyramidon	252.
a-naphthol and para-phenylene diamin in solution in sodium carbonate, and analogous reagents	351, 453.
Eugenol	76, 125.
Iso-eugenol	126.

Name of substance.	References.
Thymol	77, 124.
Ortho-toluidin	74, 76.
Para-toluidin	74, 76.
Meta-toluidin	76.
Ortho-, meta-, and para-cresols	76.
Xylidin	76.
Anilin	74, 76.
Ortho-, meta-, and para-xylenols	77.
Carvacrol	77.

Many of these reagents have found special application in the study of particular phases of biological oxidations. Thus, hydroquinone and guaiacum have been most extensively used in the investigation of laccase; tyrosin in the study of tyrosinase; and salicylic aldehyde in the study of aldehydase. So, in the same way, guaiacum, aloin, benzidin, the leuco-base of malachite green, and phenolphthalin have been most extensively used in testing for blood. whereas the potassium iodide-starch reagent (v. Storch (414)), para-phenylene diamin, and guaiacum, have been most extensively employed in distinguishing between raw and boiled milk.

Various attempts have also been made to determine quantitatively the oxidizing power of these various catalysts by means of certain of these reagents. Thus, Laborde (256) has proposed a colorimetric method in which tincture of guaiacum is used for this purpose; similarly Slowtzoff (404) has employed the indophenol reaction, Kastle (239, 240, 241), the oxidation of phenolphthalin, and Czyhlarz and von Fürth (131) the oxidation of the leuco-base of malachite green, as the basis of colorimetric methods. Bach (19) has made use of the oxidation of hydriodic acid (potassium iodide and acetic acid), for quantitative purposes, and later Bach and Chodat (30, 31) have employed the change of pyrogallol to purpurogallin for the quantitative study of the peroxidase reaction. Herzog and Meier (210) have measured such oxidations quantitatively by means of vanillin, which is converted into dehydrovanillin, and Battelli and Stern (35) have employed the oxidation of formic acid. The conversion of tyrosin into melanin has also been studied quantitatively by von Fürth and Jerusalem (178), and by Bach (24). (See pp. 79–81.)

LACCASE.

This oxidase has been so fully considered in the historical development of the subject of the oxidases that but little additional need be said concerning it. As already pointed out in the foregoing, it rapidly blues guaiacum and oxidizes hydroquinone with the absorption of oxygen, and its activity is greatly augmented by the presence of very small amounts of manganese salts. Like other ferments, its activity is lost on boiling. As is evident from the work of Planche (326, 327), Schoenbein, (377, 378, 383), and Bertrand (51), laccase or a guaiacum-bluing ferment of similar nature is almost universally distributed in the plant kingdom. Thus Bertrand found it in the tubers of the dahlia, in the potato, in the rhizome of the American reed, in the racines of the beet and turnip, in the stalk of the asparagus, and in apples, pears, etc. As a matter of fact, there are certainly but comparatively few of the higher fungi or of the chlorophyllous plants which do not blue guaiacum at least in certain of their tissues at certain stages of their development.

It was believed at one time by Rey-Pailhade (342, 344) that animal tissues have not the power to blue guaiacum and that therefore they contain no laccase. Subsequent investigations, however, have shown that this is much too sweeping a generalization. Thus Biedermann (67) observed that an aqueous extract of the middle intestine of the starving meal-worm gives an intense blue coloration with guaiacum. According to Giard (192), *Botrylloides cyanescens* and *Ascidia fumigata*, Grube, give an immediate and very intense blue color with tincture of guaiacum. The blood of the last-named ascidian was clear yellow when freshly drawn, becoming dark green on exposure to the air. Portier (330) has confirmed these observations on *Ascidia mentula*, and Abelous and Biarnes (6) have obtained similar results with the blood-plasma of the craw-fish. Similarly Pieri and Portier (324) have found a powerful oxidase in the gills and labial palps and blood of the acephalous molluscs, including the common oyster and the fresh-water species, *Anadonta cygnea;* this oxidase is said to give an intense blue coloration with guaiacum and to rapidly convert hydroquinone into quinone and quinhydrone. Hougonenq and Paviot (220) claim to have found that certain malignant tumors give the guaiacum reaction; Cavazzani (113) has made experiments indicating the presence of an oxidase in the cerebro-spinal fluid, which he has termed ''Cerebro-spinase,'' and recently the brothers Lumíere and Chevrotier (281) have prepared a protoplasmic extract of red blood corpuscles to which they have given the name ''Hemoplase'' and which they claim possesses the properties of an oxidase to a remarkable degree, as shown by its power to oxidize guaiacum, guaiacol, paraphenylene diamin, pyrogallol, and hydroquinone. Gessard (185) has found laccase in the ink-gland of the cuttle-fish.

While these observations are of interest as showing the occurrence of laccase or a similar guaiacum-bluing ferment in animal tissues and fluids, it is undoubtedly true that such ferments are of much rarer occurrence in animal than in plant tissues. At present the precise significance of this is only a matter of conjecture. It is interesting to note in this connection, however, that Ehrlich (157) found the tissues of the higher animals to possess powerful reducing properties, as indicated by their conduct toward methylene blue. It is quite conceivable, therefore, that such oxidases as laccase are not really absent from animal tissues, but that their presence is merely obscured by the presence of powerful reducing substances, whose affinity for their oxygen is so great as to prevent the oxidation of the oxidase reagent.

Laccase is very soluble in water and aqueous solutions of the ferment are very readily obtained from such plants as the potato (*Solanum tuberosum*) (tuber), from the fruit of the egg plant (*Solanum melongena*), from the silk of the green corn (*Zea mays*), and from many varieties of fungi. In my own experience *Lactarius piperatus* and *Lepiota americana* afford excellent material from which to obtain the ferment. The former yields nearly colorless water-clear extracts of considerable oxidizing power, while the latter fungus affords extracts of remarkable oxidizing power. In this connection glycerin extracts of *Lactarius piperatus* and *Lactarius volumen*, which had been kept in the laboratory in glass stoppered bottles for a period of four years, still showed the laccase and tyrosinase reactions strongly. (See p. 56.) It not infrequently happens that laccase occurs in association with tyrosinase in the same plant or even animal tissues. See Gessard ([185, 186]), and Bertrand ([54]). In the separation of the two oxidases advantage is taken of the greater stability of laccase toward heat and alcohol. Thus from *Russula delica* Bertrand separated the two ferments by precipitating the aqueous extract obtained by macerating the fungus with its own weight of chloroform water, with one and one-half times its volume of 95 per cent alcohol. The filtrate thus obtained after concentration at 50° C., still showed all of the reactions of laccase. It failed, however, to oxidize tyrosin. On the other hand, an aqueous extract of the alcoholic precipitate oxidized tyrosin, but failed to oxidize hydroquinone or pyrogallol to any appreciable extent.

Similarly it was found possible to destroy the tyrosinase and leave the laccase in the aqueous extract by heating to 70° C. (*See* Bach [23]). In the preparation of laccase no special precautions are necessary other than those which hold for the preparation of ferments in general. If tyrosinase is present along with the laccase, the extract is either heated to 70° C. for a short time to destroy the tyrosinase, or the latter is precipitated by the cautious addition of alcohol. The tyrosinase-free extract may then be concentrated by evaporation at low temperatures and the laccase finally precipitated by the addition of alcohol. Inasmuch as we have no criterion for judging of the absolute purity of a ferment, it is very doubtful whether much is gained by the attempt to isolate laccase and the other oxidases in pure condition, and it has been my own experience that we frequently lose in activity what we gain in the so-called purity of the enzyme by all attempts at its purification. The stability of laccase apparently depends upon the nature of the substances with which it finds itself in association or upon conditions which at present are altogether unknown to us. Thus it is not an unusual thing to find that extracts of the peel of the potato lose their power to oxidize guaiacum after standing a few hours, (*see* Kastle and Shedd [247]), whereas aqueous extracts of *Lepiota americana* retain their activity for weeks or even months (*see* Kastle [238]), and glycerin extracts of *Lactarius piperatus* and *Lactarius volumen* were found by Kastle to blue guaiacum four years after they were first prepared.

Reference has already been made to the fact that aqueous extracts of laccase have been found to lose their activity on boiling. It has also been pointed out that laccase is less sensitive toward heat than tyrosinase. That it has a rather high thermal death point as compared with certain other ferments may be seen from the following observations bearing on this point. Kastle ([238]) found that exposure to a temperature of 80° C. or higher for a short time is sufficient to render the very active oxidases of *Lepiota americana* inert. On the other hand, at temperatures below 80° C. an hour's exposure was found to be insufficient to destroy the oxidizing power of these extracts toward guaiacum. Bertrand (cited by Green ([199]), p. 293) found laccase to be still active after heating to 70° C.

As already pointed out (see pp. 59–61), laccase is not specific in its action, but promotes the oxidation of a large number of easily oxidizable substances, such as guaiacum, guaiacol, phenolphthalin, hydroquinone, pyrogallol, adrenalin, and many other phenols and amino derivatives of the benzene series.

It has long been known that such substances as hydrocyanic acid and hydrogen sulfide destroy the activity of the oxidases and similar catalysts. Bouffard ([69, 70]) has pointed out that sulfurous acid prevents the action of oenoxydase. Up to the present, however, very little systematic work has been done on the effect of poisons on laccase. Kastle and Loevenhart ([244]) observed that the oxidizing power of aqueous extracts of the potato is destroyed by hydrocyanic acid, hydroxylamin, phenylhydrazin, sodium thiosulfate, and tenth-normal solutions of certain acids, such as hydrochloric, hydrobromic, benzene-sulfonic, para-nitro-toluene-sulfonic, oxalic, and salicylic, and that these substances also inhibited the oxidizing power of certain organic peroxides. Recently Bertrand ([61]) has found that most acids exert a poisonous or paralyzing action on laccase. On the other hand, there are some acids, such as carbonic, boric, and phosphoric, which are inactive at all concentrations.

THE PREPARATION OF LACCASE.

Slowtzoff ([404]), using the potato and cabbage as sources of the ferment, employed the following method for the preparation of what he calls pure laccase: One kilogram of fresh-washed potatoes were macerated to a paste and acetic acid added, so as to form a 0.5

to 1.0 per cent solution, in order to prevent the action of the oxidases on tyrosin and other chromogens contained in the potato. After standing twenty-four hours the mass is strained through a cloth and filtered. The clear reddish or yellowish liquid is then saturated with ammonium sulfate, and the precipitate, consisting of proteids, coloring matter, and ferments, is collected on a filter and washed with saturated ammonium sulfate solution, and finally dissolved in water. This salting out with ammonium sulfate and re-solution in water is repeated three or four times. The water solution finally obtained was then dialyzed against running water in pergament paper and then precipitated with 4 to 5 volumes of 95 per cent alcohol. The precipitate thus obtained was collected on a filter, washed with ether and dried over sulfuric acid. At the end of a week the yellowish-brown powder thus obtained was extracted with distilled water; a water-clear solution was thus obtained which, after saturation with chloroform and standing a month, gave only a slight percipitate (not weighable). In order now to obtain the pure ferment, the water extract thus obtained was precipitated with 5 or 6 volumes of ethyl alcohol, and the precipitate collected and dried over sulfuric acid in a desiccator. The yield of pure laccase was so small, however, that even after a year only about 1 gram of the material was obtained. The yield of laccase from cabbage was found to be even smaller.

The pure laccase obtained by Slowtzoff was found to give all of the reactions for protein and to contain 12.8 per cent nitrogen and 0.53 per cent of sulfur, and to be very poor in ash. According to this author, it belongs to the group of albumins and contains neither manganese nor phosphorus.

In order to determine the oxidizing power of his pure preparation, Slowtzoff made use of Röhmann's reagent, viz., a solution of paraphenylene diamin and meta-toluylene diamin in sodium carbonate solution, the quantity of coloring matter produced by the action of the ferment or other oxidizing agent, such as a ferric salt, being estimated colorimetrically. On the basis of these observations, he arrived at the following conclusions respecting the nature of laccase and its mode of action:

(1) Laccase belongs to the group of ferments for the reason—
  (*a*) That it loses its activity at high temperatures. In this connection he found the thermal death point of the ferment to vary with the degree of purity of the preparation; thus his purest preparations lost their activity at as low a temperature as 50° C., whereas preparations richer in ash only lost their activity at temperatures of from 65° to 70° C.
  (*b*) The amount of the substance oxidized is proportional to the square root of the quantity of laccase present.
  (*c*) The quantity of product resulting from the action of the ferment is proportional to the quantity of the ferment, but not to the amount of substances being oxidized.

(2) The pure laccase preparations were found to act best in weakly alkaline solutions, as already observed by Bertrand and Bourquelot.

(3) Laccase belongs to the group of proteins. Its ash constituent is very small and without influence on its oxidizing power.

(4) Laccase is not destroyed by weak acids, nor by peptic or pancreatic digestion.

ANTI-LACCASE.

According to Gessard (191) it is possible to obtain a serum capable of retarding the action of laccase by the injection of preparations containing this oxidase subcutaneously into a rabbit. In order to obtain this anti-laccase serum Gessard adopted the following mode of procedure: A rabbit weighing about two kilograms received at intervals of five or six hours apart six injections, each of 1 gram of laccase powder in 10 c. c. of water. According to Bertrand (55) this represents about 0.15 gram of pure laccase. Two animals treated in this manner gave a serum of about the same potency. By means of guaiacum and guaiacol he found that the serum obtained from animals thus treated completely retards the action of laccase when two parts of the serum by volume are added to one part by volume of a 2 per cent solution of laccase. On the other hand normal serum and anti-tyrosinase serum were both found to be without effect on the action of laccase. Anti-laccase prepared by the use of the laccase from the juice of the lac tree was found to retard to a degree at least the color reactions produced by an extract of *Russula delica* on oxidase reagents. On the other hand Gessard (185, 186) observed that the anti-laccase obtained by the injection into rabbits of laccase from the lac tree is without retarding action on the laccase from the ink gland of the cuttle fish. He concludes therefore that the oxidases do not differ from other enzymes in their power to give rise to specific anti-bodies in the blood serum of animals, which have received a number of injections of the ferment.

According to Gessard the results of these researches on anti-laccase and anti-tyrosinase are sufficient to prove the individuality of these two oxidases, and serve to show that the oxidases do not differ from other enzymes in regard to their power of giving rise in the serum of animals to substances which oppose their action.

Czapek (129, 130) has also obtained evidence of the production of anti-oxidases in plants which hinder the oxidation of homogentisic acid, and which are produced in the growing ends of roots, special sense organs, and in fungi, as the result of irritation.

In the light of Bach and Chodat's views regarding the nature of the oxidases, the production of anti-bodies in the serum of animals as the result of the repeated injection of oxidases is probably due to the action of the peroxidase moiety of the oxidase and not to the oxygenase, since of these the former only seems to possess the properties of a ferment. Gessard's work is of such importance as to warrant confirmation, especially in view of the failure of von Fürth and Jerusalem (178) to obtain evidence of anti-tyrosinase, and the whole subject of anti-oxidases should be reinvestigated by means of Bach's peroxidase.

TYROSINASE.

It has long been known that on exposure to the air certain of the higher fungi turn pink or red and finally black, whereas other species become blue. We have already seen that the latter change is due to an oxidizing ferment, laccase. That the reddening and final blackening of other species of mushrooms is due to the action of a specific oxidase was first suspected by Bourquelot and Bertrand (89), who in 1896 pointed out the existence in certain mushrooms, such as the *Rassula foetens* Pers., of a very active oxidizing ferment, probably different from laccase. They (87, 88) then showed that the blackening of *Russula nigricans* differs from the bluing of *Boletus cyanescens* by reason of the fact that the blackening of the crystalline chromogen contained in the former species is not accomplished by the laccase of the sap of the lac tree, whereas the blackening is undoubtedly due to an oxidation, as indicated by the fact that if one does not agitate the aqueous extract of the fungus the blackening takes place first in the upper layers of the liquid, and during the blackening oxygen is absorbed. Continuing these investigations Bertrand (53) proved the crystalline chromogen of *Russula nigricans* to be tyrosin. He also found that the beet root and the tubers of the dahlia and potato, like certain of the higher fungi, also redden and then turn black on exposure to the air. This change he now definitely proved to be an oxidation of tyrosin by atmospheric oxygen under the influence of a specific oxidizing ferment, to which he gave the name *tyrosinase.* From the roots and tubers of certain plants, such as the beet and dahlia, he was able to obtain in crystalline condition as much as 0.5 gram of tyrosin from one quart of the expressed juice, an amount about corresponding to the solubility of the compound in pure water. The tyrosin thus obtained was identified by Hoffmann's or Piria's reactions, and its composition determined by analysis. He also isolated tyrosin from *Russula nigricans,* and in this connection Bourquelot and Harlay (90) give a drawing of a transverse section through the stipe of *Russula nigricans,* showing the rosettes of tyrosin crystals distributed more or less regularly throughout the tissue of the fungus. Bertrand also showed that the blackening of tyrosin is due to an oxidase and that this oxidase differs from laccase. Thus when a small amount of the aqueous extract of the russula, prepared in the cold, and a solution of tyrosin were brought together, the mixture became red, then inky black, and finally deposited a black precipitate. He showed that oxygen was absorbed at the same time; this was proved by simply allowing the tube in which the reaction was being carried out to remain quiet, whereby these color changes were first observed to occur on the upper surface of the liquid. In a vacuum or under a bell jar, resting in a watch glass on the surface of mercury, the mixture acquired a faint rose tint, since it was impossible to remove all traces of oxygen therefrom, but they showed no further deepening of color no matter what the duration of the experiment. With a boiled extract of russula no change of color was observed. A repetition of these experiments on the boiled juice of the beet, or with tyrosin of animal origin (from the horse), or of vegetable origin (from the dahlia or russula), or with the oxidase obtained from the beet or the dahlia, always led to the same results. Finally, in order to prove that the oxidation of tyrosin could not be accomplished by laccase, the following experiment was carried out: A certain amount of extract of russula was introduced into a vacuous flask, and then some tyrosin added. The flask containing these substances was then allowed to stand for twenty-four hours, at the end of which time no change of color had occurred. The contents of the flask were then heated to 100° C. for ten minutes in order to destroy all enzyme action. The flask was then opened and its contents exposed to the action of the air, but the tyrosin remained unaltered even after the addition of ordinary laccase. Hence the blackening of tyrosin is not due to the successive action of two ferments but solely to that of tyrosinase in the presence of oxygen. He then points out that independently of their special interest, these observations go to show that laccase is not the only oxidizing ferment existing in the vegetable world but that on the contrary, it should be regarded as a type of a series of analogous substances to which he had already given the generic name of *oxydases*. (See p. 54.)

While perhaps not so widely distributed in nature as laccase, tyrosinase has been found in a large number of plants and animal species. Bourquelot and Bertrand (87, 88, 89) found it in a large number of fungi, and also in phenogams. According to Lehmann (260) and Lehmann and Sano (261) tyrosinase is found in a number of species of bacteria, notably in *B. fluorescens nonliquefaciens*, and also in *B. phosphorescens*, *B. putridens*, and *Actinomyces chromogens*. As a general thing, wherever we find tyrosinase in plant tissues, we are apt to find laccase. The converse of this, however, does not hold generally—that is, we do not find tyrosinase wherever we find laccase. For example, in *Russula delica*, *Lactarius piperatus*, and in the tubers of the dahlia and potato, we find both tyrosinase and laccase, whereas in the silk of the green corn (*Zea mays*) we find laccase but no tyrosinase.

Tyrosinase is also widely distributed in the animal kingdom, where it plays an essential rôle in the formation of animal pigment (*melanogenesis*). The following are the more important investigations bearing on this point: The blackening (melanose) of the blood (hemolymph) of certain insects was made the subject of an investigation by Krukenberg (254) and also by Fredericq (176) as early as 1881. According to Fredericq, oxygen was responsible for this change of color, whereas, according to Krukenberg, it was probably due to carbon dioxide. Fredericq also made the interesting observation that the blood obtained from insects which previous to bleeding had been heated to 50–55° C. for fifteen minutes, showed no blackening on exposure to the air. Dewitz (138) has also shown that an oxidase, the precise nature of which was not investigated, plays an essential rôle in the metamorphosis of certain insects. As is well known, the larvæ of the fly are white during the entire life of this phase of the insect, and only at the moment of the formation of the pupa does any change of color take place. This color change begins in the abdominal cavity as two large colored spots.

Biedermann (67) seems to have been the first to obtain evidence of tyrosinase of animal origin. In his experiments the middle intestine (*Mitteldärme*) of three or four starving meal worms (*Tenebria molitor*) were placed in chloroform water. The light yellowish solution thus obtained was divided into two portions. To one portion a few drops of a solution of tyrosin was added, and both were kept over night in open watch glasses in a moist chamber. The portion containing the tyrosin had become violet black in color, whereas the portion to which no tyrosin had been added was only slightly darkened.

Von Fürth and Schneider (179) have also made important contributions to our knowledge of animal tyrosinase and its relation to animal pigmentation. The pupae of the butterfly, chiefly of the species *Deiciphila elpenor* and *euphorbiae*, furnished the material for their investigations. By careful puncture and squeezing, about one cubic centimeter of a clear, bright greenish-colored fluid was obtained from each pupa. This was the hemolymph, called for the sake of brevity the *blood* of the insect. On standing a few moments in the air this fluid began to darken on the upper surface, and after a time a black clot separated. On the other hand, if the proteid of the fresh blood be removed by boiling, it shows none of these color changes on standing in the air. When dried in vacuo over sulfuric acid, no change of color in the blood was observed. When a few drops of the fresh blood was added to a few cubic centimeters of a fresh solution of tyrosin, there appeared on the upper surface of the solution a violet-colored ring; this color gradually spreads through the solution until the whole of it is colored a dark violet, and is turbid through the separation of a fine and coarse flocculent precipitate. On the other hand, two drops of the fresh blood added to water gave a solution which showed none of the color changes, but ultimately gave a precipitate scarcely darker in color than that of the fresh blood. The diluted blood gave with tincture of guaiacum a dirty, dark bluish-green color after long standing, and also a positive reaction with Spitzer's para-phenylenediamin-α-naphthol reagent. It is therefore evident from these observations that the blood of these lepidoptera contains oxidases having the power of oxidizing guaiacum, Spitzer's reagent, tyrosin, and the chromogen of the blood itself. Attempts to purify the tyrosinase of the blood of lepidoptera by precipitation with uranyl acetate according to Jacoby (^{225}) failed. Von Fürth and Schneider were able to separate it from the chromogen and from the crystalline substances of the blood by fractional precipitation with ammonium sulfate. The ferment thus purified gave with tyrosin a violet-colored solution, which after a short time became dark violet and finally black. It was also found to produce coloring matter with pyrocatechin (yellowish red) and hydroquinone (red solution becoming turbid and finally showing a considerable brown precipitate); a carmine-red solution of an iron compound of suprarenin, the blood-pressure-raising compound of the suprarenals, became dirty brown in color, whereas the control experiment showed no alteration. Oxyphenyl-ethyl amin (Emerson) became yellowish brown and gave finally an olive-colored precipitate. On the other hand, it was found to have no action upon casein, indicating that the ferment is powerless to act on the tyrosin residues contained in proteid molecule. The nature of the black substance produced by the action of the tyrosinase of lepidoptera on tyrosin was also studied. Ten to twenty c. c. of a freshly prepared solution of the ferment, obtained from the lymph of from twenty to forty Deiciphila pupae, was brought together with a few decigrams of finely pulverized tyrosin and shaken vigorously in a shaking machine for four to six hours. In a short time the characteristic violet coloration appeared in the solution, and after a time a considerable black precipitate separated, leaving the supernatant fluid clear and colorless. With fresh quantities of tyrosin this gave no further coloration. This material was then filtered off and washed with water, then with dilute hydrochloric acid, then with hot water until chlorine free, and finally with alcohol and ether and dried to constant weight at 110° C. This black substance was found to be insoluble in water, alcohol, ether, and the common organic solvents and in dilute alkalis at room temperatures and in strong boiling hydrochloric acid. A small quantity of it melted with the purest sodium hydroxide from sodium gave rise to an unmistakable odor of indol and skatol. On analysis it gave the following numbers:

	Per cent.
C	55. 44
H	4. 45
N	13. 74

corresponding to the following atomic ratios:

$$N:H:C=1:4.55:4.77,$$

which is essentially the same as that obtained by Hofmeister for a whole series of pigments ordinarily called *Melanine,* to which belong the dark pigment of the hair, and of the skin, the choroid coat, melanotic tumors, sepia black, and certain split products of proteids, such as Schmiedeberg's melanine acid (melanin saüre). In its physical properties, solubility, etc., and in its tendency to yield substances having a skatol-like odor, on melting with alkali, it agrees closely with the melanins, and with a pigment obtained by Ducceschi (149) by oxidizing tyrosin with potassium chlorate in hydrochloric acid solution. For other analyses of the black pigment of hair and feathers, see Hodgkinson and Sorby (213).

According to these authors (von Fürth and Schneider) tyrosinase in its occurrence in the animal kingdom is by no means limited to the insects. They have also obtained it from the blood of the crawfish (*Flusskrebse*), and by refined methods it would doubtless be possible to recognize tyrosinase in the most widely differing classes of animals. Acting upon their suggestion, Przibram, of the zoological station at Trieste, found tyrosinase in the ink sac of the cuttlefish, *Sepia officinalis.* An extract of the washed epithelial lining of the sac gave with a solution of tyrosin first a very beautiful orange-yellow color, changing to sepia brown, and finally yielding a black precipitate. Von Fürth and Schneider are therefore of the opinion that probably wherever melanotic pigments occur in the living tissues of the lower and higher animals they originate as the result of the action of appropriate enzymes on substances of aromatic nature. They point out in this connection that Salkowski and Jacoby have shown independently that tyrosin results from the autolysis of various animal tissues. It would seem likely therefore that in the formation of melanotic pigments two ferments are jointly concerned, one, an autolytic ferment capable of splitting off tyrosin or a similar aromatic complex from the protein molecule, and the other tyrosinase, which transforms the tyrosin into melanin. To determine whether tyrosinase occurs in melanotic tumors offers an interesting and important field for further investigation.

Gessard (184) has obtained tyrosinase from the glands of the ink sac of the cuttlefish (*Seiches*) and calamary (*Calmar*), and in 1904 this same author (190) showed that the coloration of the integument of the green fly (*Lucilia Caesar* L.) is due to the action of tyrosinase. The larvæ of the fly are white, and from them this author was able to obtain tyrosin in crystalline condition, as well as to demonstrate the presence of tyrosinase. In the course of their metamorphoses these larvae exhibit a succession of colors similar to those shown by a solution of tyrosin when acted on by tyrosinase, until finally the insect attains the full iridescent green color of the fly. When the white pupae are kept in a vacuum the ferment is inactive and they remain white. These facts serve to corroborate the hypothesis that tyrosinase is responsible for the production of cutaneous pigments in man and animals.

In order to demonstrate the presence of tyrosinase, the ink sac (glande du noir) of the cuttle fish was removed and macerated with chloroform water and filtered through a Chamberland filter. Under these conditions the fine granules of pigment are retained by the filter and a clear solution of the ferment is obtained which exhibits the same color changes with tyrosin as is shown by an extract of russula. Gessard was also able to demonstrate the presence of tyrosinase in the commercial product known as *sepia envessie*—crude sepia. This is simply the dried gland with its contents and is employed in the preparation of the refined coloring matter of the same name, sepia. In the course of this investigation he also showed that the anti-tyrosinase serum (182) obtained by the repeated injection of a rabbit with vegetable tyrosinase is powerless to hinder the action of the animal tyrosinase on tyrosin, indicating that, despite the similarity of the two varieties of tyrosinase in their action on tyrosin, they are not precisely alike in all respects. (See also Gessard, [183].)

Similarly in his studies on the formation of the melanotic pigments in tumors of the horse, this author (184) calls attention to the fact that a general chemical and physical relationship has long been recognized as existing between the black pigments of the eye and skin and that of the cuttle fish (Seich) and other molluscs. It is quite likely, therefore, that our knowledge of the formation of this pigment in the case of the cephalopods will hold equally well for its production in other animals. The abnormal production of melanotic pigments in healthy or diseased tissues of man is rare, but more common in those of the horse, in which case its production is of less formidable significance. Melanotic tumors are especially common on the white horse, and these furnished the material for Gessard's investigations. He has found that in the production of the melanotic pigment of such tumors the same agencies are at work as in its production in the ink sac of the cuttle fish, viz, a chromogen and an oxidizing ferment. From such tumors he was able to obtain tyrosin by appropriate methods, in crystalline condition, and aqueous extracts thereof were found to give with tyrosin the color changes characteristic of tyrosinase. The author concludes therefore that tyrosin is the chromogen whose oxidation by tyrosinase gives rise to the pigment in melanotic tumors and wherever else such pigments are met with in the animal economy. He is also of the opinion that the color of the negro is due to the reaction which gives rise to production of the ink of the cuttle fish (Seiche) and the black pigment of mushrooms. While such is doubtless the case, we are still a long way from an understanding of the physiological cause which gives rise to tyrosinase in the epiderm tissues of the negro and the lack of its general production in the epidermal tissues of the white races under normal conditions. The fact, however, that melanotic pigments are formed over limited areas in the dermal structures of white-skinned races indicates that the same causes of pigmentation may be operative in all races to a greater or less degree and serves to emphasize the importance of further studies on the mode of action of tyrosinase and its mode of origin in animal tissues.

The occurrence of tyrosinase in the skins of certain pigmented vertebrates has been investigated by Miss Florence M. Durham (155). Aqueous extracts of the skins of rabbits, rats, guinea pigs, and chickens in the fœtal stage of development, containing small amounts of ferrous sulfate, were found to act upon tyrosin with the production of pigments similar in tint to those characteristic of the coat of the animal. Thus black pigments were formed with extracts of the skins of black-pigmented animals, and yellowish pigments with those of the skins of animals containing orange-colored pigments, and with extracts of the skins of white or albino animals no pigments were formed by the action of an extract of the skin on tyrosin. The tyrosinase present in the skins of animals was found to act most rapidly at 37° C. It is destroyed by boiling and does not act in the cold. From one to ten days were required for the production of the pigment in vitro. Another peculiarity of the tyrosinase contained in the skins of animals is that it only acts upon tyrosin in the presence of small amounts of iron.

Phisalix (321) has obtained tyrosinase from the skin of the green frog and Gessard (188) has found it in the skins of frogs of other species, such as the frog rousse and the common toad. More recently Phisalix (322) has investigated the color changes occurring in the larvæ of the cockroach (*Phyllodromia germanica*). Immediately after hatching from the egg the integument of the larva is soft and bright white in color. In the course of a short time, however, it becomes grey, then brown, and finally black, so that three hours after hatching the little cockroach is entirely black. According to this author this change of color is the result of the action of tyrosinase on tyrosin, both of which occur in the embryo at the moment of its development; indeed, it is probable that they are both present in the egg in which they are deposited at the time of ovagenesis.

Still more recently a very valuable contribution to our knowledge of melanotic pigments and fermentative melanine formation has been made by Von Fürth and Jerusalem (178). These authors have compared hippomelanin (the black pigment produced in tumors of the horse) with other natural and artificial melanins, both as to mode of formation and general physical and chemical properties. They find hippomelanin to be iron free and are inclined to look upon its sulfur content as of accessory nature. In its physical properties, general chemical conduct, and decomposition products, hippomelanin shows a close resemblance to the artificial melanin produced by the action of tyrosinase on tyrosin, whereas it differs in certain respects from other melanins and epidermal pigments and the pigment phymatorhusin of malignant melanotic tumors. Up to the present, according to these authors, the chemical investigation of hippomelanin has disclosed no fact at variance with the well-established hypothesis of the fermentative origin of melanin as the result of the action of tyrosinase on the cyclic complexes resulting from the degradation of the protein molecule.

The principal sources of vegetable tyrosinase are certain of the higher fungi, especially many species of russula, such as the *Russula delica* (Bourquelot and Bertrand, (87, 88, 89), *Agaricus melleus* and *Agaricus campestris* (Von Fürth and Jerusalem, 178), and wheat bran (Bertrand and Mutermilch, 65). The ink sac of the cuttle fish (*Sepia officinalis*) and the hemolymph of the pupæ of *Deiciphila euphorbiæ* (178, p. 161) are the chief sources of animal tyrosinase. In order to obtain a solution of tyrosinase from *Russula delica* it is only necessary to macerate the fresh fungus with chloroform water or with glycerin, or, as recommended by Bach (24), the tyrosinase of *Russula delica* may be precipitated from the aqueous extract of the fungus by means of 96 per cent alcohol. Young, sound fungi are ground in a sausage machine and 300 c. c. of the clear expressed juice is poured into 1.5 liters of 96 per cent alcohol. The precipitate thus formed is filtered off by means of a filter pump, washed with alcohol, and dried in vacuo over calcium chloride. The dried precipitate is now mixed with 300 c. c. of water, whereby only a small amount of the material goes into solution. The mixture is then filtered, an entirely colorless solution of tyrosinase being obtained.

In this connection Bach (24) has observed that the activity of the tyrosinase solutions depends on the age and state of preservation of the fungus. Thus from three lots of the fungus (I, young, unblemished fungi; II, older, more or less injured fungi; and III, putrid fungi) he obtained aqueous extracts, equal amounts of which acting on the same quantities of tyrosin, required the following quantities of 0.002 N. permanganate:

I.	II.	III.
37.8 c. c.	13.6 c. c.	8.3 c. c.

The residue was then dried in vacuo or at once dissolved in 100 c. c. of chloroform water, in which case it was used at once, since aqueous solutions of the ferment are very unstable. By this mode of preparation the tyrosinase is separated from the catalase which the fresh aqueous extracts of this fungus contain. These authors have found that tyrosinase is easily destroyed or rendered inactive by alcohol, and hence if the ferment is prepared by this method it is necessary to filter off the alcohol as soon as practicable.

In order to prepare tyrosinase from the ink sac of the cuttle fish, Gessard (184) macerated the ink sac with chloroform water and filtered through a Chamberland filter. A clear solution was thus obtained which gives with tyrosin the same color changes as those shown with an aqueous extract of *Russula delica.* In the preparation of the animal tyrosinase employed in their latest investigations Von Fürth and Jerusalem (178) employed the hemolymph of the pupae of *Deiciphila euphorbiae.* This was half-saturated with ammonium sulfate, and the washed and pressed precipitate thus obtained dissolved in 0.04 per cent soda solution. This solution exhibited strong tyrosinase reactions.

In order to obtain the ferment from wheat bran, Bertrand and Mutermilch (65) recommend the following method: One part of wheat bran is mixed with four parts of water and the mixture allowed to stand for several hours. The mixture is then centrifugalized, and the solution thus obtained is mixed with three volumes of 95 per cent alcohol and again centrifugalized. The precipitate is then washed with 80 per cent alcohol, mixed with distilled water, and again centrifugalized. The solution thus obtained is then mixed with three to four times its volume of alcohol, and the precipitate thus formed is collected, washed with strong alcohol, and dried in vacuo over sulfuric acid. The substance thus obtained, the yield of which is about 0.8 per cent, contains no laccase. On the other hand, when dissolved in water and filtered through a Chamberland filter, a clear solution is obtained which of itself undergoes no alteration on exposure to the air. On the addition of small amounts of tyrosin, however, it passes rapidly through a succession of colors—rose, cherry red, and finally, brownish black. On the other hand, if all gaseous and dissolved oxygen be removed, or if the filtered solution be heated to 100° C. for five minutes, no coloration with tyrosin is observed.

In the preparation of vegetable tyrosinase from *Agaricus melleus,* Von Fürth and Jerusalem (178) rubbed up two kilograms of the fungus with sand, and extracted the mass with two liters of chloroform water. After two or three hours the supernatant liquid was poured off and mixed with twice its volume of 96 per cent alcohol. The precipitate was filtered off on raw silk.

All observers seem to be agreed that tyrosinase is a true enzyme. Thus it appears to conform to Portier's (330) definition of an oxidizing ferment, according to which, first, gaseous or dissolved oxygen is necessary for its action; second, its action is accompanied by a notable absorption of oxygen; third, it is destroyed by heat; and, fourth, it is nondialyzable.

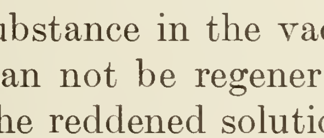
Miss Durham (155) found that after filtering off the pigment produced by their action upon tyrosin, the preparations of animal tyrosinase could act upon fresh portions of tyrosin. According to Bertrand (59) tyrosinase is more easily destroyed by heat than laccase; thus he found the former to be destroyed in twelve minutes at 60–70° C., whereas laccase withstood this temperature for twenty hours. Gessard (182) found tyrosinase to be almost destroyed by heating to 65° C. for thirty seconds. Chodat and Staub (117) observed the activity of tyrosinase to increase with a rise of temperature to 61° C., and to become inactive at 61° C. Advantage has been taken of this difference in the stability of tyrosinase and laccase toward heat in the separation of the two enzymes, and tends to show that these two oxidases are different ferments. Thus *Russula delica* contains both tyrosinase and laccase. If now, according to Bertrand (54) the fungus be macerated with its own weight of chloroform water and the liquid thus obtained be treated with alcohol in the proportion of three volumes of alcohol to two volumes of extract, a precipitate is obtained which gives the reactions of tyrosinase. If now the filtrate be evaporated at 50° C. to one-tenth of its original volume, it will be found to act energetically on hydroquinone and pyrogallol, but to be without action on tyrosin. In other words, the filtrate that has been subjected to a temperature of 50° C. for some time still contains laccase, but no tyrosinase. Similarly Bach (25) has obtained laccase free from tyrosinase from the fungus *Lactarius vellereus* by heating to 75° C. Miss Willcock (451) has shown that tyrosinase is not killed by the radium emanation.

Kastle has observed that glycerin extracts of *Lactarius piperatus* and *Lactarius volumen* oxidize tyrosin strongly after having been kept four years in glass-stoppered bottles under ordinary laboratory conditions.

Like many other enzymes, tyrosinase is sensitive to the action of acids, alkalies, salts, and certain poisons like hydrocyanic acid. Thus Wolff (459) finds that the tyrosinase from *Russula delica* is most active on tyrosin when the solutions are neutral to phenolphthalein. Similarly Abderhalden and Guggenheim (1) find that N/100 hydrochloric acid inhibits the action of tyrosinase, and that N/100 sodium hydroxide retards it considerably. After treatment with acid or alkali, neutralization of the acid or alkali fails to restore it to its original activity, indicating that the ferment is actually destroyed under these conditions. Gessard (182) found that while salts of the metals promote the coagulation of the black pigment, they hinder the development of the initial coloration, the retardation being proportional to the quantity of salt present. Neutral salts were found to produce a retardation ranging from twenty-three minutes to nine days, and alkaline carbonates prevented the development of the color for seventeen days. Even egg albumin and blood serum were found to retard the action of the ferment.

The changes of color produced by the action of tyrosinase on tyrosin have been carefully studied by Gessard (183). According to this author, when tyrosinase is added to an aqueous solution of tyrosin, oxygen is absorbed and the liquid takes on a rose color which gradually becomes reddish yellow, rapidly changing to mahogany red and then to garnet. He also observed the most marked coloration in the upper layers of the liquid, due to immediate contact with the air. Continuing these studies, Gessard (189) observed the coloration of tyrosin by tyrosinase to consist of two distinct phases, the first of which alone, viz, the change to rose and then to red, is, according to this author, attributable to the ferment. After a certain interval, depending on general conditions, the solutions acquire a violet color, and finally yield a black precipitate (melanine), leaving the supernatant fluid perfectly colorless. When, for example, the red liquid resulting from the action of tyrosinase upon tyrosin is exposed to a vacuum, it slowly becomes colorless. Now, on exposure to the air, the decolorized solution acquires a violet instead of a red color. Hence, a new substance has been produced by the reduction of the first substance in the vacuum, from which the first substance apparently can not be regenerated. The substance thus obtained by exposing the reddened solutions of tyrosin to a vacuum has been found to be very oxidizable and is characterized by its yielding a violet solution on oxidation, the coloring matter showing a great tendency to separate from the solution in the form of a black precipitate. The production of the violet compound as the result of the action of tyrosinase on tyrosin is also facilitated by the presence of certain salts, a fact which would probably explain the production of the black compound under natural conditions.

Aside from the fact that melanines are formed by the oxidation of tyrosin through the agency of tyrosinase, but little is known as to the precise mechanism of the process. According to Gonnermann (195), homogentisic acid, hydroquinone-acetic acid—



$$C_6H_3\begin{cases}(OH)_2\\ CH_2COOH\end{cases}$$

is the principal product resulting from the action of tyrosinase on tyrosin in the presence of oxygen. According to this author, tyrosinase is not an oxidizing but a hydrolytic ferment, and his conception of the process is that the homogentisic acid produced by the action of tyrosinase on tyrosin in the presence of air results from the spontaneous oxidation of an unknown product of the hydrolysis of tyrosin by tyrosinase and not from the direct oxidation of the tyrosin, through the agency of the ferment. This view of the mode of action of tyrosinase has recently been disproved by Bach ([25]), who has shown that tyrosinase does not produce black pigments from mixtures containing such substances as might be produced by the hydrolysis of tyrosin, such as phenol + d + l serin, hydroquinone + alanin, p-cresol + oxyamino-acetic acid, and p-oxy-benzyl alcohol + glycocoll.

Gonnermann's hypothesis respecting the mode of action of tyrosinase has also been refuted by Chodat and Staub ([117]). The results of their experiments in an atmosphere of carbon dioxide show clearly that oxygen is required for the process and that the action of the ferment is not simply the production of an easily oxidizable substance by the hydrolysis of tyrosin.

We have seen that according to Gessard ([181, 189]), the action of tyrosinase on tyrosin consists of two distinct processes, first, the oxidation of tyrosin to a red substance, and, second, the condensation of the red substance to a black product (melanine). The oxidation can be accomplished either by tyrosinase in the presence of air, or by a chemical oxidizing agent such as Millon's reagent, whereas, for the condensation of the red substance into the black pigment, the action of the mineral salts contained in the tyrosinase are necessary. This hypothesis respecting the mode of action of tyrosinase has recently been refuted by Bach ([25]). In order to throw further light on this subject, he prepared an active solution of tyrosinase and heated it to boiling. After cooling, tyrosin was added to the solution, and 20 c. c. portions of it were placed in four reagent glasses. To the first of these there was then added 5 c. c. of water, to the second 2 c. c. of 1 per cent hydrogen peroxide and 3 c. c. of water, to the third 2 c. c. of 1 per cent hydrogen peroxide solution, 2 c. c. of a peroxidase solution, and 1 c. c. of water, and to the fourth a solution of an oxidase prepared by heating an extract of *Lactarius vellereus* to 75° C. to destroy the tyrosinase. These tests remained colorless for weeks, indicating that the oxidation of tyrosin by tyrosinase is not referable to the inorganic substances which it contains. Bach also sought in vain for a co-ferment of tyrosinase among plants. He concludes, therefore, that the oxidation of tyrosin only takes place through the action of peroxidases, hydrogen peroxide, plant juices, or ferment preparations when the preparation itself is active to tyrosin, that is, when it contains tyrosinase. Indeed, it would seem from his most recent utterances on the subject that Bach (ibid.) is inclined to look upon the action of tyrosinase as completely different from that of the common oxidases (peroxidase + hydrogen peroxide). Tyrosinase, he says, belongs to a peculiar class of oxidizing ferments, whose oxidizing action is exerted upon substances containing slightly labile hydrogen.

Formerly all observations upon the action of tyrosinase were qualitative in character, being confined to rather crude and indefinite color comparisons. Recently, however, three quantitative methods for determining the quantity of pigment resulting from the action of tyrosinase on tyrosin have been proposed. These are (1) a spectrophotometric method, (2) a sedimentation method, and (3) a volumetric method by means of a 0.002N solution of potassium permanganate. The first two methods were proposed by Von Fürth and Jerusalem (178). For details concerning these methods and the use of the instrument, with which the writer is not familiar, the original article may be consulted. In this connection see also Mörner (307). The second method of Von Fürth and Jerusalem (178) depends upon the sedimentation of the pigment by boiling with a small amount of calcium chloride. After boiling a short time the beakers or tubes containing the substances are allowed to stand, when the black pigment settles out, leaving the liquid clear. The clear supernatant liquid is then poured off and the residue washed with water and transferred to a graduated centrifuge tube by means of water, centrifuged and measured. The third method was first employed by Bach (23), and depends upon the fact that the brown pigment formed by the action of tyrosinase on tyrosin can be oxidized by a dilute acid solution of permanganate, 0.002N, to a colorless compound. Hence in order to determine the quantity of pigment produced in a given time by the action of tyrosinase on tyrosin, the black mixture is titrated with 0.002N permanganate, after the addition of sulfuric acid, until the color of the titer disappears.

Of the three methods, Bach's is the simplest and commends itself most strongly to chemists. It requires no special apparatus, and by its use he (Bach) obtained far more regular and generally concordant results than Von Fürth and Jerusalem were able to obtain with the spectrophotometric and sedimentation methods. (See Bach [24]).

THE KINETICS OF MELANINE FORMATION BY TYROSINASE.

The quantitative methods devised by Von Fürth and Jerusalem (178) and by Bach (23) have already been utilized by these observers and also by Chodat and Staub (117) in studying the kinetics of the tyrosinase process. According to the latter the velocity of the reaction at small concentrations is proportional to the quantity of ferment present. At greater concentrations the rate of the reaction has been found equal to the algebraic expression, $Kc + b$, in which c is the concentration, and K and b are constants. Von Fürth and Jerusalem (supra) have investigated the effect of temperature, quantity of ferment, and the influence of hydrogen peroxide, alkalinity, and inorganic catalyzers on the kinetics of melanine formation by vegetable and animal tyrosinase.

Von Fürth and Schneider (179) found the tyrosinase of insect blood to be exceedingly sensitive to the prolonged action of high temperatures. Thus a long exposure to 30° C. is sufficient to inhibit the action of the ferment. In order to determine the effect of temperature on the action of vegetable tyrosinase (from *Agaricus melleus*) Von Fürth and Jerusalem prepared four tubes, each of which contained 4 c. c. of the tyrosinase solution, 60 c. c. of an alkaline solution of tyrosin, and 2 c. c. of 3 per cent hydrogen peroxide. These tubes were labeled *a*, *b*, *c*, and *d*; *a* was kept at 5°–7° C., *b* at room temperature, *c* at 40° C., and *d* at 55° C. At the end of half an hour *a* and *b* were not noticeably altered in appearance; *c* was darker, and *d* was the darkest in color. The next morning *a* and *b* were colored black, *c* was lighter, and *d* was the lightest in color. The quantities of melanine in the four tubes as determined by the spectrophotometric method were found to stand in the following ratio:

$$a = 1.29;\ b = 0.55;\ c = 0.42;\ \text{and}\ d = 0.22.$$

These authors conclude, therefore, that so far as the influence of temperature on the production of melanine by the action of tyrosinase is concerned, two opposing processes are at work, viz, the accelerating effect of temperature common to all chemical reactions and the destructive action of temperature on the labile ferment. The result is that the process reaches an equilibrium between 30° to 50° C., and that between 60° and 65° C. the ferment ceases to act on the tyrosin. The effect of small amounts of hydrogen peroxide is to increase the quantity of melanine produced by tyrosinase in a given time, whereas larger quantities of the peroxide exert a retarding effect on the process. Roughly, the quantity of melanine formed by the action of a given amount of the ferment acting under the same conditions was found to be proportional to the concentration of the tyrosin. Within narrow limits of concentration (0 to 10 c. c. of 0.04 per cent sodium carbonate solution in a total dilution of 27 c. c.) the effect of alkali was found to be practically negligible. Within certain limits the quantity of melanine formed increases with increase in the concentration of the fungus tyrosinase. Thus the effect of doubling the quantity of ferment was to cause an increase in the production of melanine from 1.0 to 1.4. On the other hand, the addition of further amounts of the ferment caused no increase in the production of melanine; in fact, a slight diminution in the quantity of melanine occurred, indicating that increasing quantities of the ferment above certain limits cause a retardation of the process.

With animal tyrosinase (from the hemolymph of *Deiciphila euphorbiae*) the rate of melanine formation was considerably increased by an increase in the quantity of hydrogen peroxide present, but in the end very nearly the same amounts of melanine were produced in all cases. Acids, even the weakest, were found to prevent the action of animal tyrosinase, while the effect of the addition of small amounts of alkali is to cause a distinct increase in the activity of the ferment. Of the metallic catalyzers tested, viz, 1 per cent solutions of the sulphates of manganese, iron (ferrous), copper, and nickel, only manganese was found to increase the rate of production of the melanine by animal tyrosinase. With the animal tyrosinase much greater increases in the quantities of melanine produced resulted from increases in the quantities of ferment; in other words, while the further addition of animal tyrosinase over and above a certain amount caused no corresponding increase in the quantity of melanine produced, no distinct hindrance of the process, such as that brought about by large amounts of vegetable tyrosinase, was observed.

As already indicated in the above, Bach's (23) permanganate method for the determination of melanine has yielded more concordant results in the study of the kinetics of melanine formation by tyrosinase than any that have been employed up to the present time. Without going into details, this author (24) has shown that in the production of melanine from tyrosin, tyrosinase undoubtedly obeys the law of mass action, the departures therefrom observed during the later phases of the reaction being due to the fact that the activity of the ferment becomes more or less exhausted during the course of the reaction, this exhaustion being the more rapid the greater the concentration of the ferment or substrat; that is, the greater the velocity of the reaction.

THE ACTION OF TYROSINASE ON VARIOUS AMINO COMPOUNDS, ESPECIALLY THE PRODUCTS OF PROTEIN DEGRADATION.

It has been pointed out that laccase is not specific as an oxygen carrier, but that it can effect the oxidation of various easily oxidizable substances such as guaiacum, guaiacol, hydroquinone, phenolphthalin, etc. The question naturally suggests itself in this connection, Is the action of tyrosinase confined to tyrosin or can it likewise accomplish the oxidation of other aromatic amino compounds? The earlier workers in this field were doubtless inclined to look upon it as specific in its action on tyrosin. Thus vegetable tyrosinase (from *Russula delica*) was employed by Bougault (72) as a reagent for the detection of tyrosin in various animal products, and by Harlay (206) for the detection of tyrosin in the products of the pancreatic digestion of fibrin, and also in the products of the proteolysis in germinating grain. With the products of the pancreatic digestion of fibrin, tyrosinase gives a reddish brown color (tyrosin); with the products resulting from the peptic digestion of fibrin, Harlay found the extract of russula to give a green color. This indicates, of course, the absence of tyrosin, but it also indicates that tyrosinase can act upon substances other than tyrosin. During the last few years this conduct of tyrosinase toward a large number of aromatic amino compounds has been studied, including the optical isomers of tyrosin, and also the effect of various amino compounds and other substances on the action of tyrosinase on tyrosin. Thus it has been found by Bertrand and Rosenblatt ([66]) to act equally well upon racemic and laevo-tyrosin. They found the tyrosinase from *Russula queletti* Fr., to give equal amounts of melanine with (d+l) and l-tyrosin, in a given time, without any separation of the racemic compound into its optically active components. According to Chodat and Staub ([117]) albumoses do not give a red color with tyrosinase. Such a coloration is produced by the action of tyrosinase on glycyl-tyrosin anhydride, indicating that possibly other peptids may give the reaction. In a continuation of their researches on the action of tyrosinase on the products of protein degradation, these authors ([118]) have observed that the oxidation of tyrosin by tyrosinase is diminished by certain amino acids, such as glycin, leucin, and alanin. They have found tyrosinase to act upon certain dipeptids, such as tyrosin anhydride, and glycyl-tyrosin anhydride, giving rise to yellow substances which do not become black, as does tyrosin itself. When, however, an amino acid, such as glycin, leucin, or alanin, is present, a red coloration similar to that resulting from tyrosin is obtained. Thus, a mixture of glycyl-tyrosin anhydride with glycin gives with tyrosinase a rose color, changing to bluish green; with alanin it gives a deeper red, and with leucin a deep brown color. Phenyl-alanin is not acted on by tyrosinase. These observers conclude, therefore, that the action of the ferment does not depend altogether upon the presence of a benzene nucleus in an amino acid. They have also found that tyrosinase acts readily on p-cresol, less readily on m-cresol, and still less readily on o-cresol. As a rule they have observed tyrosinase to act most readily on the homologues of phenol, in which the side chains occupy the para- position, and in this respect the ferment seems to differ essentially from Millon's reagent, which is apparently specific for benzene compounds containing one hydroxyl group, especially meta derivatives. According to Chodat and Staub (supra) the action of tyrosinase on p-cresol serves to distinguish the ferment from laccase. The addition of glycin or another amino acid greatly increases the rapidity of its action on p-cresol, giving rise to violet color which ultimately becomes blue with a reddish fluorescence. These authors conclude that tyrosinase may be employed as a reagent for tyrosin and that with the addition of amino acids, the ferment may also be employed to detect peptids containing tyrosin residues in the products of the digestion of protein.

Bertrand ([62]) in his recent researches on melanogenesis, has also studied the action of tyrosinase from wheat bran on various compounds analogous to tyrosin. With phenyl-alanin, phenyl-ethyl-amin, phenyl-methyl-amin, phenyl-amino-acetic acid, phenyl-propionic acid, phenyl-acetic acid, alanin and glycocoll, no coloration was observed. On the other hand, compounds containing phenolic hydroxyl were oxidized with the production of characteristic colors, as may be seen from the following table:

Name of compound.	Color produced with tyrosinase.
Tyrosin	Grenadine-red; then inky black.
p-hydroxy-phenyl-ethyl-amin	Grenadine-red; then olive-black.
p-hydroxy-phenyl-methyl-amin	Orange-yellow, orange-red, clear maroon.
p-hydroxy-phenyl-amin	Orange, mahogany-red, brown.
p-hydroxy-phenyl-propionic acid	Orange-yellow, grenadine-red, brown.
p-hydroxy-phenyl-acetic acid	Yellow, orange-yellow, brown.
p-hydroxy-benzoic acid	Rose, orange, yellow.
p-cresol	Yellow, orange, red.
phenol	Yellow, orange, red, brown.

He concludes, therefore, that only substances containing phenolic hydroxyl are oxidized by tyrosinase. He found that polypeptids are not colored exactly as is tyrosin, but become first yellow, then orange, and then mahogany-red, without the production of any precipitate. He concludes, therefore, that if in these polypeptids there were previous splitting into tyrosin and other products, one should obtain the same coloration as with tyrosin, since glycocoll in the proportion ordinarily found would not modify the action of the tyrosinase on tyrosin. In his opinion, it is necessary to separate the chromogen in pure condition in order to properly identify it by means of tyrosinase.

The action of tyrosinase from *Russula delica* on tyrosin, tyrosin-containing polypeptids, and certain other compounds, under various conditions, has also been studied by Abderhalden and Guggenheim.(1) According to these authors glycocoll, d-alanin, d-valin, l-prolin, d-serin, d, l-iso-serin, l-phenyl-alanin, l-aspartic acid, and d-glutaminic acid are without effect on the action of tyrosinase on tyrosin, except in so far as they influence the rapidity of the development of the color. Aspartic and glutaminic acids were found to inhibit the action, as did also the other amino acids, especially if present in strong solution. The action of tyrosinase was also tried on the following substances: l- and d-tyrosin, di-iodotyrosin, l-phenyl-alanin, homogentisic acid, l-tryptophane, skatol, indol, l-prolin, and cystine. Of these, homogentisic acid and tryptophane were the only substances except tyrosin to show a color change with the ferment. On the other hand, polypeptids containing tyrosin residues were colored by tyrosinase, the color being modified to some extent by the nature of the amino acid combined with the tyrosin in the polypeptid. Halogen derivatives of the polypeptids were not acted upon. The action of tyrosinase on a polypeptid containing tyrosin was modified to some extent by various amino acids. Thus the action was greatly accelerated by l-prolin, whereas it was retarded by aspartic and glutaminic acids. Prolin was found to act especially energetically in augmenting the action of tyrosinase on glycyl-l-tyrosin anhydride. They also found tyrosinase to act on phenol, giving a brown color, and here again the color produced by the action of tyrosinase was modified by amino acids. Thus glycocoll and phenol gave a cochineal color, and prolin and phenol gave a violet reaction. These authors conclude that the character of the pigment resulting from the action of tyrosinase on tyrosin is dependent upon the combination in which the tyrosin exists. In the free state it is colored differently from what it is when in the anhydride or in the polypeptids. The amino acids when present apparently take part in the production of the pigment. In a later communication (2) these authors point out that tyrosinase acts rapidly on d-alanyl-l-tyrosin, and on l-leucyl-l-tyrosin. They also found it to act on adrenalin with the rapid production of a red color and ultimately dark red flocculi. It was also found to act on the three optical isomers of adrenalin with equal rapidity.

ON THE NATURE OF TYROSINASE.

Bach and Chodat (28) (see p. 118–120) have shown that laccase is composed of two distinct substances, an oxygenase—that is, a substance which forms a peroxide by taking up of oxygen and which is replaceable by hydrogen peroxide,—and a peroxidase, which activates this peroxide or the hydrogen peroxide added. According to this conception, the system, peroxidase + hydro-peroxide, is to all intents and purposes identical with the oxidases in its general behavior toward readily oxidizable substances. The question, therefore, naturally suggests itself in this connection, Is tyrosinase similarly constituted? In other words, Is this oxidase composed of a specific peroxidase and an oxygenase, and can other peroxides, such as hydrogen peroxide, take the part of the oxygenase in tyrosinase oxidations? Bach (21) has attempted to answer these questions. According to this observer, tyrosinase contains a peroxidase and an oxygenase, and it is to the former that it owes its specific power to oxidize tyrosin and similarly constituted substances, since hydrogen peroxide may be employed in the place of the oxygenase contained in tyrosinase in accomplishing the oxidation of tyrosin. Thus he observed that a fresh aqueous extract of young potato tubers rapidly oxidizes and blackens a solution of tyrosin, whereas if the expressed juice of finely ground new potatoes be allowed to stand for twenty-four hours with one-tenth of its volume of strong alcohol in order to remove mucilaginous substances, and the filtrate therefrom be mixed with four times its volume of absolute alcohol, there is obtained, after filtering and drying in vacuo over calcium chloride a dark-grayish mass, which on treatment with water dissolves only in part. After treatment with water and filtering, a perfectly clear and colorless solution is obtained, which shows strong peroxidase reactions, but weak oxygenase reactions, and which only acts upon tyrosin after standing from thirty-six to forty-eight hours. In other words, by the action of alcohol, the activity of the potato tyrosinase has been greatly weakened, a fact which is in harmony with Bertrand's earlier observations on the tyrosinase contained in *Russula delica.* According to Bach, it is weakened for the reason that the oxygenase moiety of the ferment has been destroyed by the alcohol. He therefore sought to restore it to its original activity by the addition of small amounts of hydrogen peroxide. As a matter of fact, the weak tyrosinase solutions which only oxidize the tyrosin after thirty-six to forty-eight hours, become dark brown in one hour after the addition of small amounts of hydrogen peroxide. Bach concludes, therefore, that the specific character of tyrosinase lies in the specific nature of its peroxidase.

On the other hand, R. Chodat and Staub (118) found that hydrogen peroxide not only did not accelerate the action of tyrosinase on tyrosin, but actually retarded it. As Bach pointed out in his first communication on the subject (21), however, tyrosinase is very sensitive to the action of hydrogen peroxide, and it is necessary to work with very dilute hydrogen peroxide in order to demonstrate the accelerating effect. Von Fürth and Jerusalem (178) have also observed that small amounts of hydrogen peroxide materially accelerate the action of tyrosinase, whereas with larger amounts of the peroxide the reaction is retarded.

More recently Bach (23) has been able to accelerate the oxidation of tyrosin by weak tyrosinase from *Russula delica* by means of hydrogen peroxide. As already pointed out under the preparation of tyrosinase (see p. 74), he prepared aqueous extracts of the ferment from three lots of the fungus (I, from fresh, unblemished fungi; II, from older, more or less damaged fungi, and III, from putrid fungi). Portions of these original extracts were diluted ten times with water, and 10 c. c. of the diluted extracts were mixed with 10 c. c. of a tyrosin solution containing 0.05 per cent of tyrosin and 0.04 per cent of sodium carbonate, and 30 c. c. of water added. After standing twenty-four hours, 1. c. c. of 10 per cent sulfuric acid was added, and each solution was titrated with 0.002 N potassium permanganate to complete decolorization. The quantities of permanganate required to decolorize, and the original colors resulting from the action of the tyrosinase, were as follows:

	Number of extract.		
	I.	II.	III.
Appearance before titration	Deep black; black sediment.	Violet black.	Dark brown.
Permanganate required ... c. c.	37.8	13.6	8.3

In order now to determine the effect of hydrogen peroxide on each of these extracts, similar experiments were carried out, except that to each solution 1 c. c. of 0.05 per cent solution of hydrogen peroxide was added to each of the tests. After standing twenty-four hours the three solutions were titrated with 0.002 N permanganate, with the following results:

	Number of extract.		
	I.	II.	III.
Permanganate required ... c. c.	37.3	26.7	23.2

It is evident from these results that the weaker the tyrosinase the greater the accelerating effect of hydrogen peroxide on its activity. After a few days extract No. I had become acid in reaction, and was slimy and brown and not in a condition to be filtered. In order, therefore, to neutralize the acid and coagulate the slimy material, the extract was treated with 10 grams of magnesium carbonate and filtered. The residue was then treated with 30 c. c. of water, in which, however, but little of the residue dissolved. Ten cubic centimeters of this solution were then mixed with an equal volume of the tyrosin solution. After twenty-four hours the mixture was entirely colorless. When, however, 0.5 c. c. of a 0.05 per cent solution of hydrogen peroxide was added, a tolerably rapid oxidation of the tyrosin occurred, and in the course of ten hours the mixture was colored black. It would seem, therefore, that by shaking the extract of the fungus with magnesium carbonate the peroxidase of tyrosinase can be separated from its oxygenase. A partial separation of the constituents of tyrosinase can also be accomplished by means of methyl alcohol. Thus, according to Bach (ibid.), 100 c. c. of the fungus extract were poured into 500 c. c. of strong methyl alcohol. The resulting precipitate was rapidly filtered, washed with methyl alcohol, and dried in vacuo over calcium chloride. The dry residue was rubbed up in a mortar with 100 c. c. of water, whereby only a small amount of the residue passed into solution. This mixture was then filtered and the filtrate tested toward tyrosin with and without hydrogen peroxide. While the solution containing hydrogen peroxide showed the characteristic blackening with tyrosin after twelve hours and required 17.6 c. c. of 0.002 N permanganate to decolorize it,[a] the test without hydrogen peroxide remained colorless for two whole days. Bach concludes, therefore, that at ordinary dilutions hydrogen peroxide exerts no influence on fresh, normal tyrosinase. As the result of certain changes in the tyrosinase, however, which may be brought about naturally or by artificial means, whereby the ferment becomes greatly weakened, its activity toward tyrosin may be greatly increased by dilute hydrogen peroxide. He is therefore of the opinion that the simplest view to take of the weakening of tyrosinase and its partial restoration by hydrogen peroxide is to refer it to the destruction of its unstable oxygenase.

In a more recent communication Bach (25) shows that it is impossible to oxidize tyrosin by the oxidase of *Lactarius vellereus*, and also that it is impossible to oxidize it by this peroxidase in the presence of hydrogen peroxide and a preparation of tyrosinase which had previously been destroyed by boiling.

It has also been shown by Chodat (116a) and also by Bach (21, 22) that ordinary peroxidase and hydrogen peroxide are without action on tyrosin. It would seem, therefore, that tyrosinase presents us with a case of specific ferment action connected in some way with the chemical constitution of the substance oxidized, and that while the two oxidases, laccase and tyrosinase, are similarly constituted in the sense that each contains a peroxidase and an oxygenase, and that in each case the oxygenase component may be replaced by hydrogen peroxide, the two enzymes differ in the specific character of their peroxidase constituent. The peroxidase of laccase is specific in the sense that while it can activate hydrogen peroxide toward guaiacum, hydroquinone, pyrogallol, phenolphthalin, etc., it can not activate it toward tyrosin, and while the peroxidase of tyrosinase can activate hydrogen peroxide toward tyrosin, and certain other amino compounds, it can not activate it toward the laccase reagents.

ANTI-TYROSINASE.

According to Gessard (182), the blood serum of a rabbit which has been inoculated with vegetable tyrosinase at successive intervals, retards the action of the ferment on tyrosin to a considerable extent, so that a long interval is required for the solution of the ferment and

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[a] The excess of hydrogen peroxide remaining at the end of these experiments was in all cases removed by the addition of 1 c. c. of catalase solution. This quantity of catalase solution was sufficient to decompose 10 c. c. of a 1 per cent solution of hydrogen peroxide in one minute.

tyrosin to exhibit the succession of color changes ordinarily shown by a solution containing tyrosin and tyrosinase. This author reached the conclusion, therefore, that by the repeated injection of tyrosinase into an animal, there is developed in the blood of the animal receiving the injection an anti-body, to which he gave the name *anti-tyrosinase* (183). He observed further that as the result of the repeated injection of animal tyrosinase (from the ink sac of the cuttle fish) into an animal, such as the rabbit, the blood serum of the animal receiving such injections acquires the property of retarding the action of tyrosinase of the same origin. On the other hand, such serum was found to be without effect on vegetable tyrosinase. On the other hand, Von Fürth and Jerusalem (178) were unable to obtain any evidence of the formation of an anti-tyrosinase in the blood serum of rabbits following the injection of tyrosinase from the hemolymph of certain lepidoptera.

OXIDASES FROM VARIOUS SOURCES.

Since the earlier work of Bertrand and Bourquelot on laccase and tyrosinase, a number of oxidases have been obtained by various observers from different sources, to which special names ending in *-ase* have been given, usually to indicate something pertaining to the particular occurrence of the ferment, but in some cases referring to some peculiar chemical transformation which they can effect. Among these may be mentioned the following:

ŒNOXIDASE (OXIDASE OF WINE).

According to Cazeneuve (114, 115) and other French investigators, this is the oxidase which is responsible for the disease of wine known to French wine makers as *La Casse* or *Cassure*, as the result of which a red wine loses its characteristic color, due to the oxidation and sedimentation of its characteristic coloring matter. According to Martinand (287), this oxidase is present in the ripe grapes, whereas, according to Laborde (256), it is produced by a fungus, *Botrytis cinerea*, which grows freely on grapes and on wine must and is known commonly as the "sweet rot." It has also been found by Martinand (287) in other fruits beside the grape, such as the plum, pear, and apple. It has also been shown that under ordinary conditions the greater quantity of the ferment normally present in the fresh juice of the grape is lost or disappears during fermentation. In all probability it is carried down by the precipitates which go to form the wine stone. According to Martinand, it is destroyed in four minutes at 72° C., or even at 55° C., after an exposure of one and one-half hours. Bouffard and Semichon (71) have found it to be destroyed by very dilute sulfurous acid, 0.02 gram of sulfur dioxide per liter of enzyme. In many respects œnoxidase resembles laccase. It is worthy of note in this connection, however, that, according to Legatu (259), the disease of wine ordinarily ascribed to œnoxidase is in reality due primarily to the presence of ferrous salts in quantities above the normal. These are oxidized to ferric salts and then precipitated by the tannin, the precipitate carrying down the coloring matter of the wine. According to this author the only part played by the œnoxidase is that it assists in the rapid oxidation of the ferrous salts, and hence may participate to that extent in accomplishing the changes already described.

MALOXIDASE (APPLE OXIDASE).

The color changes occurring in fruits like the apple, pear, peach, etc., as a result of a wound or cut in the fruit or an abrasion of the skin are familiar to everyone. It is also known that no such changes of color occur if the fruit be previously heated to about the temperature of boiling water. The effect of heat in preventing these changes is also seen to good advantage in various sorts of artificially and naturally dried fruits, especially dried apples. Apples which have been dried in the sun by natural processes are brown in color in consequence of the oxidation of tannin by an oxidizing ferment, maloxidase, contained in the fruit (*see* Lindet (271, 272)). On the other hand, evaporated apples which have been dried artificially at higher temperatures, and in some instances even exposed to the action of sulfur dioxide, are white, for the reason that the oxidase has been destroyed. The juice of the apple has been found to blue guaiacum and to oxidize hydroquinone and pyrogallol. In this connection it has been pointed out by Kastle and Shedd (247) that those vegetable tissues which readily oxidize guaiacum and phenolphthalin rapidly turn brown or reddish in color when their freshly cut surfaces are exposed to the air, whereas the tissues of those plants which do not oxidize these reagents do not turn brown or red on exposure to the air. In other words, the oxidases present in the raw fruit are responsible for both phenomena.

According to Lindet (271, 272) the oxidase of the apple and the tannin upon which it acts are stored in different cells, and hence it is only when these are brought together by actual rupture of the cells that we have those color changes occurring which are characteristic of the bruised or macerated fruit. On the other hand, Kastle and Loevenhart (244) have pointed out that, on the assumption that the oxidizing ferments are of the nature of peroxides, the oxidase (peroxide) is not present as such in the intact cell, but only its precursor, viz., an autoxidizable substance which, when it comes into contact with the air through the rupture of the tissue or cell, unites with the oxygen to produce the peroxide or the so-called oxidizing ferment, or according to the views of Bach and Chodat (28) the precursor of the oxygenase portion of the ferment. Hence the tannin and the substance destined to become the oxidase or a part thereof as the result of the action of oxygen could exist together in the same cell, or, for that matter, even in the same solution, and yet no oxidation or no coloring take place until the cell had been ruptured and air admitted. It seems highly probable that the so-called maloxidase and Bertrand's laccase are the same.

SPERMASE.

This oxidase has been detected by Grüss (201) in the embryo of the barley by means of Wurster's reagent (tetramethyl-para-phenylene diamin). If a grain of barley be cut in two along the greater length of the grain and the cut surface pressed against moist "tetra" paper, a violet color develops on the exposed surface of the embryo, while the endosperm remains colorless. On the other hand, if the grain be heated to 55° C. for fifteen minutes the embryo shows no color with "tetra" paper, indicating that the ferment has been destroyed. The ferment scarcely colors guaiacum, and hence, according to Grüss, should not be confused with laccase. He is of the opinion that it plays a part in the morphological and physiological changes which accompany the production of malt. Thus, he has shown that in the kiln-drying of very moist malt, without ventilation, the oxidase is destroyed (201).

OXIDIN (*Boutroux*).

According to Mégé-Mourier (293, 294, 295), the characteristic color of brown bread is produced during panification by a substance of ferment-like nature, to which he gave the name "*Cerealin.*" Afterwards Boutroux (92) showed that these changes of color result from the action of an oxidase (laccase), to which, for reasons already indicated, he gave the name "*Oxidin.*" Quite recently Bertrand and Mutermilch (65) have obtained tyrosinase from wheat bran and have reached the conclusion that the changes of color observed in bread during baking are due, in part at least, to the action of this ferment. It is quite likely, therefore, that Mégé-Mourier's *Cerealin* and Boutroux's *Oxidin* are merely mixtures of laccase and tyrosinase.

SCHINOXIDASE.

Sarthou (357, 359) obtained this oxidase from the latex of *Schinus molle* by the usual method. An aqueous extract of the latex of this plant blues guaiacum and oxidizes the phenols, such as hydroquinone, resorcin, and pyrogallol, and transforms potassium ferrocyanide into potassium ferricyanide with the absorption of oxygen. The ferment differs from Bertrand's preparations of laccase chiefly by the fact that the ash is rich in iron, but contains no manganese. According to Sarthou (358), this iron exists in the active ferment in organic combination, and to this the ferment owes its oxidizing power.

OLEASE.

Tolomei (424) has observed that fresh olives gradually undergo fermentation when exposed to the air, with the production of acetic and other fatty acids and the evolution of carbon dioxide. According to this author these changes are brought about by the action of an oxidase to which he has given the name "Olease." This ferment has also been found by Tolomei in the olive oil itself, and to its action are due those changes which take place when the oil becomes rancid. The acids produced by its action serve to gradually weaken the ferment.

PURPURASE.

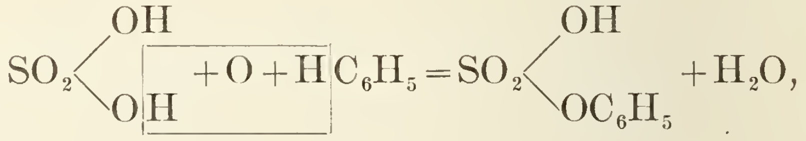
One of the most interesting and picturesque changes attributable to oxidizing ferments is that described by Dubois (148), which results in the production of a purple pigment in the mollusc, *Murex brandaris.* According to this author the pigment glands of these gasteropods are analogous to the photogenic (luminous) organs of *Pholas dactylus,* the principal difference being that while the fixation of oxygen in the latter gives out its energy in the form of light, the latter absorbs luminous vibrations with the production of a pigment. In other words, the changes occurring in the production of the pigments of molluscs are also photochemical. Dubois observed that on extracting the pigment gland with absolute alcohol the chromogen contained in the gland passed into solution. The alcoholic solution of the chromogenic substance was concentrated on the water bath and the concentrated solution used to impregnate test papers for the purpose of experimentation. The residue of the gland remaining after extraction with cold absolute alcohol was extracted first with chloroform water, and the residue was finally macerated with glycerin, all of these operations being carried out in the dark or in the feeble light of the dark room. On adding a drop of the glycerin extract of the gland to the test paper containing the chromogenic substance of the gland and moistening with water and exposing to sunlight, a purple color gradually developed on the paper, the intensity of which depended on the time of exposure and the intensity of the light. The glycerin extract alone is not colored on exposure to the light, and it loses its activity when heated to 120° C. in the autoclave. Three factors are therefore concerned in the development of the purple pigment in molluscs, (1) a chromogenic substance soluble in alcohol, (2) a ferment, and (3) light. According to Dubois, the chromogenic substances (*les substances chromogeniques*) concerned in these changes consist of a definite, crystallizable substance, the chromogen proper, which has been described by Letellier (268) (*see* footnote to Dubois's article), and a ferment. To the former Dubois gave the name "purpurin," and to the latter "purpurase." No special evidence has been brought forward by Dubois, or by anyone else for that matter, to indicate that purpurase is an oxidizing ferment. Indeed, its conduct toward the ordinary oxidase reagents seems never to have been investigated. However, the changes resulting in the production of the pigment in the pigment gland of *Murex brandaris*, in which it evidently participates, present many close analogies to those oxidations which are accomplished by oxidases, and hence certain authors have been led to put purpurase in the class of oxidizing ferments.

LUCIFERASE.

The production of light by animals and plants has been the subject of many researches. In this connection it was long ago pointed out by Dubois (145, 147) that the active agent of light production in animals and plants is a substance having the general properties of a ferment. This enzyme he has called "luciferase." According to Dubois (146), the transformation resulting in the production of light in animals and plants takes place under the influence of life, water, and a suitable temperature. From his earlier researches on the subject he concluded that physiological light is not the result of a combustion, nor even of a slow oxidation, but a direct chemical act (*mais directe*). In his later investigations, however, he claims to have shown that the fixation of oxygen is necessary, the oxidation taking place not directly but indirectly, and for the most part, at least, through the action of luciferase as an intermediary, which thus conducts itself like an oxidizing ferment. In this connection he observed that the luminous organs of the *Lampyridæ* and also the eggs contained in the ovaries of the females give a beautiful blue color with tincture of guaiacum. So, also, the filtered extract of the luminous mucus from the body of a dead fish, prepared with chloroform water, gave a similar reaction. Dubois (147) concludes, therefore, that the photogenic substances concerned in the production of physiological light are "luciferin" and "luciferase." In other words, the light generated by various life forms is the result of a chemical change, probably an oxidation, brought about by the action of luciferase on luciferin. My own experience with the firefly native to the Central and Middle Western States, *Luciola pennsylvanica*, is that the aqueous extracts of the luminous organs do not show the guaiacum reaction directly, but only after the addition of hydrogen peroxide. The whole subject requires further investigation.

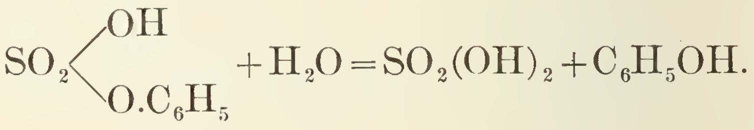
ALDEHYDASE (SALICYLASE).

We have seen that Schoenbein (384), especially as the result of his work on the oxygen-carrying power of blood, recognized the importance of oxygen carriers for oxidation processes occurring in the animal organism. Traube (427) also believed that a complete analogy exists between the respiratory changes occurring in muscle and the process of slow combustion. His theory of muscular activity was based upon the assumption that the muscle fiber contains a vital, oxidizing (*verwesungs*) ferment (*see* Traube (425), p. 107), which carries oxygen from the blood to the oxidizable substances contained in the muscle fluids, without the ferment itself suffering any destruction. These or similar views were also shared by other distinguished observers. Thus, according to Claud Bernard (47) the respiration of tissue is not a direct combustion, but an indirect oxidation accomplished by chemical agents of the nature of ferments. Some few observations were made by Schützenberger (393) on the oxidation of certain substances in the animal organism. It remained for Schmiedeberg to greatly extend our earlier knowledge of such processes. Thus, as the result of their investigation of the formation of hippuric acid in the animal organism, Bunge and Schmiedeberg (106) came to the conclusion that the red blood corpuscles play an essential rôle in the formation of hippuric acid in the living kidney, for the reason, possibly, as these observers surmised, that it plays the part of an oxygen carrier. From these observations Schmiedeberg himself (366) was naturally led to the study of those oxidations which in the animal organism might result in the formation of hippuric acid. He arrived at the conclusion that the principal changes occurring in the animal organism are splittings (hydrolysis), oxidation, and synthesis, and, as he proved in these researches, the two latter processes frequently go hand in hand. It was shown that benzyl alcohol was oxidized by blood to only a slight extent, and almost equally well by a solution of sodium carbonate, but not at all in pure water. Similar results were obtained with salicylic aldehyde. On the other hand, by the action of oxygenated blood in the tissue of the kidney and lung both of these compounds are oxidized a thousand times more rapidly than they are by blood alone or by a solution of sodium carbonate. From this it follows that conditions exist in the tissues whereby an increased activity is conferred on the oxygen of the blood, in that it is rendered active or gotten into the nascent state, or some change is effected in the oxidizable substance, whereby it becomes more easily oxidizable. This increased activity on the part of the oxygen may be explained as a result of the action of (1) an exciter analogous to platinum-black, or (2) of readily combustible substances in the tissues which have the power of decomposing the oxygen molecule, as a result of which not only would they themselves become oxidized, but other substances as well. This last was an application of Hoppe-Seyler's theory of oxidation (1878). On the other hand, Schmiedeberg observed that these aromatic compounds are more rapidly oxidized than phosphorus. This, he says, is evident from the fact that in phosphorus poisoning in man following the administration of 0.1 to 0.2 gram of the substance, some of the phosphorus apparently remained in the body in unaltered condition after death. Hence he distinguishes between synthetic oxidations and those like the oxidation of phorphorus, and points out that it is only substances containing hydrogen that lend themselves to such oxidations as the former. He concludes also that in the apparent activation of oxygen in such synthetic oxidations the living tissue acts not upon the oxygen molecule, but upon the oxidizable substance; otherwise it would oxidize the phosphorus as readily as the benzyl alcohol or salicylic aldehyde. Essentially similar views have recently been advanced by Mathews (289) in order to account for the oxidation of the sugars (see footnote, p. 56). Schmiedeberg also pointed out that all of these oxidation processes have this in common, viz., that the final product of the oxidation occurs in the urine in the form of a conjugated compound in which it is paired with sulfuric or glycuronic acid, or with glycol. Hence the production of phenol in the organism following the administration of benzene may result from the following changes:

(*1*)


$$\mathrm{SO_2}\!\left\langle\begin{matrix}\mathrm{OH}\\ \mathrm{O}\boxed{\mathrm{H}\quad +\mathrm{O}+\mathrm{H}}\end{matrix}\right.\!\mathrm{C_6H_5}=\mathrm{SO_2}\!\left\langle\begin{matrix}\mathrm{OH}\\ \mathrm{OC_6H_5}\end{matrix}\right.+\mathrm{H_2O},$$

and

(*2*)


$$\mathrm{SO_2}\!\left\langle\begin{matrix}\mathrm{OH}\\ \mathrm{O.C_6H_5}\end{matrix}\right.+\mathrm{H_2O}=\mathrm{SO_2(OH)_2}+\mathrm{C_6H_5OH}.$$

See also Baumann and Herter (40).

As a matter of fact, Schmiedeberg found that a dog which had received 24 grams of benzene, in eight doses in twenty-four hours, excreted 1.6907 grams of phenol, of which 1.1005 grams were found in combination with sulfuric acid.

Several years later this subject was reinvestigated by Jacquet (222), who showed, first, that the blood alone does not possess the power of accomplishing the oxidation of such substances as benzyl alcohol and salicylic aldehyde; second, that certain animal tissues or cell-free extracts thereof in contact with blood or atmospheric oxygen have the power of accomplishing the oxidation of these substances; third, that while such extracts lose their oxidizing power on boiling, their oxidizing powers are not destroyed by carbolic acid, quinine, or by freezing, or by precipitation with alcohol and re-solution in water. He arrived at the conclusion, therefore, that oxidations in the animal organism are brought about by ferments or enzymes.

Further studies on the oxidizing ferments were made by Pohl ([329]) with the view of determining whether the several oxidizing ferments described by various authors as occurring in animal and plant tissues are the same or different enzymes. He reached the conclusion that two essentially different kinds of oxidations occur in living tissues and that these are brought about by at least two distinctly different ferments, one of which accelerates the oxidation of fatty (formic) and aromatic aldehydes, and the second brings about such oxidations as the production of indophenol-blue from an alkaline solution of α-naphthol and para-phenylene diamin. He found further that certain plant extracts have the power of accomplishing the indophenol reaction, but are powerless to oxidize formic or salicylic aldehyde or mannite. An aqueous solution of tannin needles proved to be especially active. In this connection he also showed that amygdalin gives the indophenol reaction apparently independently of the action of any ferment.

On the other hand, Spitzer ([406]) arrived at the conclusion that glycolysis (the disappearance of sugar in the blood) is only a special case of oxidation by blood and animal tissues, and that the glycolytic ferment of Lepine is probably identical with the oxidizing ferments in tissues capable of oxidizing aromatic alcohols and aldehydes. In support of these conclusions he cited, first, an observation by Salkowski ([356]) to the effect that under certain conditions blood can oxidize salicylic aldehyde, and, secondly, some observations of his own to the effect that those tissues which can rapidly oxidize alcohols and aldehydes can also destroy glucose. The results obtained in subsequent researches tend to confirm him (*see* Spitzer ([407])) in the belief that the oxidizing ferments, especially of the animal organism, are substances of the same nature, viz., nucleoproteids, and that certain of these owe their activity as oxygen-exciters to the organic iron which they contain.

On the other hand, Abelous and Biarnes ([7, 8]) observed that certain globulins have the power to oxidize guaiacum, but are without action on salicylic aldehyde, and, as already pointed out, Raudnitz ([338]) proved that the substance in milk which causes the bluing of guaiacum in the presence of hydrogen peroxide is not identical with that which catalyzes the hydrogen peroxide. It was also pointed out by Lepine ([262]) and also by Jacoby ([224]) that the glycolytic ferment differs from the oxidizing ferment oxidizing salicylic aldehyde in several respects, especially in regard to the effect of temperature on the two ferments, the glycolytic ferment being destroyed at 58° C., whereas the oxidizing ferment under consideration is only destroyed at 100° C. This last observation was confirmed by Jacoby (224). From these and other observations Jacoby (225) came to the conclusion that several oxidizing ferments occur in the liver, so that according to this author it seemed no longer advisable to refer to the ferment capable of oxidizing salicylic aldehyde merely as an oxidation ferment. He therefore adopted Bertrand's nomenclature in the naming of these substances, designating as *aldehydase* the ferment or ferments of the liver found to be capable of oxidizing aldehydes, and giving the name *salicylase* to the particular ferment concerned in the oxidation of salicylic aldehyde (*see* Jacoby (225)).

In order to obtain a water-clear solution of the ferment having powerful oxidizing powers, Jacoby (225) recommends the following method of preparation: Fresh beef liver is put through a sausage machine and then rubbed up with quartz sand, and the paste thus obtained mixed with some distilled water. Toluene is added and the mixture allowed to stand several hours with vigorous shaking; the mass is then filtered. The dark, clear liquid thus obtained is then saturated with ammonium sulfate to the extent of 25 per cent and the fluid rendered weakly alkaline with sodium carbonate, so that after saturation with ammonium sulfate the liquid generally smells of ammonia. In about twenty-four hours a small amount of precipitate is produced in the liquid, which is then filtered off. The filtrate is then saturated to the extent of 33⅓ per cent with common salt, and after twenty-four hours the precipitate is again removed by filtration. The clear, dark-colored liquid is then saturated to the extent of 60 per cent with ammonium sulfate, with the result that a heavy precipitate is obtained which requires about twenty-four hours to settle out completely. This precipitate, which contains the aldehydase, is then filtered off, washed with 60 per cent ammonium sulfate solution, and then taken up with distilled water, in which it only partially dissolves. After several hours the aqueous solution is filtered, and 95 per cent alcohol gradually added to the clear filtrate, until a good filterable precipitate is obtained. As a general thing sufficient 95 per cent alcohol has to be added to bring the concentration of the alcohol in the whole liquid up to about 30 per cent. The solution containing the precipitate is then filtered. The precipitate is then extracted five or six times with distilled water containing a few drops of dilute soda solution, and the extracts united. As a rule the ferment is most completely extracted by allowing the finely divided precipitate to stand over night with water. The bright clear liquid thus obtained is still found to contain protein. It is then made faintly alkaline with soda and uranyl acetate added until a filterable precipitate is obtained, which is then handled in precisely the same way as the alcoholic precipitate. There is thus obtained finally a water-clear liquid which vigorously oxidizes salicylic aldehyde and which now gives none of the protein reactions.

The ferment thus obtained is soluble in water and, as has been pointed out, can be salted out with ammonium sulfate. It is practically nondialyzable. In spite of its great solubility in water, the ferment is not removed from the liver by intensive washing out of the circulatory system with 0.7 per cent salt solution. At a pressure of six atmospheres the ferment passes through the Chamberland filter. The aldehydase was found by Jacoby to be perceptibly soluble in 20 per cent alcohol, but insoluble in concentrations equal to or greater than 30 per cent. It is also precipitated from its solutions by tannin. With dilute solutions of the ferment the Millon and biuret tests were found to be negative. Aldehydase was found to lose its oxidizing power on boiling or by treatment with small amounts of free acid or alkali. Toward salts it conducts itself much like a globulin, and yet at the concentration at which it vigorously oxidizes salicylic aldehyde it does not give the protein reactions.

That aldehydase is a ferment is indicated by the fact that it is not consumed in the oxidations which it can accomplish, but can react with fresh quantities of the oxidizable substance. Thus Jacoby allowed a clear extract of liver to act upon salicylic aldehyde for forty-eight hours, at the end of which time small portions of the liquid gave an excellent test for salicylic acid. The main portion of the liquid was then dialyzed against water for three days and the ferment was then salted out with ammonium sulfate and the precipitate dissolved in water. Two-thirds of this solution alone gave no test for salicylic acid after seventy-two hours' digestion, whereas another portion digested with salicylic aldehyde gave an abundant test for salicylic acid.

In addition to the above-mentioned researches, aldehydase has formed the subject of numerous investigations during the past fifteen years, among which may be mentioned those by Salkowski and his coworkers, Abelous and Biarnes, Medwedew, and others. The occurrence and distribution of the ferment in various animal tissues has been studied by Salkowski and by Salkowski and Yamagiwa, and also by Abelous and Biarnes. In oxidizing power toward salicylic aldehyde, Salkowski and Yamagiwa (355) found certain animal organs to stand in the following order:

Liver = 100.0
Spleen = 80.4
Kidney = 15.5
Pancreas = 2.0
Muscle = 1.0,

whereas Abelous and Biarnes (⁵) arranged the tissues in the following order with regard to their activity toward salicylic aldehyde:

1. Spleen.
2. Lung.
3. Liver.
4. Thyroid.
5. Kidney.
6. Thymus.
7. Suprarenal.
8. Testicle.

According to these authors muscle, pancreas, and brain are incapable of oxidizing salicylic aldehyde. Medwedew (²⁹¹) studied the kinetics of the oxidation of salicylic aldehyde by extracts of various organs and has found that the quantity of salicylic aldehyde oxidized is proportional to the square of the concentration of the ferment, and inversely proportional to the square root of the concentration of the aldehyde.

One of the most interesting facts disclosed by these investigations is that the oxidation of the aldehyde by aldehydase is independent of the presence of atmospheric oxygen. Thus in certain of his experiments Medwedew (²⁹²) found the following amounts of salicylic acid to be produced (1) during aeration, and (2) in the absence of air:

No. of experiment.	Amount of salicylic acid found, in milligrams.	
	(1) Aerated.	(2) In absence of air.
1	85	83
2	118	115
3	80	78

It will be observed that the differences between the several amounts of salicylic acid formed in the two cases are very small and are probably within the limits of experimental error, and yet in experiment No. 3 (1) was subject to a continuous current of air for 16 hours, whereas (2) remained without aeration, and portion (2) of experiment No. 2 was kept in a hermetically sealed vessel. Similarly it has been shown by Abelous and Aloy (⁴) that the oxidation of salicylic acid by various organs proceeds more rapidly in a vacuum than in the presence of air. In fact, according to these authors, liberal supplies of free oxygen diminish the rate of oxidation very considerably and may even suppress it altogether. These authors are of the opinion, therefore, that in such oxidations as take place in a vacuum the oxygen necessary for the oxidation is furnished by certain oxygen compounds which are dissociated by the oxidizing ferment. In other words, such processes as the oxidation of salicylic aldehyde under the influence of aldehydase partake of the nature of anaerobic fermentations, and, as is well known, the oxygen required for the latter processes is furnished by various oxygen-containing substances participating in the fermentation. In this connection it is interesting to recall that Traube provided for such cases in his general theory of fermentation. According to this distinguished observer the oxygen of water might under certain conditions be transferred to the oxidizable substance by means of a ferment, and in the fermentation of a compound like sugar the oxygen present in one part of the molecule might be transferred to another part of the molecule, thereby giving rise, after splitting, to one substance richer in oxygen than the original, and to another poorer in this element. Such a change is met with in the breaking up of glucose into carbon dioxide and alcohol by yeast. It is interesting to note in this connection that similar changes have been met with among inorganic substances; thus, when an aqueous solution of phosphorous acid is heated, phosphoric acid and phosphine are produced—

$$4H_3PO_3 = 3H_3PO_4 + PH_3$$

Whether water actually participates in such changes is at present unknown. In my opinion these simple processes would warrant further investigation from the point of view of anaerobic fermentation.

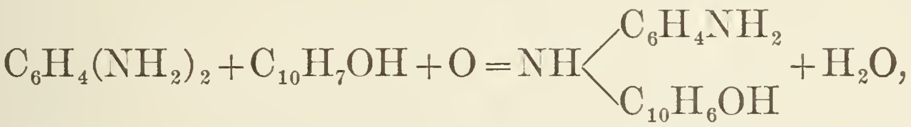
In this connection Abelous and Gerard (9,10) have shown that extracts of various animal tissues have the power of reducing nitrates to nitrites. So also it was afterwards found by Abelous (3) that the juice of the potato can also reduce nitrates, but is incapable of oxidizing salicylic aldehyde. On adding a small amount of potassium chlorate, however, the aldehyde is oxidized at the same time that the chlorate is reduced. This property of the juice is not lost on boiling. In some respects these reactions are similar to those investigated by Kastle and Elvove (243). These authors also observed that the aqueous extract of the potato has the power of reducing nitrates to nitrites and that in the presence of certain readily oxidizable organic compounds, such as formic aldehyde and benzyl alcohol, the quantities of nitrite formed are greatly increased. On boiling, the aqueous extract of the potato loses its power to reduce nitrates even in the presence of readily oxidizable substances. All of these facts point to the presence in the potato and in animal tissues of certain ferments which have the power of effecting the transfer of oxygen from a substance rich in this element, such as the chlorate or nitrate, to an easily oxidizable substance. According to Abelous (3) these are the oxido-reducing ferments.

Dony-Hénault and Mlle. J. van Duuren (144) have recently investigated the oxidation of salicylic aldehyde by means of aqueous extracts of calf's liver. According to these observers the methods for the estimation of salicylic acid are far from exact. In their own work they adopted the method of Elion of estimating the salicylic acid formed during the oxidation by means of bromine. They have also arrived at the conclusion that the salicylic acid appears to combine in part at least with certain substances present in the extracts and hence would be likely to escape detection in most of the methods. They agree with Abelous and Aloy (4) that the acid is only produced rapidly in the absence of oxygen. The quantity of salicylic acid produced in a given time also varies with the concentration of the aldehyde and the amount of extract employed, the former being the preponderating factor in determining the velocity of the reaction. They observed, further, that the oxidizing power of extracts of the liver diminishes spontaneously when such extracts are left to themselves, especially at higher temperatures. According to these authors, the results thus far reached in the study of this oxidation do not warrant the conclusion that the oxidation in question is accomplished by a ferment acting in the absence of air. About all that can be said is that a certain amount of oxidizing material is present, but this being limited the amount of salicylic aldehyde oxidized by a given quantity of extract is also limited, while the oxidase is a true catalyst, probably of a mineral nature, and as such ought to be able to accomplish the oxidation of practically unlimited quantities of material. According to these authors the presence of such substances has not been proven in such animal extracts as those under immediate consideration, nor is it necessary to assume their presence in order to account for the phenomena observed.

THE INDOPHENOL OXIDASE; THE RÖHMANN-SPITZER REAGENT.

In his study of the oxygen requirements of the organism it was shown by Ehrlich (157), in 1885, that the intravenous injection of α-naphthol and para-phenylene diamin results in the formation of indophenol in the tissues of the animal. So also Würster (466) showed that di- and tetramethyl-para-phenylene diamin are reagents for active oxygen, and that in the animal organism these substances are converted into blue coloring matters. Acting upon these suggestions, Röhmann and Spitzer (351) have made use of a reagent consisting of equal amounts of α-naphthol and para-phenylene diamin, in a dilute solution of sodium carbonate (three molecules of sodium carbonate to one molecule of each of the organic compounds), for the investigation of the oxidizing power of the various animal tissues. Various other related substances can be employed in the preparation of the reagent; thus dimethyl-para-phenylene diamin (453) can be used instead of para-phenylene diamin. They also showed that other coloring matters result from the oxidation of suitable mixtures by the action of various animal tissues. Thus they succeeded in showing that certain indamines like toluene-blue result from the oxidation of meta-toluene diamin and para-phenylene diamin, and Bindschedler's green from dimethyl-para-phenylene diamin and dimethylanilin, and that the synthesis of various eurhodins may be accomplished in the same manner. An easy method of demonstrating such reactions consists in placing a small amount of an animal tissue, such as the liver, on a test paper which has been prepared with the two chromogenic components of the dye. If, for example, a small amount of fresh liver be placed upon a test paper which has been saturated with a sodium carbonate solution of *a*-naphthol and para-phenylene diamin, the place on the paper occupied by the tissue is soon deeply colored, whereas the other portions of the paper show only a slight coloration. According to these authors, the change in question is represented by the following equations:

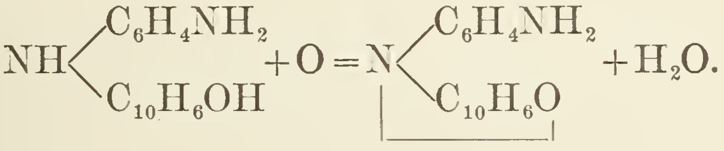
1.



$$C_6H_4(NH_2)_2+C_{10}H_7OH+O=NH\left\langle\begin{array}{l}C_6H_4NH_2\\ C_{10}H_6OH\end{array}\right.+H_2O,$$

and

2.



$$NH\left\langle\begin{array}{l}C_6H_4NH_2\\ C_{10}H_6OH\end{array}\right.+O=N\left\langle\begin{array}{l}C_6H_4NH_2\\ C_{10}H_6O\end{array}\right.+H_2O.$$

Thus one atom of oxygen goes to effect the synthesis of the leuco compound and a second atom to effect the oxidation of the leuco compound to the coloring matter. When the solution of the chromogens is allowed to stand in contact with atmospheric oxygen, the coloring matter is formed only slowly in the presence of alkalies; when the animal tissue is added the process is greatly accelerated. It was shown by these authors that these oxidations are most readily accomplished by extracts of cells, the body fluids and secretions being comparatively inactive. In this respect the change is analogous to the destruction of glucose, a change which is readily accomplished by extracts of red and white blood cells in physiological salt solution, but not by blood serum. They reached the conclusion, therefore, that the oxygen exciters responsible for these oxidations are contained only in the cells. That such is the case is evident also from the conduct of such extracts and secretions toward guaiacum and hydrogen peroxide. Extracts of red blood cells blue a mixture of guaiacum and hydrogen peroxide instantaneously, whereas the blood serum causes no change of color, or if it acts at all it does so very feebly. While they knew nothing of the particular cell components responsible for these changes, they seemed to think that their observations furnished evidence, hitherto wanting, of a single oxidizing ferment. By precipitating the macerates of fresh organs with alcohol and washing the precipitate thus obtained with alcohol and ether, they obtained dry powders which retained their oxidizing powers for a year, whereas the alcohol extracts were found to be inactive. A comparison of the different organs showed that they activated oxygen toward these reagents with different degrees of intensity. As a rule they were found to be energetic oxygen carriers, accomplishing these oxidations more rapidly than they were brought about by palladium foil or palladium-hydrogen. Finally, these authors called attention to the general similarity between the synthesis of indophenol and similar dyes with that of bromphenol cystein, which, according to Baumann, results from the administration of brom-benzene to dogs. They arrived at the conclusion therefore that the cells of animal tissues contain substances which have the power of activating molecular oxygen, whereby it can accomplish the oxidation of substances not ordinarily directly oxidizable (*dysoxydabler Stoffe*). They protest, however, against the supposition that the oxidation of all difficultly oxidizable substances in the organism depends on the action of oxygen-carriers.

The indophenol oxidase is by no means confined to animal tissues. Mention has already been made of the work of Pohl ([329]) on this subject. This author found that many plant tissues react strongly to the Röhmann-Spitzer reagent. Especially is this the case with tannin needles. He also pointed out that the reaction is also brought about by amygdalin, apparently altogether independently of the action of an oxidase. It is possible, of course, that his amygdalin may have been contaminated with a vegetable oxidase. Rey-Pailhade ([342]) also found the indophenol oxidase to be widely distributed among plants, and according to this author yeast reacts feebly to the Röhmann-Spitzer reagent. Abelous and Biarnes ([5]) have determined the oxidizing power of various tissues from the same and different animal species, colorimetrically, by means of the Röhmann-Spitzer reagent. According to these authors, the tissues of the frog and rabbit, the latter killed by bleeding, stand in the following order with regard to oxidizing power:

Frog.	Rabbit.
Lung.	Spleen.
Liver.	Lung and thyroid.
Kidney.	Liver and kidney.
Testicle.	Pancreas and suprarenals.
Brain.	Ovary.
Muscle.	Brain.
	Muscle.

It will be observed that there is general agreement between these findings and those of the same authors and also of Salkowski with regard to the relative oxidizing power of the various animal tissues toward salicylic aldehyde (see pp. 97–98).

One of the most interesting facts revealed by these determinations is the slight oxidizing power of muscle and nerve tissue as compared with that of other animal tissues, and, as pointed out by Abelous and Biarnes (5), this is all the more remarkable when it is borne in mind that the muscular system is the seat of very powerful exothermic reactions. In this connection it has been observed by Kastle (240) that extracts of muscle and brain greatly retard the oxidation of an alkaline solution of phenolphthalin by blood, and it may be, as suggested by him in explanation of his own results, that muscle and nerve tissues may be unusually rich in powerful reducing agents which would interfere with the oxidation of all extraneous oxidizable material. The occurrence and distribution of various intra-cellular ferments, including the indophenol oxidase, has been studied by Rosell (352) with the following results. In the table the presence of the ferment is indicated by the sign (+) and its absence by the sign (−).

Intra-cellular ferments in beef tissues (Rosell).

Organ.	Aldehydase.	Indophenol oxidase.	Catalase.	Trypsin.	Pepsin.
Pancreas	−	+	+	+	−
Salivary glands	+	+	+	+	−
Lymph glands	+	−	+	+	−
Spleen	+	+	+	+	+
Bone marrow	−	+	+	+	+
Thymus	+	+	+	+	−
Lacteal glands	−	−	+	+	−
Muscle	−	−	+	+	−
Lung	+	−	+	−	+
Brain	+	−	+	−	−
Suprarenals	+	−	+	+	−
Testicle	+	−	+	+	−
Kidney	+	−	+	−	−

The presence of the guaiacum-oxidase could not be established with certainty.

THE PURIN OXIDASES (XANTHIN-OXIDASE).

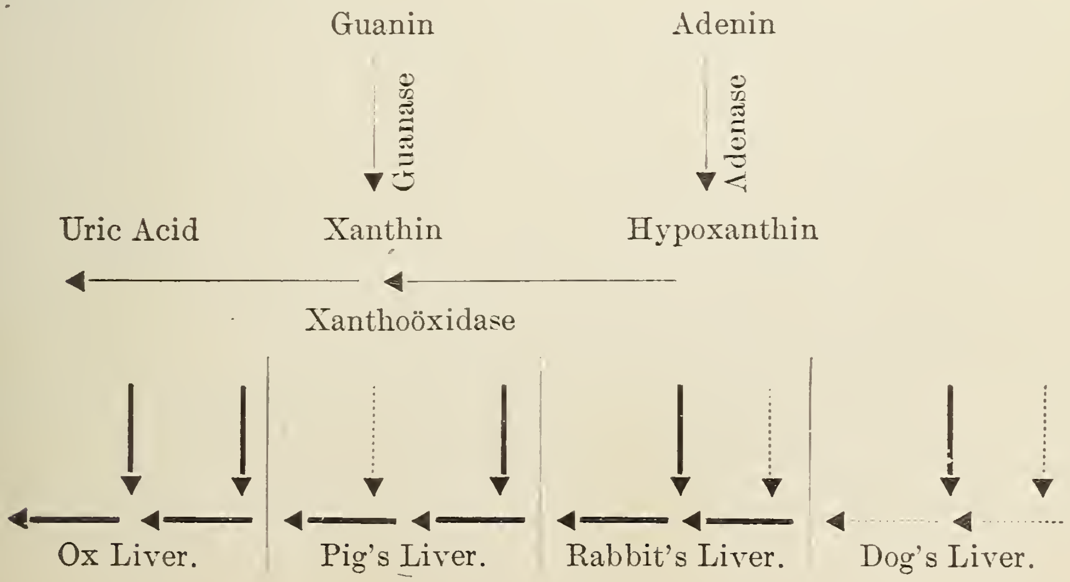
It has long been known that on a flesh diet alone the ratio of urea to uric acid, $\frac{\text{urea}}{\text{uric acid}}$, in the urine is fairly constant, varying from 45 to 65. On the other hand it was pointed out by von Noorden (312) that on different diets it is subject to enormous variations, even in the same individual. Thus in some of his cases it ranged from 23.2 to 122.4. So also by feeding milk, peptone, and vegetable proteid, Camerer (108) was able to double the total nitrogen secreted without causing any increase in the output of uric acid. On the other hand it was pointed out by Kossel (253) that those foodstuffs which cause an increase in the excretion of uric acid contain much larger amounts of hypoxanthin than human muscles. Thus the muscles of the hen and pigeon contained over 0.1 of hypoxanthin per 100 grams of moist muscle, whereas the muscles of man contained only 0.039 to 0.048 gram. It was afterwards shown by Weintraud ([445]) that following a diet rich in nucleins, as for example, the calf's thymus, the uric acid in the urine is considerably increased, whereas according to Hess and Schmoll ([211]) a similar increase in the uric acid does not follow a nuclein-free proteid diet.

On the other hand it is of interest to note in this connection that uric acid itself can be destroyed to a certain extent in the organism, and that following the administration of uric acid by the mouth in men and dogs only a small part of it is recoverable from the urine (*see* Minkowski, [302]). It has also been shown by Minkowski that hypoxanthin causes a distinct increase in the output of uric acid, and that meat extract which contains considerable amounts of this substance has a similar influence on the uric acid excretion. That certain purin bases are formed by the decomposition (autolysis) of the nucleins was shown by Horbaczewski ([218, 219]). This author allowed a mixture of spleen pulp and water to stand at 50° C. From this slightly putrid mixture he was able to isolate large amounts of xanthin and hypoxanthin, whereas from the fresh extract of spleen only traces of these purins were obtainable. After shaking the slightly putrid mixture with air he obtained no xanthin or hypoxanthin, but only uric acid. Similar results were obtained by adding blood or hydrogen peroxide to the slightly putrid spleen pulp. It is evident from these results that the nucleins of the spleen are the precursors of the purins.

On repeating Horbaczewski's work, Spitzer ([409]) showed that uric acid is formed in aqueous extracts of spleen pulp through which is passing a current of air and in which putrefaction is prevented by chloroform or thymol, and that contrary to the opinion of Horbaczewski, xanthin and hypoxanthin can be readily converted into uric acid by the action of a current of air on an aqueous extract of spleen containing these substances at 50° C. Similar results were obtained with the liver, but other organs, such as the kidney, pancreas, and thymus, were found to be much less active in their power to accomplish this oxidation. Similar results were obtained by Wilner ([452]), who arrived at the conclusion that in the liver, not only of birds but also of certain mammals, there are produced large amounts of uric acid. He also showed that the addition of hypoxanthin to liver extracts causes a great increase in the quantity of uric acid obtainable from the extract.

Evidently, therefore, the oxidation of xanthin and hypoxanthin is accomplished *in vivo* and *in vitro* through the instrumentality of an oxidizing ferment. This ferment has been made the subject of an exhaustive investigation by Burian ([107]) and named by him *xanthin-oxidase.* By following Spitzer's method and using one part of macerated liver to two parts of chloroform water he was able to obtain clear extracts of xanthin-oxidase containing only very small amounts of purin bases. On digestion in a current of air these extracts alone gave practically no uric acid. They were found, however, to oxidize xanthin and hypoxanthin rapidly in a current of air. By means of these preparations of xanthin-oxidase he was able to confirm the previous observations of Spitzer and Wilner and to show that, as is the case with many ferments, the conversion of xanthin and hypoxanthin under the influence of the ferment is a reaction of the first order. He showed also that the xanthin-oxidase is not consumed in the process, but is capable of oxidizing fresh quantities of xanthin and hypoxanthin in the presence of oxygen. Hence it would seem to be a true ferment. This is evident from the fact that no noteworthy falling off in the coefficient of the velocity of the reaction was observable.

On the other hand, the reverse process, viz, the reduction of uric acid to other purin bodies does not take place to any noticeable extent. He is of the opinion therefore that xanthin-oxidase is responsible for the production of uric acid from purin bases in the living animal. Contrary to the observations of Wilner (452) he found that in the absence of purin bases, tartronic and dialuric acids cause no production of uric acid with his extracts of xanthin-oxidase. He concludes therefore that these substances can act only by accelerating the action of the xanthin-oxidase on purin bodies already present in the liver extracts. Neither can xanthin-oxidase convert guanin or adenin directly into uric acid, but, as has been found by Jones and Austrian (230, 231), these substances must first be desamidized by the action of guanase and adenase, whereby they are converted into xanthin and hypoxanthin, respectively, before their oxidation into uric acid can occur. The occurrence and distribution of these ferments have been exhaustively studied by Jones and Austrian (230, 231) and also by Schittenhelm (365) and others. A very good idea of their distribution in the liver of various animals is afforded by the following diagram, which is given in certain of Jones's original contributions to the subject:



In the above diagram the solid black lines indicate the presence of the particular ferment to which it appertains, whereas the dotted lines indicate the absence of the ferment; the first diagram explains the four that follow.

It is evident from these results that the production of uric acid from xanthin or hypoxanthin takes place directly as the result of the combined action of the xanthin-oxidase and molecular oxygen, whereas it can only be formed from guanin and adenin by previous desamidization through the action of guanase and adenase, respectively, which belong to the group of hydrolytic ferments.

Reference has been made repeatedly to the wide distribution in nature, especially in the plant kingdom, of oxidases of the type of laccase. Whether these represent merely special occurrences of laccase or whether they are really distinctly different oxidases can not be determined in the present state of our knowledge. So far as one can judge from the experimental evidence now at hand it would seem probable, however, that all of these guaiacum-bluing vegetable ferments are pratically indentical with laccase, and it is doubtful if there is much to be gained by the introduction of these new names, which after all only serve to tell something with regard to a special occurrence of the ferment without throwing any light on differences in properties, if such exist. On the other hand, Sarthou (357, 359) is inclined to the opinion that the oxidases are distinct substances which can not replace one another in the changes which they bring about.

Irrespective of these differences of opinion, however, the following additional facts pertaining to their occurrence are of interest.

Aso found oxidases in tea (15) and in kaki fruit (14); Loew (277) found them in tobacco, and Carles (110) in valerian; they have been found in the grapevine by Cornu (123), in plants of the genus *Spiræa* by Beijerinck (41), and in the vanilla bean by Lecomte (257). According to Breaudat (95) indigo-producing plants contain two ferments, one a hydrolytic enzyme and the other an oxidase; the latter in the presence of alkali transforms indigo-white into indigo-blue. On the other hand Bergtheil (46) was unable to find an oxidase in the indigo plant. Bourquelot (86) has proved the presence of oxidases in certain medicinal preparations and in certain gums such as gum arabic, gum senegal, etc. Lepinois (264) found an oxidase in aconite and belladonna, and Vadam (438, 439) found an oxidase in hellebore. Similarly oxidases have been found in oleaginous grains by Mazé (290) and in digitalis by Brissemoret and Joanne (98).

As is evident from what has already been set forth in this monograph, the oxidases occur abundantly in the higher fungi. In addition to this they have been found in different yeasts, such as *Saccharomyces ellipsoideus*, *S. cerevisiæ*, and *S. apicultus*. According to

Tolomei (423), Effront (156), and Buchner (103) the oxidases of these yeasts oxidize guaiacum and are concerned in the production of the bouquet of certain wines. To these also are attributable the darkening in color of zymase (expressed yeast juice) on exposure to the air, and also the rise in temperature produced when large amounts of yeast cells are exposed to the air. These observations by Tolomei and Effront on the occurrence of oxidases in yeasts have been confirmed by Grüss (202), only this author found these oxidases to be without action on guaiacum or hydroquinone. On the other hand, like his spermase, they were found to be capable of oxidizing tetra-methyl-para-phenylene diamin, and other amino compounds, such as phenylhydrazin. Hence according to Grüss the yeast oxidase belongs to the class of amino-oxidases.

Issajew (221) has also investigated the oxidases of yeast and has confirmed the work of the earlier observers mentioned. He found that the oxidase in yeast oxidizes both the easily oxidizable substances which the yeast contains and also other easily oxidizable substances, such as the polyphenols, and that the upper yeast (*Oberhefe*) contains, as one might naturally expect, more oxidase than the under yeast (*Unterhefe*).

Various bacteria, such as the bacillus of malignant pustules (Dietrich and Liebermeister (139), and the colon bacillus (Roux (353)), have been found to contain oxidases. The oxidase of the latter was found to oxidize hydroquinone, gelatin, peptone, etc., with the production of a brown pigment, and to be active only in the presence of oxygen.

Chapter III.

THE PEROXIDASES AND CATALASES.

In addition to the oxidases, two other classes of enzymes are more or less immediately concerned in the oxidation processes occurring in the plant and animal. These are the peroxidases and catalases. These have been found to have even a wider distribution among living cells and tissues than the oxidases. They were called by Bourquelot (83) the "indirect oxidizing ferments." It was known to Schoenbein (383) that many substances of animal and vegetable origin which in themselves are incapable of bluing guaiacum, acquire this property when mixed with hydrogen peroxide. In other words, just as certain extracts and tissues have the power of rendering active the oxygen of the air, so certain others possess the property of rendering active the oxygen of hydrogen peroxide, thereby enabling this compound to effect certain oxidations which ordinarily it is incapable of bringing about. Thus on adding a small amount of extract of malt to a mixture of guaiacum and hydrogen peroxide the mixture rapidly becomes blue in color. He also made the interesting observation that many plant and animal tissues and the extracts thereof and many hydrolytic ferments have the power of effecting the decomposition of hydrogen peroxide into water and oxygen. He seems to have regarded the power to render active the oxygen of hydrogen peroxide and the power to catalyze this substance not as specific activities of any given substances but as properties pertaining to the ferments as a class. In other words, the power to oxidize guaiacum by means of hydrogen peroxide and the power to decompose the latter substance into water and oxygen were looked upon by him simply as properties of diastase, emulsin, myrosin, and other ferments. This view prevailed for a long time and was shared by others. Thus, according to Spitzer (407), the power to decompose hydrogen peroxide is a measure of the oxidizing power of various animal tissues. It was afterwards shown by Raudnitz[a] (338, 339), however, that the substance in milk which gives the guaiacum reaction with hydrogen peroxide is really different from the other substances present in milk, in that it conducts itself differently toward various precipitants; and Jacobson (223) pointed out that the power of any given

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[a] Raudnitz (339) called the catalase of milk a superoxydase, and the guaiacum-bluing ferment a globulin-oxydase.

tissue or ferment to decompose hydrogen peroxide can be destroyed by certain degrees of heat and by certain poisons which have no action on the other ferments present in the preparations. Similar conclusions were also reached by Loew (278) in his work on catalase. (*See also* Bourquelot (83).) Hence we have come to regard the peroxidases and catalases as distinctly specific enzymes. Apparently, therefore, three distinctly different sets of substances are concerned in vital oxidations: First, the oxidases, by means of which the oxygen of the air is rendered sufficiently active to effect the oxidation of guaiacum and other oxidizable substances directly; second, the peroxidases which render active the oxygen of hydrogen peroxide and other peroxides (including the oxygenases); and third, the catalases, which decompose hydrogen peroxide into water and molecular oxygen, without, apparently, being able to activate the oxygen of the peroxide toward oxidizable substances.

Schoenbein (383) included the peroxidases and catalases among his oxygen-carriers and catalysts (*Sauerstofferreger* and *Sauerstoffuebertrăger*) without apparently assigning particular names to these particular groups of carriers. Later, those substances which induce the oxidation of guaiacum and similar reagents through the agency of hydrogen peroxide and which lose this property on boiling, were called by Bourquelot (83) "indirect oxidizing ferments" (*ferments oxydants indirect*), and in 1898 Linossier (273) gave them the name of peroxidases as signifying those substances whose function it is to decompose hydrogen peroxide and other analogous peroxides and thereby induce oxidations by means of these peroxides. The term "catalase" was proposed by Loew (278) for those ferments which decompose hydrogen peroxide into water and molecular oxygen without apparently being able to activate the oxygen of the peroxide toward readily oxidizable substances.

The peroxidases and catalases seem to be even more widely distributed in various living tissues of the plant and animal than the oxidases. To such an extent is this the case that the properties of these substances might almost be turned to account as a general chemical test for vital activity. It can certainly be said of any living tissue or organ that it is dead when it fails to show the reactions of the peroxidases and catalases. Thus Brocq-Rosseu and Gain (100), in their observations on the duration of the peroxidases in grains, found that all seeds which retained their germinating power contained peroxidases, and in corn peroxidases were recognized by these observers (99) in samples of the grain over two hundred years old. On the other hand, it was observed by these authors that the peroxidase activity outlasts the power to germinate by a hundred years. In other words, it would appear that peroxidase activity is one of the most characteristic and persistent properties of living material.

SOURCES OF PEROXIDASE AND METHODS FOR ITS PREPARATION.

Among plants the peroxidases are almost universally distributed. There are but few, if any, plant tissues which do not give peroxidase reactions at some stage of their growth and development. So, likewise, they are widely distributed in animal tissues and secretions; saliva, milk, pus, etc., show typical peroxidase reactions. By means of certain of the very sensitive peroxidase reagents employed by Kastle and Porch (246) in their study of the peroxidase reaction of milk, Doctor Roberts, working in this laboratory, has been able to stain a large number of the leucocytes in fresh blood smears, indicating that in the blood the peroxidase proper is confined to the white cells. Thus with a reagent containing cresol, para-phenylene diamin and hydrogen peroxide, the leucocytes are stained blue.

By precipitation with alcohol, Linossier (273) prepared a peroxidase, free from oxidase, from pus. In many instances plant peroxidases may be obtained free from oxidases by heating the aqueous extract to 70° C., at which temperature the oxidase is destroyed. Aso (16) has separated plant peroxidases from oxidases by fractional precipitation with alcohol, in which solvent the oxidases are soluble to a considerable extent.

As sources of peroxidase, Bach and Chodat (27) have employed the pumpkin (*Kürbisfrüchten*) and the root of the horse-radish (*Meerrettigwurzel*). In order to obtain the peroxidase, these authors proceed as follows: Two kilograms of finely grated horse-radish root are allowed to stand several hours at ordinary temperature in order to completely hydrolyze all glucosides that may be present. The mass is then digested for four to five days with 80 per cent alcohol in order to dissolve the essential oils. The reddish alcoholic extract is then poured off, the residue is washed with 80 per cent alcohol, pressed, and extracted with about 8 liters of 40 per cent alcohol. The 40 per cent alcoholic extract, which shows strong peroxidase reactions, is then reduced to small volume at 30° C. in vacuo, filtered, and absolute alcohol added until a turbidity is produced. The white precipitate thus produced is dissolved in a small amount of water, again precipitated with absolute alcohol, and dried in vacuo. In this way a yellowish white gummy mass is obtained which is very soluble in water and readily soluble in 40 per cent alcohol. As ordinarily obtained these peroxidase preparations strongly reduce Fehling's solution. By re-solution in water and re-precipitation with alcohol, peroxidase preparations may be obtained which no longer reduce Fehling's solution. The purest peroxidase preparations obtained by this method give ammonia and substances having the odor of pyridin on heating with caustic soda, but failed to show the ordinary reactions for proteid. On heating to boiling, solutions of the peroxidase were found to lose their activity; on standing, however, such boiled solutions regain their activity. That such is the case was first observed by Woods (163) in his study of the peroxidase of tobacco, and has been accounted for by Woods, and also by Aso (16), upon the supposition that the peroxidase is regenerated from zymogens which are more stable towards heat and various reagents than the ferment itself. Bach and Chodat (27) find that a second heating destroys the peroxidase altogether; so also an alcoholic solution of the ferment is destroyed by heating to the temperature of boiling alcohol. The interval required for the destruction of the enzyme has been found to vary with the concentration of its solution. Thus when diluted with twenty times its volume of water a given specimen which in its original dilution required eighteen minutes in boiling water for complete destruction, required but three minutes at this temperature when thus diluted. According to Bach (19) the peroxidase is a single enzyme, whose function is to activate hydrogen peroxide in the oxidation of substances containing labile hydrogen.

Bach and Tschermiack (32) have given detailed directions for the purification of peroxidase. No essential differences have been observed between the conduct of crude peroxidase and that of the purest preparations. The pure preparations were found to contain 6 per cent of ash; this ash was found to be iron-free, but to contain aluminium and manganese. Bach and Chodat (27) found that peroxidase, the chief constituent of oxidase, contains nitrogen and gives the pyrrol reaction. They conclude, however, that it is not a proteid since neither the raw product nor the purified enzyme show the protein reactions.

According to Bach and Chodat (27) the action of peroxidase is specific in that it strongly activates hydrogen peroxide and other peroxides in a large number of oxidation processes, such as the oxidation of pyrogallol, gallic acid, anilin, dimethylanilin, etc. They observed further that while it strongly activates small amounts of hydrogen peroxide, it is destroyed by larger amounts of the peroxide (*see also* Schoenbein (379), p. 474), and also that in the absence of hydrogen peroxide or a similar substance the peroxidase has no oxidizing power (*see also* Linossier (273)). Decidedly the most interesting observations recorded by these observers is that the peroxidase not only activates hydrogen peroxide and the peroxides resulting from the slow oxidation of various organic compounds such as ether, alcohol, and the essential oils, but that it also has the power of increasing the oxidizing power of the oxidases. As elsewhere pointed out, Moore and Whitley (306) argue from this that the oxidase is nothing more than a mixture of peroxidase and an unstable, naturally occurring peroxide (*see also* Bach and Chodat (28)).

Quantitative studies of the oxidation of pyrogallol by hydrogen peroxide and a peroxidase have also been made by Bach and Chodat (31) with the following results:

(1)

[Pyrogallol, 1 gram; hydrogen peroxide, 0.1 gram; peroxidase, from 0.01 to 0.1 gram, in 50 c. c.]

Peroxidase	0. 01	0. 02	0. 03	0. 04	0. 05	0. 06	0. 07	0. 08
Purpurogallin	0. 021	0. 042	0. 066	0. 083	0. 102	0. 123	0. 145	0. 166

(2)

[Pyrogallol, 1 gram; peroxidase, 0.1 gram; hydrogen peroxide, from 0.01 to 0.1 gram.]

Peroxide	0. 01	0. 02	0. 03	0. 04	0. 05	0. 06	0. 07	0. 08
Purpurogallin	0. 020	0. 042	0. 060	0. 078	0. 099	0. 121	0. 142	0. 168

(3)

[Peroxidase, 0.1 gram; hydrogen peroxide, 0.1 gram; pyrogallol, 1 to 4 grams.]

Pyrogallol	1. 0	1. 5	2. 0	3. 0	4. 0
Purpurogallin	0. 168	0. 205	0. 203	0. 208	0. 202

It would seem therefore that the amount of pyrogallol oxidized under these conditions is proportional to both the quantity of the peroxidase and of the hydrogen peroxide, but independent of the quantity of pyrogallol present, provided that the latter is in excess of the quantity capable of being oxidized within the given time by the several amounts of the peroxidase and hydrogen peroxide employed.

NATURE AND MODE OF ACTION OF THE OXIDASES, PEROXIDASES AND CATALASES, AND THE CHEMICAL RELATIONSHIPS EXISTING AMONG THESE SUBSTANCES.

The question still remains to be considered as to how these substances act as oxygen carriers. We have seen that according to Schoenbein they react by ozonizing the oxygen of the air, and in the case of the peroxidases, by converting hydrogen peroxide, an antozonide, into an ozonide, after the manner of lead acetate. On the other hand, according to Bach (18) the oxidases are substances having a special aptitude for forming peroxides. Similar views have been advanced by Kastle and Loevenhart (244). Thus according to the peroxide theory of oxidation, when molecular oxygen finds itself in contact with the complex autoxidizable substances contained in the plant cell, it combines with the same in much the same way that it unites with rubidium or benzaldehyde. There is produced under these circumstances a complex unstable peroxide which, in turn, can give up a part, if not all of its oxygen, to any oxidizable substance or acceptor that may happen to be present, or in the event that no other oxidizable substance is present, it may oxidize a part of itself.

In this manner we account for the oxidation of guaiacum, potassium iodide, and hydroquinon by atmospheric oxygen through the intermediate action of the vegetable oxidase. This theory also enables us to understand the instability of these substances.

Diagrammatically, these changes may be represented as follows:

(1) $$A + O_2 \overset{\text{(Oxidase)}}{=} AO_2,$$

and

(2) $$\overset{\text{(Oxidase)}}{AO_2 +} B = AO + BO,$$

or

(3) $$AO_2 + 2B = A + 2BO,$$

and

(4) $$AO_2 + A = 2AO.$$

In this connection see also Engler and Weisberg (164), supra.

In the above equations A is the autoxidizable substance or substances contained in the plant or animal which is the immediate precursor of the oxidase. AO_2 is the oxidase resulting from the union of A with molecular oxygen, and B is the substance oxidized by the oxidase, as, for example, guaiacum, phenolphthalin, or hydroquinon. If the change proceeds as indicated in equation (2), both the precursor of the oxidase and the second oxidizable substance (the oxidase reagent) will be completly oxidized, and the oxidase will not be regenerated as the result of the oxidation, but will be destroyed. On the other hand, if the oxidation proceeds according to equation (3), the precursor of the oxidase will be regenerated, and at the end of the process will be in a condition to again enter into the cycle of changes indicated in equations (1) and (3). Finally, it is conceivable that the oxidase may oxidize a second part of A, in which case, as indicated by equation (4), both the precursor of the oxidase and the oxidase itself will be destroyed. As a matter of fact, it is known that solutions of oxidases gradually lose their oxidizing powers; this is readily intelligible in the light of equations (1), (2), and (4), especially in view of the fact that all living tissues and extracts contain powerful reducing substances which in the processes under consideration would function as B in equation (2).

In support of the view that the oxidases are really peroxides, we may cite the following observations of Bach and Chodat (26): The fresh sap of the *Lathræa squamaria*, which contains an oxidase, was subjected to the action of a current of air and a 1 per cent solution of barium hydroxide was added drop by drop. A precipitate is formed under these circumstances which is found to contain barium, and when decomposed by sulfuric acid the resulting solution gave a blue coloration with potassium iodide and starch, but no reaction with titanic acid. Nitrites were also shown to be absent. Hence, according to these authors, the separation of the iodine from the potassium iodide could only have been brought about by an acylhydroperoxide. A similar experiment carried out on a specimen of the *Lathræa squamaria* sap which had lost its power to blue guaiacum gave a completely negative result. Hence the peroxide formation with the active sap depends on the presence of the oxidase, and leads to the belief that the oxidase itself is of a peroxide nature, or that it at least contains a peroxide as one of its constituents.

Schoenbein, in his paper on the catalytic action of organic materials (peroxidases and catalases) and their distribution in the plant and animal kingdoms ([383]), explains the activating and catalyzing power of such substances on the supposition that, like lead acetate, they convert hydrogen peroxide (an antozonide) into an ozonide (like lead peroxide), and that under the influence of the latter the former is actively decomposed with the production of water and molecular oxygen. Thus he proved that when lead acetate is added to a solution of hydrogen peroxide, lead peroxide (an ozonide) is formed, under the influence of which the hydrogen peroxide is actively decomposed; and that if lead acetate be added to hydrogen peroxide solution containing guaiacum, the latter is oxidized at the same time that a part of the hydrogen peroxide is decomposed, for the reason that the lead peroxide oxidizes the guaiacum at the same time that it decomposes the hydrogen peroxide. According to Schoenbein, therefore, what we now know as the peroxidases are those substances occurring in the secretions and tissues of animals and plants which have the power of ozonizing hydrogen peroxide or converting it into an ozonide. The catalysis or decomposition of the hydrogen peroxide he looked upon as a secondary phenomenon resulting from the action of the ozonide thus formed upon the hydrogen peroxide remaining unchanged. Lepinois ([263]) conceives that the decomposition of hydrogen peroxide takes place in such a way that where only a part of the oxygen is set free it is fixed by the guaiacum or guaiacol.

From their study of the hydrogen peroxide-guaiacum reaction, Kastle and Loevenhart ([244]) arrived at the conclusion that the peroxidases are substances which are capable of reacting with hydrogen peroxide to form peroxides, which are more vigorous oxidizing agents than hydrogen peroxide itself. This view regarding the nature of these substances has been concurred in by Bach ([20]). The decomposition of hydrogen peroxide and the mechanism of oxidations by means of this substance has formed the subject of a still further investigation by Loevenhart and Kastle ([275]). It is now known that hydrogen peroxide undergoes spontaneous decomposition into water and molecular oxygen; it is also known that it can effect the oxidation of many substances directly, such as formic aldehyde and sulfurous acid, without the intervention of an oxygen carrier. It is also a matter of common observation that its decomposition into water and molecular oxygen is greatly accelerated by various catalysts, such as spongy platinum, lead peroxide, manganese dioxide, etc., and also that its oxidizing powers are greatly increased by these same substances. It has also been established through the researches of Schoenbein ([383]) and through some observations of Loevenhart and Kastle ([275]) that, with but few exceptions, those substances which can bring about the decomposition of hydrogen peroxide catalytically can also greatly increase its oxidizing power; and in proportion as a substance is able to decompose the peroxide, so also can it accelerate oxidations by this substance to a corresponding degree. A good catalyst has been found to be a good oxygen carrier and, vice versa, a poor catalyst is a poor carrier. Finely divided platinum decomposes hydrogen peroxide very rapidly; it has been found also to be a powerful oxygen carrier. On the other hand, sugar charcoal decomposes hydrogen peroxide very slowly; it is a very poor oxygen carrier. It is evident, therefore, that oxidation by hydrogen peroxide in the presence of a carrier and its catalytic decomposition go often, if not always, hand in hand, so that the latter process, as has been pointed out by Spitzer ([407]), is often a measure of the former. It would seem, therefore, that all of these phenomena, widely differing as they appear at first sight, are in reality closely correlated and referable to a common cause, namely, the tendency on the part of the hydrogen peroxide to unite directly with oxidizable substances, forming thereby either a peroxide or some other complex unstable holoxide derivative which tends to part with its oxygen more easily than the hydrogen peroxide itself. This derivative, therefore, readily oxidizes some other substance to which one of its compounds stands in the relation of an oxygen carrier, or it gives up molecular oxygen, or both.

It is important for this assumption, of course, that such higher oxides and unstable addition-products of hydrogen peroxide with other substances should actually exist. In reality, we have abundant proof of their existence. In fact, as may be seen from the following, many such compounds are known. Thus in 1878, Schöne ([388], [389]) isolated a number of compounds of hydrogen peroxide with the alkalis and alkaline earths, such as the following:

$BaO_2.H_2O_2$, or H_2BaO_4;
$K_2O_2.2H_2O_2$, or $H_4K_2O_6$;
$Na_2O_2.2H_2O_2$, or $H_4Na_2O_6$.

All of these compounds were found by this observer to be very unstable and are obtainable in a state of purity only at very low temperatures. He therefore explained the catalytic decomposition of hydrogen peroxide by alkalis on the assumption that these hydrogen peroxide addition-products with the alkalis are first produced, thus:

$$2R\mathrm{OH} + 3\mathrm{H_2O_2} = \mathrm{H_4}R_2\mathrm{O_6} + 2\mathrm{H_2O},$$

and that these substances then undergo the following transformations:

$$(1)\qquad R_2\mathrm{H_4O_6} = R_2\mathrm{O_4} + 2\mathrm{H_2O};$$

$$(2)\qquad R_2\mathrm{O_4} + \mathrm{H_2O} = 2R\mathrm{OH} + \mathrm{O_3}.$$

He was led to assume the intermediate production of such peroxides as R_2O_4 for the reason that the compounds such as $H_4K_2O_6$ turned yellow during decomposition. The work of Schöne on these complex addition-products of hydrogen peroxide has been confirmed by the later researches of Forcrand (^{173}), who has obtained evidence not only of the existence of such compounds as H_2BaO_4 and H_2CaO_4, but also of still more complex derivatives such as $CaO_2 10H_2O_2$, and Moissan (^{304}) from his investigation of the unstable blue compound of chromic anhydride and hydrogen peroxide, reached the conclusion that it must be represented by the formula H_2CrO_5, or $CrO_3.H_2O_2$.

Similarly, in order to explain the great acceleration caused by small amounts of molybdic and tungstic acids in the oxidation of hydriodic acid by hydrogen peroxide, Brode (^{101}) has been led to assume the formation of permolybdic and pertungstic acids as the result of the action of the peroxide on the catalyzer, while nine years previously Cammerer (^{109}) had obtained permolybdic acid, $2MoO_3.H_2O.H_2O_2$, and pertungstic acid, $WO_3.H_2O.H_2O_2$, by boiling the ordinary acids with hydrogen peroxide, and still more recently Pissarjewsky and Mellikoff (^{325}) and also Muthmann and Nagel (^{308}) have obtained similar acids and their salts, some of the latter being very unstable and even explosive. According to Job (^{226}) cerous salts act as oxygen-carriers in the presence of hydrogen peroxide, probably through the alternate formation and decomposition of cerium peroxide.

Petrenko (^{319}) also, while studying the action of hydrogen peroxide on sodium arsenate, obtained a compound having the composition $Na_9As_3O_{17}.21H_2O$. This he found to be a hydrogen peroxide derivative having the following constitution: $3Na_3AsO_4.5H_2O_2.16H_2O$. So also Kazanesky (^{248}) obtained the compounds $K_2CO_3.2H_2O_2.12H_2O$, and $K_2CO_3.3H_2O_2$, and similarly Staedel (^{410}) found that on adding a 90 to 95 per cent solution of aqueous hydrogen peroxide to a concentrated solution of cadmium chloride, a compound was obtained which crystallized in silky needles containing 23 per cent of hydrogen peroxide, the theory for $CdCl_2.2H_2O_2$ being 27.09 per cent.

Jones and his co-workers ([232], [233]) have recently investigated the lowering of the freezing point of certain salts and acids in aqueous hydrogen peroxide as a solvent. In discussing the abnormal lowering of the freezing point of certain of these salts, such as potassium nitrate, in this solvent, these observers make this significant statement: "The most probable explanation of the above results, all things considered, seems to be that there is union between the molecules of the salts investigated and the molecule of hydrogen peroxide."

According to Manchot ([284]) the apparent reductions by means of hydrogen peroxide are in reality due to the formation of more highly oxidized primary products, which ultimately break down into final products which are less highly oxidized than the hydrogen peroxide itself. (*See also* Kastle and Loevenhart.)

There seems to be abundant evidence, therefore, that hydrogen peroxide is not only able to form peroxides by double decomposition, but that it also frequently combines directly with various substances to form complex unstable addition products, and that oxidations by means of this substance are often greatly accelerated and its decomposition greatly hastened by the formation and subsequent decomposition of these complex substances. It would seem logical, therefore, to look upon the peroxidases as substances capable of forming unstable peroxides from hydrogen peroxide by double decomposition, or of combining directly with hydrogen peroxide to form unstable holoxide (Traube) or moloxide (Engler) derivatives, possessing greater powers of oxidation than hydrogen peroxide.

Thus, if we designate the peroxidase by P, and the second oxidizable substance by B, the oxidations effected by the peroxidase might be represented diagrammatically as follows:

$$P + H_2O_2 = PO_2 + H_2O,$$
$$\text{and } PO_2 + B = PO + BO,$$
$$\text{or } PO_2 + 2B = P + 2BO,$$

$$\text{or } P + H_2O_2 = H_2PO_2,$$
$$\text{and } H_2PO_2 + B = P + BO + H_2O.$$

As already pointed out, these views respecting the mode of action of the peroxidases are shared by Bach, who has observed that when a mixture of a peroxidase and hydrogen peroxide is allowed to stand for some time both disappear from the solution, a fact which indicates the mutual interaction of these two substances. According to Bach and Chodat ([27]) the peroxidases exert not the slightest oxidizing action in the absence of the peroxide. On the other hand, they found that it can activate not only hydrogen peroxide but also organic peroxides, such as ethyl-hydroperoxide, $C_2H_5O_2H$. Further, they have shown that the system (peroxidase + peroxide) accomplishes precisely the same kind of oxidations as are accomplished by the oxidases, and that between the two sorts of oxidizing agents there is the closest sort of agreement, and in this connection they have made a number of interesting observations which would seem to indicate that the vegetable oxidases are not single enzymes but mixtures of peroxidases and peroxide-forming substances, to which they have given the name "oxygenase."

THE OXIDASE A MIXTURE OF PEROXIDASE AND OXYGENASE.

As early as 1898, Linossier (273), in discussing the function of the peroxidases, stated that the oxidases fix the oxygen of the air, forming peroxides which are destroyed by the peroxidases as fast as they are formed.

In the course of their investigations on the "Function of Peroxides in the Living Cell" Bach and Chodat (27) found that by the fractional precipitation of an aqueous solution of the oxidase of a fungus, *Lactarius vellereus*, by alcohol, two fractions could be obtained possessing markedly different properties. The first of these is almost insoluble in 40 per cent alcohol and was found to have the properties of a weak oxidase. The second substance is soluble in 40 per cent alcohol but insoluble in pure alcohol, and has no oxidizing powers. This second substance, however, was found to impart great activity to hydrogen peroxide as an oxidizing agent, and not only has it the power of conferring activity upon hydrogen peroxide, but also upon organic peroxides, such as ethyl hydro-peroxide, etc., and what is even more interesting, it was also found to impart activity to the weak oxidase composing the first fraction obtained in the precipitation of the *Lactarius* extract. In a recent paper these authors (31) give the following interesting results of their experiments with these substances:

Pyrogallol.	Horse-radish peroxidase solution.	Lactarius peroxidase solution.	Lactarius oxygenase	Oxygen absorbed.	Carbon dioxide evolved.
	c. c.	*c. c.*	*Gram.*	*c. c.*	*c. c.*
1 gram.	15	....	....	0.5	0.1
1 gram.	....	....	0.059	3.1	1.1
1 gram.	15	....	0.059	9.9	5.5
1 gram.	....	15	....	0.2	0.0
1 gram.	....	....	0.05	3.1	1.1
1 gram.	....	15	0.05	11.0	6.8

These results show conclusively that the oxidizing power of the oxygenases is greatly increased by the peroxidases in general, and still more greatly increased by the peroxidase from the same source as the oxygenase itself.

According to Bach and Chodat (28), therefore, the oxygenases are of the nature of substituted peroxides. They are exceedingly unstable and have, as compared with the peroxidases, only a limited distribution in the vegetable kingdom. On the other hand, the peroxidases are characterized by great stability. Thus the peroxidase of the horse-radish root is not completely destroyed by a single boiling of its solution. The peroxidases occur in practically every plant thus far examined for them, and they have likewise been found widely distributed in the tissues and secretions of animals, such as the leucocytes, milk, saliva, etc. Like the oxidases, the peroxidases have been found to contain manganese, and to this element Bach and Chodat (31) ascribe their activity. They are also disposed to regard them as true ferments, although they gradually lose their activity and ultimately disappear as the result of the oxidations which they bring about.

It would seem, therefore, that it is not the oxidase but rather the peroxidase which is the most important agent in plant and animal oxidations, inasmuch as it would render active the oxygen occurring in any peroxide combination whatsoever, whether it be hydrogen peroxide, an organic peroxide, or an oxygenase.

Indeed, according to Moore and Whitley (306) the peroxidases are the only true ferments participating in biological oxidations. According to these authors, Bach's so-called oxygenase is merely an unstable peroxide resulting from the action of the oxygen of the air on some readily oxidizable substance contained in the plant or animal tissue. From their standpoint the only essential differences between a tissue showing oxidase reactions and one showing only peroxidase reactions is that the former contains, in addition to the peroxidase, a store of naturally formed peroxides, which are very unstable toward heat, whereas the latter contains only the ferment (peroxidase). In this connection it was long ago pointed out by Bach (18), and also by Kastle and Loevenhart (244), that the oxidizing ferments (oxidases) were not true ferments for the reason that they present many close resemblances to the organic peroxides, and for the further reason that they are not true oxygen-catalysts in the sense of being unable to accomplish the oxidation of practically unlimited amounts of oxidizable material. In the writer's opinion, therefore, the objections which have been recently urged against the prevailing conceptions regarding the oxygenases are well taken. It should be borne in mind, however, that the precursors of the oxygenases are unstable toward heat and hence possess, to some degree at least, the characteristics of biologically active substances.

Certain oxidases, such as aldehydase and the glycolytic enzyme, peroxidases and catalases have been found in the blood, and also certain more stable oxygen-catalysts, such as hemoglobin and its iron-containing derivatives, and in the case of certain of the invertebrates, hemocyanin, the oxidizing powers of which are not destroyed upon boiling. In this connection it is interesting to note that all of the oxygen carriers of the blood of whatever nature are contained in the formed elements and not in the plasma or serum. Even the cellular elements exhibit well marked and characteristic differences in their conduct toward oxidase and peroxidase reagents. Furthermore, various observers do not seem to be agreed with regard to the oxidizing properties shown by the formed elements of the blood. Thus it was shown by Klebs in 1868 ([250]) that pus has the power of bluing guaiacum directly. On the other hand, according to Linossier ([273]), if one uses a freshly prepared tincture of guaiacum the superficial portion of the resin having been previously removed by washing with alcohol, the blue color is not produced upon addition of pus, but only after the addition of hydrogen peroxide. Hence, according to Linossier, pus (or white blood corpuscles) contains a peroxidase, but no oxidase. More recently, however, Meyer ([300]) has shown that in the perfectly fresh state the thick leucocyte layer obtained by centrifugalizing the blood of patients suffering with myelogenous leucemia, gives no reaction with guaiacum. If, however, water be added and the mixture shaken a few moments, a very intense blue color develops. On the other hand, if the corpuscles be shaken with serum or with an isotonic salt solution no blue color develops. According to Meyer this shows that the leucocytes contain an oxidizing ferment (oxidase) which first becomes liberated or activated by the solution of the cells in water. Similarly a few drops of leucemic blood diluted with such a large amount of water that scarcely any blood color was visible gave with guaiacum a deep blue color. He also observed that fresh untreated pus gives no guaiacum reaction, but that when shaken with distilled water it gives the guaiacum reaction at once. He also found that these aqueous extracts of pus and leucocytes from myelogenous leucemia could oxidize phenolphthalin. He concludes, therefore, that the polynuclear and probably also the mononuclear, neutrophile cells contain a substance extractable with water which blues guaiacum without the addition of hydrogen peroxide, or in other words, that it contains an intracellular oxidizing ferment killed by boiling, but not at 73 ° C., and which, as found for other oxidases by Bach and Chodat, contains an oxygenase and a peroxidase.

Reference has already been made to the fact that A. and L. Lumière and Chevrotier ([281]) have prepared a protoplasmic extract of blood corpuscles which exhibits the properties of an oxidase to a marked degree, as shown by its power to oxidize guaiacum, guaiacol, hydroquinon, etc.

In the light of these facts there can scarcely be any doubt that certain of the leucocytes contain both oxidases (see also Portier (331, 332,)) and peroxidases.

Dr. Norman Roberts, working in the Hygienic Laboratory on the peroxidase activity of the urine in health and disease, has examined the urines of 175 diseased persons and also the urines of a considerable number of normal individuals for peroxidases. As nearly as he has been able to discover, the peroxidase reaction of urine is not specifically characteristic of any of the diseases studied, except such as involve an active inflammation of the genito-urinary tract. It does seem to be constant, however, for active inflammations of this character and is due to the leucocytes and possible in some instances to certain epithelial cells which these urines contain. He has also shown that in fresh blood smears and fresh sections of highly vascular tissues the majority of the leucocytes are stained blue on treatment with the peroxidase reagent (a solution containing cresol, para-phenylene diamin, and hydrogen peroxide), whereas the red cells of the blood and the cells characteristic of the tissues examined remained unstained. (See also Winkler (453).) As is well known, pus also actively decomposes hydrogen peroxide.

In the light of these facts there can scarcely be any doubt that certain of the leucocytes contain oxidases, peroxidases, and catalases.

We have seen further that Senter (400) has prepared a very active catalase from defibrinated blood, free from hemoglobin and from any oxidase or peroxidase. While, therefore, the blood undoubtedly contains oxidases, peroxidases, and catalases, it has gradually come to be recognized that its oxygen-carrying power can not be due entirely to oxidases and peroxidases, for the reason that this oxygen-carrying power persists after boiling, and after treatment with acids and alkalis. Indeed it seems to persist as long as the blood pigments are not deprived of their iron. Thus according to Moitessier (305) the so-called peroxidase reaction of the blood, upon which is based most of the chemical tests for blood, is not really due to a peroxidase but to hemoglobin and hematin. According to this author the non-ferruginous blood pigments, such as hematoporphyrin, do not exhibit such reactions. Czyhlarz and von Fürth (131) have also arrived at the conclusion that the so-called peroxidase reaction of the blood is due to hematin and not to a peroxidase. Lesser (267) also obtained the guaiacum reaction with blood which had been boiled. He also is of the opinion that the reaction is due to the blood pigment and that the iron-free derivatives of hemoglobin do not give it. Whitney (450) also concludes that it is the iron of the hemoglobin and its iron-containing derivatives which are responsible for the guaiacum test and similar reactions. Buckmaster ([104, 105]) also regards the oxidizing power of blood in the presence of hydrogen peroxide as due to a pseudo-peroxidase and in some way dependent on the part played by iron in the hemoglobin molecule, although the precise way in which the iron acts is still obscure. Studies on the oxygen-carrying power of blood toward solutions containing hydrogen peroxide, phenolphthalin, and alkali have also been made by Kastle and Amoss ([241]) and later by Kastle ([240]), who has recently recommended this reaction as a chemical test for blood. It has been shown that the amount of phenolphthalin oxidized both in the presence and absence of hydrogen peroxide is proportional to the quantity of hemoglobin present, and that while the oxygen-carrying power of the blood is somewhat diminished, it is by no means entirely destroyed even after repeated boiling. The formed elements of the blood therefore contain oxidases, peroxidases, catalases, and a more stable oxygen-carrier, viz, hemoglobin, or, in certain of the lower animals, hemocyanin. To the catalases we owe the active decomposition of hydrogen peroxide into water and molecular oxygen, as shown by blood and pus. To the oxidases we owe the oxidation of guaiacum, phenolphthalin, and similar substances, as shown by aqueous solutions of the leucocytes. To the peroxidases we owe those oxidations which take place only in the presence of hydrogen peroxide or a similar compound, as also shown by the leucocytes. These properties are all lost on boiling. On the other hand, certain oxidations by means of hydrogen peroxide are induced by hemoglobin and its iron-containing derivatives, and hence we find that the blood can still induce certain oxidations by hydrogen peroxide even after it has been boiled. The fact that these carriers become inactive with the splitting off of the iron which they contain is a matter of great interest in view of the part played by iron and manganese in the activation of the oxidases and in view of the relation of iron to active nucleo-proteids.

The fact that hemoglobin and its iron-containing derivatives oxidize various chromogenic substances in the presence of hydrogen peroxide has been turned to practical account in hematological and forensic investigations. This subject has recently been discussed at length by Kastle ([240]) in a communication entitled "Chemical Tests for Blood," in which there is given a reasonably complete bibliography of the extensive literature of this subject.

IRON, COPPER, AND MANGANESE IN THEIR RELATION TO THE OXIDIZING FERMENTS. ARTIFICIAL OXIDASES, PEROXIDASE ACCELERATORS, AND AUXILIARY OXYGEN CARRIERS.

According to Spitzer ([407]) the oxidizing power of animal tissues is referable to certain nucleo-proteids which they contain, and the oxidizing power of these substances is in turn referable to combined iron. In this connection it is of interest to note that so far as is known the most stable and most perfect oxygen catalysts occurring in the animal organism contain either copper or iron. According to Wells (verbal communication) the blood of certain marine forms has been found to contain zinc. The fact that hemoglobin and its iron-containing derivatives are all capable of inducing the oxidation of such substances as guaiacum, phenolphthalin, etc., by means of hydrogen peroxide or other compounds of this nature, whereas the iron-free blood pigments can not accomplish such oxidations, speaks strongly in favor of the assumption that the activity of such oxygen carriers is dependent on iron in organic combination. (*See* Kastle (240)), "Chemical Tests for Blood," Bulletin No. 51, Hygienic Laboratory.) In this connection it is also of interest to note that Floyd (171) found nearly twice as much ash in the skin of the negro as in that of whites, and nearly twice as much iron in the ash of the negro's skin as in the ash of whites. According to this author the pigment appears to originate in the outer layer of the true skin, and in all probability is the product of the alteration of the red coloring matter of the blood. It has also been shown experimentally that certain iron salts accelerate biological oxidations. Thus Battelli and Stern (36) have found that the quantity of carbon dioxide produced by the action of an extract of the muscle of the horse or dog on calcium lactate is considerably increased by the presence of small amounts of ferrous sulfate.

It has been shown by Bertrand (56, 57, 58) that the oxygen-carrying power of laccase is in some way associated with the presence of manganese. By fractional precipitation with alcohol he was able to resolve a certain specimen of laccase into two portions, one of which was poorer and the other richer in manganese than the original sample. The oxidizing powers of these three specimens were proportional to their manganese content, as may be seen from the following table:

No. of specimen.	Quantity of manganese in ash.	Oxygen absorbed in 1½ hours by 50 c. c. of a 2 per cent solution of hydroquinon in the presence of 0.2 gram of the specimens.
	Per cent.	*c. c.*
1	0.159	19.1
2	.126	15.5
3	.098	10.6

He also succeeded in showing that the laccase contained in lucerne is poor in manganese and comparatively inactive toward hydroquinon. In the presence of a small amount of manganese (1 milligram in the form of the sulfate) the oxidizing power of lucerne laccase is greatly increased. That such is the case is evident from the quantities of oxygen absorbed by a solution of hydroquinon in the presence of manganese alone, lucerne laccase alone, and a mixture of manganese and laccase, thus:

	Oxygen absorbed.
	c. c.
1. Manganese alone	0.3
2. Lucerne laccase alone	.2
3. Laccase + manganese	6.3

In other words, the effect of the manganese on laccase poor in this constituent was to increase the oxygen absorption twenty-five times. Other metals, such as iron, aluminium, cerium, zinc, copper, calcium, magnesium, and potassium, were found to be incapable of increasing the oxidizing power of laccase.

He therefore arrived at the conclusion that the oxidizing ferments as we ordinarily recognize them consist in reality of two portions, one organic and very unstable with which we associate those properties usually characteristic of the ferments as a class, and a second portion, which might be called the co-ferment, mineral or organic in its nature, and which with the first substance forms the really active system. Bertrand ([59]) therefore is disposed to regard manganese as the co-ferment of laccase, just as calcium is the co-ferment of pectase, and hydrochloric acid the co-ferment of pepsin.

In a later communication Bertrand ([56, 57]) proved that various manganese salts can bring about the oxidation of various oxidizable substances, such as hydroquinon, etc., in the air, and that the quantity of oxygen absorbed varies with the nature of the manganese salt employed, being greater with the manganese salts of the organic acids. The several amounts of oxygen absorbed by hydroquinon in the presence of various manganese salts are shown in the following table:

Salt of manganese.	Oxygen absorbed.	Salt of manganese.	Oxygen absorbed.
	c. c.		*c. c.*
Nitrate	1.5	Acetate	15.7
Sulfate	1.6	Salicylate	16.3
Chloride	1.8	Lactate	17.6
Formate	7.4	Gluconate	21.6
Benzoate	15.3	Succinate	22.1

It would seem, therefore, that those manganese salts which are most easily hydrolyzable are the most efficient oxygen carriers. According to Bertrand, therefore, when a manganese salt finds itself in contact with water it hydrolyzes in the sense of the equation—

$$R''\text{Mn} + \text{H}_2\text{O} = R''\text{H}_2 + \text{MnO}.$$

As is well known, however, manganous oxide is spontaneously oxidizable, and in the course of this oxidation molecular oxygen is split into two atoms, one of which combines with the manganous oxide to form the peroxide, the other going to oxidize the hydroquinon or other oxidizable substance, which ordinary molecular oxygen is powerless to oxidize. Thus

$$MnO + O_2 = MnO_2 + O,$$

and

$$C_6H_4(OH)_2 + O = C_6H_4O_2 + H_2O.$$

In the presence of an acid, $R''H_2$, and a substance like hydroquinon the latter is oxidized. Thus a further amount of hydroquinon is oxidized and the manganese salt regenerated, thus:

$$R''H_2 + MnO_2 = R''Mn + H_2O + O,$$

and

$$C_6H_4(OH)_2 + O = C_6H_4O_2 + H_2O.$$

In harmony with this view Bertrand proved that while manganese peroxide is stable in dilute acids it is reduced on adding hydroquinon, with the production of quinon and a manganous salt. He was therefore led to consider the oxidases whose oxidizing powers are so greatly intensified by a manganese salt as special combinations of manganese and an acid radicle, the latter probably of a proteid nature and partaking of the nature of a ferment and having just the affinity necessary to maintain the metal in solution. According to this conception the manganese would be the really active element of the oxidase, so far as the activation and transfer of oxygen is concerned, whereas the acid albuminoid radicle would impart to the ferment its other properties, such as its conduct toward heat, solubility, etc. According to Rey-Pailhade (343) the reducing ferment which he has described under the name of "philothion" possesses the properties of the acid albuminoid radicle of the oxidases.

Other observers have found manganese in oxidases. Thus Lepinois (264) found both manganese and iron in the oxidase of the roots and leaves of aconite and belladonna. Carles (110) found manganese in quantity in the oxidase of valerian root. According to Vitali (440) the oxidase of pus contains a trace of manganese, and to this it owes its oxidizing properties. Aso (15) likewise found both manganese and iron in the ash of the oxidase of tea leaves. Portier (332) has also shown that the activity of the oxidase of the branchies of *Artemis exoleta* is generally increased by the addition of small amounts of sulfate of manganese.

According to Bach and Chodat (31) manganese is also the active agent of the peroxidases. Kelley (249) has recently shown that pineapple plants containing a high percentage of manganese contain a more active oxidase than plants which have only small percentages of this element.

On the other hand, oxidases have been obtained which contain no manganese. Thus Sarthou ([357, 359]) found the oxidase of *Schinus molle* to contain iron, calcium, and sodium, but no manganese; according to this author the oxidizing power of this oxidase is proportional to its iron content. Vadam ([438, 439]) found iron but no manganese in the ash of an oxidase from hellebore. According to Stoecklin ([412]), manganese is not present in the ash of the oxidase from horseradish.

It is evident, therefore, that certain metals, such as iron, manganese, and copper, one or more of them, enter into the composition of the oxygen carriers present in the living organism as essential ingredients. In this connection it is interesting to note that small amounts of manganese greatly accelerate a number of chemical processes. Thus according to Villiers ([441]) if one boils equal volumes of a saturated solution of oxalic acid and hydrochloric acid containing 25 per cent of HCl, and nitric acid equally dilute, there is not produced any disengagement of gas, even after a long time; on the other hand, if one adds to the solution a trace of a manganese salt the action develops instantly and there is produced a regular disengagement of carbon dioxide and nitrogen. This author has compared the action of a manganese salt to that of a mineral ferment (*ferments mineraux*). In another communication he ([442]) describes the use of small amounts of a manganese salt in the destruction of organic matter in toxicological analysis. Gigon and Rosenberg ([193]) have observed that the presence of small amounts of manganous or ferrous sulfate increases very markedly the digestion of starch by the diastatic blood ferment and by the pancreatic diastase.

Attempts have been made, therefore, to prepare artificial oxidases by means of certain manganese and iron compounds, and some observers have pointed out various analogies existing between certain metallic salts and the oxidases. Thus according to Trillat ([436]) when a small quantity of manganese chloride is added to a dilute solution of fresh egg albumin (3 parts to 100 of water) and the solution made faintly alkaline with caustic soda or potash there is produced a solution which in the raw state rapidly turns brown in the air, the change of color beginning on the upper surface of the liquid. In contact with the air this solution has been found to blue guaiacum and to oxidize hydroquinone with the production of quinone, and pyrogallic acid to purpurogallin. Thus with a solution of alkali alone a given quantity of pyrogallic acid gave 0.102 gram of purpurogallin, whereas under the same conditions the albuminous solution containing manganese gave 0.617 gram of purpurogallin. It was observed, further, that the oxidation of the phenols is accompanied by the evolution of carbon dioxide. With certain colloids the artificial oxidase resulting from admixture with the manganese salt could be precipitated with alcohol and the precipitate redissolved with water without losing its oxidizing powers. For the most part heat destroys the oxidizing power of such solutions. Thus when heated to 105° C. for twenty minutes the solution no longer oxidizes guaiacum nor certain diphenylmethane derivatives. The effect of heat is also seen in the several amounts of oxygen absorbed by pyrogallic acid under the influence of the fresh and heated solutions; thus:

	Absorption in cubic centimeters.		
1. With the fresh unboiled solution the following amounts of oxygen were absorbed	45.0	38.0	47.0
2. With the boiled solution	0.0	5.0	3.0

It is evident, therefore, that colloidal solutions of manganese hydroxide obtained by the action of caustic soda on manganese salts in the presence of albumin and similar colloidal substances exhibit properties closely resembling those of the natural oxidases.

Garrigou (180) has found certain metals to exist in a colloidal condition in mineral waters. According to this author, therefore, such substances possess the properties of natural oxidases, and to them he ascribes the beneficial results which attend the drinking of such waters and which are the result of more vigorous oxidations in the tissues. A. and L. Lumiére and Chevrotier (280) have confirmed the work of Trillat (436) on the oxidizing power of colloidal solutions of manganese and the general analogy of such solutions to the oxidases. According to these authors, colloidal solutions of any metal capable of existing in two or more states of oxidation should exhibit properties similar to those shown by the oxidases, the state of division of the colloidal substance also determining the oxidizing power of the substance. As a matter of fact, they found that emulsions of iron and cerium in albumin, gelatin, or gum, have the power to blue guaiacum, oxidize hydroquinon, pyrogallol, guaiacol, and para-phenylene diamin, but less actively than emulsions of manganese. These authors also sought to utilize these properties in destroying the bacterial poisons, since it is known that such poisons are destroyed by powerful oxidizing agents. As a matter of fact, they found that the death of an animal by tetanus toxin was greatly delayed by the administration of these artificial oxidases, and that with a slightly acid oxidase and tetanus toxin the animal did not show the slightest sign of intoxication.

Robin and Bordet (350) have also investigated the action of artificial oxidases in infectious diseases and have arrived at the conclusion that the colloidal metals, especially manganese, promote oxidation in the tissues and intensify metabolism.[a] They claim also to have confirmed the work of A. and L. Lumiére and Chevrotier (supra) on the curative action of such substances. Fouard (174) has observed that the halides of the alkalis and the alkaline earths exercise a catalytic action in the fixation of oxygen by the polyphenols, and that the chlorides of the rare earths act even more vigorously as oxygen carriers (175). In the title of the latter article, (175), he refers to these reactions as of the oxidase type, and yet there is nothing to indicate that the activity of these carriers is destroyed by heat, so that, to my mind, the analogy is only the product of a very active imagination.

Martinand (288) has also pointed out that the oxides of the alkalis and alkaline earths which form soluble peroxides and percarbonates, give reactions similar to organic peroxidases. He calls attention to certain analogies existing between the oxides of the alkalis and the alkaline earths and the organic oxidases on the one hand and to those existing between certain metallic salts and the peroxidases on the other. He is of the opinion that these inorganic oxidases can be considered as similar to the organic oxidases in that the former are made up of a peroxidase, which is a salt of the metal, and an oxygenase, which is the peroxide formed by the action of the air on the salt. Like the organic oxygenases, the inorganic oxygenase can be replaced by hydrogen peroxide. These analogies fall short, however, in that they fail to take into account the destructive action of heat on the oxidases and peroxidases. Wolff (455) has shown that certain mineral salts can play the part of peroxidases. Thus, if a trace of ferrous sulfate (less than one part per million) be added to an old tincture of guaiacum, or to a fresh tincture containing a trace of hydrogen peroxide, a very intense blue coloration is obtained. On heating the solution containing ferrous sulfate and hydrogen peroxide, it loses its power to blue guaiacum, and traces of mineral acids prevent the bluing of guaiacum by the ferrous sulfate and hydrogen peroxide just as they prevent the action of the peroxidases, the dosage required to inhibit the reaction being the same in both cases. According to this author these reactions closely resemble those produced with plant extracts containing peroxidase, such as extract of malt, etc., and he is of the opinion that special interest attaches to these observations in view of the fact that salts of iron, like the peroxidases, are very widely distributed among living things. He has shown (456) further that certain colloidal compounds of iron are practically identical with the peroxydiastases (a name recently proposed by

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[a] In this connection see also Sée (398) and Schade (360).

Bertrand for the peroxidases). Thus with infinitesimal amounts of colloidal ferrocyanide of iron he claims to have been able to reproduce all of the reactions of the peroxidases. Thus it is filterable without loss of activity, its activity is weakened after one minute's boiling, and traces of mineral acids reduce its activity. It is also sensitive to an excess of hydrogen peroxide, as has been observed by Bach and Chodat ([27]) for the plant peroxidases. Other compounds of iron and cyanogen exhibit similar properties, although less active than the ferrocyanide. In another communication, entitled "Artificial Peroxydiastases," Wolff ([457]) points out that ferrous ferrocyanide acts in all respects like a natural enzyme. On the other hand, Wolff and Stoecklin ([460]) have found that while colloidal ferrous ferrocyanide acts like a peroxidase toward phenols, it fails to accelerate the oxidation of hydriodic acid by hydrogen peroxide. They conclude, therefore, that the catalytic action of vegetable peroxidases, such as extract of malt, on this reaction, is due to a special enzyme which may be eliminated by careful purification of the peroxidases. Continuing these investigations, Wolff ([458]) has shown that a feebly alkaline solution of ferrous ferrocyanide acts as an oxidase toward hydroquinone. He also points out that the alkalinity of the liquid plays a principal rôle in such oxidation phenomena. Thus the manganous salts employed by Bertrand ([56, 57, 58]) in his studies of the effect of manganous salts on the oxidation of hydroquinon, were always found to be alkaline toward alizarin sulfate, helianthin, and even in certain instances to turmerol. It was also shown by Wolff that the activity of neutral manganous salts, such as the sulfate is considerably increased by the addition of traces of pyridin, which does not precipitate manganese from its solutions.

Euler and Bolin ([168]) have also studied the oxidation of hydroquinone in alkaline solution under the influence of manganese salts. The relationship of the manganous salt and alkali is compared to that of the enzyme and co-enzyme. These authors have also shown that laccase has no action on hydroquinone in the absence of manganous salts, thereby confirming the work of Bertrand ([57, 58]). They showed further that laccase is not of the enzyme type, since solutions of it could be boiled for three minutes without destroying their activity. It was also found that salts of the hydroxy-acids, such as Rochelle salts, sodium citrate, calcium glucinate, and sodium mucate, accelerate the oxidation of hydroquinone in a marked manner when manganese salts are present, and these authors have suggested that laccase owes its activity to the presence of such salts.

According to Stoecklin ([413]), iron tannate can act as a peroxidase, causing the oxidation of guaiacol and tyrosin and the conversion of alcohol into aldehyde by hydrogen peroxide.

During the last two or three years Dony-Henault (143) and his co-workers have carried out a number of investigations on the subject of the oxidases. According to this author the oxidizing action of laccase is not really due to a specific enzyme but to the presence of manganese salts, the activity of which is stimulated by hydroxyl ions. He is inclined to the opinion that too much stress has been laid on the inhibition of catalytic processes by heat, as indicative of the action of enzymes. On the other hand he is of the opinion that in the presence of colloids, manganese salts would be decomposed in aqueous solution by heating to 100° C., and thereby lose their oxidizing power. Artificial laccase has been prepared by this author (144) by adding iron formate to blood serum and twice precipitating with alcohol. The substance thus obtained was found to show the reactions characteristic of natural laccase, but much less intensely. Still other artificial laccases were prepared by precipitating gum arabic with alcohol in the presence of manganous and other salts. A very active preparation was obtained by precipitating a solution containing 10 grams of gum arabic, 1 gram of manganese formate, and 0.4 gram of crystallized sodium carbonate in 50 c. c. of water, with alcohol. The precipitate was filtered off, redissolved in water, filtered, and reprecipitated. This second precipitate when washed and dried constituted the active, artificial laccase. The fact that artificial laccases can be obtained without resorting to the use of albuminous substances in these preparations, as was done by Trillat (436), indicates that Bertrand's idea that laccase contains an acid proteid radical is incorrect. Dony-Henault is of the opinion, therefore, that laccase as a distinct oxidizing enzyme does not exist. He explains the hardening and blackening of the juice of the lac-tree as due to the action of manganese in the presence of alkalis.

This author has also criticised all previous work on the oxidases on the ground that whereas in the study of the digestive ferments we have employed for the investigation the true substratum upon which they normally act, thus for diastase we use starch and for invertase, cane sugar, the action of the oxidases has been studied upon artificial or fictitious substrata, such as guaiacol, hydroquinone, etc. He therefore distinguishes between diastatic or enzymic action and catalytic action, the former being specific whereas the latter is variable or general, and he concludes that for the reason that the known oxidizing ferments act upon a number of oxidizable substances, they can not be true enzymes. He is of the opinion, therefore, that the belief in the existence of oxidases proper does not rest upon a sufficiently rigorous experimental basis. On the other hand it would seem preposterous to assume the existence of several dozen or a hundred distinct lipolytic ferments in the liver for the reason that an aqueous extract of this organ can hydrolyze a large number of ethereal salts, and it would indeed be surprising to find that an oxidase, such as laccase, could oxidize but one substance, viz, laccol, and not other phenols, especially in view of the close analogy existing between this compound and the phenols as to constitution and properties. On the other hand certain of the oxidases are apparently as specific in their effects as any other ferment; thus tyrosinase has the power of bringing about the oxidation of tyrosin, whereas the latter is not acted upon by laccase. Effront (156) is of the opinion that the individuality of tyrosinase and laccase has been established definitely, so that conclusions of this kind are open to considerable objection.

Sjolleman (403) states that by adding a solution of Seignette salt to a solution of manganous sulfate or acetate, and then hydrogen peroxide and then sodium hydroxide, one obtains a dark brown solution of manganous oxide, which shows itself to be colloidal on dialysis and toward electrolytes, and which retains its dark brown color for several weeks. This solution has been found to give characteristic reactions for the oxidases, and to decompose hydrogen peroxide like potassium permanganate. The author calls attention to the occurrence of manganese in plants as of interest in this connection, and states that manganese probably plays an important rôle in the oxidations occurring in the soil. (*See* Schreiner and Reed (390).

PEROXIDASE ACCELERATORS AND AUXILIARY OXYGEN CARRIERS.

In his investigation of the ozonic reactions of certain mushrooms it was shown by Schoenbein (378) that guaiacum blue (believed by him to be an ozonid), which results from the action of the juices of such fungi on tincture of guaiacum, can in turn oxidize other oxidizable substances, as a result of which action the guaiacum blue is reduced and decolorized. It has been recently shown by Kastle (239) that peroxidase oxidations also are in many cases greatly accelerated by the action of certain phenols. Thus it was observed by Kastle and Porch (246) that the oxidation of guaiacum, paraphenylen diamin, and phenolphthalin by hydrogen peroxide under the influence of the peroxidase of milk is greatly accelerated by phenol, the cresols, and by beta-naphthol, and similar results have been obtained by Kastle (239) with peroxidases from a number of different sources. According to this author the peroxidase accelerators probably act in the capacity of auxiliary oxygen carriers and are themselves more or less completely oxidized in such processes. Thus if *P* represents the peroxidase, *A* the auxiliary oxygen carrier, and *B* the peroxidase reagent, that is, the substances whose oxidation is really under observation, the changes taking place might be represented graphically as follows:

(1) $$P + H_2O_2 \rightarrow PO_2;$$

and

(2) $$PO_2 + A = P + AO_2;$$

or

(3) $$2PO_2 + A = 2PO + AO_2,$$

and

(4) $$AO_2 + B = AO + BO,$$

and since, as has been shown by Bach and Chodat ([27]) the oxidases consist of an oxygenase (an organic peroxide) and a peroxidase, it is readily conceivable that oxidations accomplished by the oxidases might also be accelerated by certain oxidizable substances. Thus laccol itself might function as a peroxidase accelerator and in its oxidation by laccase it might accomplish the oxidation of other less readily oxidizable substances contained in the juice of the lac-tree.

CATALASES.

One of the most characteristic properties of hydrogen peroxide is the ease with which it is decomposed into water and oxygen. Thus in the earlier researches on this substance by Thénard ([420, 421]) it was observed that this decomposition can be effected by finely divided metals, by the oxides and peroxides of the heavy metals, and also by substances of animal origin such as fibrin. We have already seen that these observations were greatly extended by Schoenbein ([383]). He proved that certain plant juices blued guaiacum directly; after standing for a short time, however, they lose this property but still retain the power to blue guaiacum in the presence of hydrogen peroxide, although this property is also lost after a time. Such extracts and juices were also found to have the power of decomposing hydrogen peroxide with the evolution of oxygen gas, and as a general thing he observed that extracts and tissues having the power to decompose hydrogen peroxide have also the power to blue guaiacum if hydrogen peroxide is present. Yeast and rennin, however, proved to be exceptional in their conduct in this regard. Both of these substances were found by Schoenbein to decompose hydrogen peroxide, yet neither had the power to blue guaiacum in the presence of hydrogen peroxide. According to Schoenbein the power to decompose hydrogen peroxide and to blue guaiacum containing small amounts of the peroxide were not specific properties of any particular class of substances but rather general properties of all soluble ferments, since the soluble ferments exhibit these changes and since the loss of its specific activity on the part of any particular soluble ferment by the action of heat or otherwise is attended with the loss of its activities toward hydrogen peroxide and a mixture of this substance with guaiacum. As a matter of fact, he was led to regard the decomposition of hydrogen peroxide into water and oxygen as accomplished by these various agents as the prototype of all fermentation (383; page 335). These erroneous ideas prevailed for a number of years. Thus, according to Flügge (172) cited by Loew (278), all enzymes can decompose hydrogen peroxide, and in 1900 Babcock and Russell (17) attempted to measure the activity of galactase, the proteolytic ferment of milk, by the activity of an aqueous extract of the separator slime toward paraphenylen-diamin and hydrogen peroxide (von Storch's reagent).

Gradually, however, facts accumulated in the literature tending to show that the power to decompose hydrogen peroxide and to blue guaiacum by means thereof were not general properties of all soluble ferments, nor were the two properties necessarily correlated, but that they were specific properties of distinct sets of substances. Thus Bergengrün (45) in 1888 observed that the fibrin ferment does not decompose hydrogen peroxide. Similarly Jacobson (223) demonstrated that the property of certain soluble ferments to decompose hydrogen peroxide could be destroyed by heating to certain temperatures and by the action of acids and alkalis without in any way injuring the specific activity of the particular ferment. So also Raudnitz (338) from his studies on the oxidases of milk reached the conclusion that the substance in milk which decomposes hydrogen peroxide is essentially different from that which gives the guaiacum reaction. Lepinois (265) also pointed out as the result of his studies on the ferments decomposing hydrogen peroxide, that there is not always a parallelism between the quantities of oxygen liberated and the intensity of other reactions, such as the bluing of guaiacum, the reddening of guaiacol, etc. Finally, in the course of the examination of a number of samples of tobacco for oxidases, Loew (278) observed that aqueous extracts of certain of the samples of cured tobacco gave an abundant evolution of oxygen on the addition of hydrogen peroxide, without giving a blue color with guaiacum. He proved the absence of diastase and emulsin in these samples of tobacco, so that evidently the power of such extracts to actively decompose hydrogen peroxide is not due to either of these ferments. He showed further that active preparations of certain of the ferments, such as diastase, emulsin, and papayotin, from other sources, are without action on the peroxide, so that evidently the power to decompose hydrogen peroxide is not a general property of enzymes. He found further that certain liquids and extracts have the power of bluing guaiacum in the presence of hydrogen peroxide, which have not the slightest power of decomposing the peroxide into water and oxygen, and conversely, certain kinds of animal and vegetable matters have the power of vigorously decomposing hydrogen peroxide without giving the peroxidase reaction with guaiacum. Thus it often happens that samples of cured tobacco have the power of decomposing hydrogen peroxide, ofttimes very actively, and yet have no power to blue guaiacum either alone or in the presence of hydrogen peroxide. On the other hand, an aqueous extract of the fresh green leaves of tobacco, containing one-fifth of its volume of absolute alcohol, showed both the oxidase and peroxidase reactions with guaiacum, whereas such extracts had no power to decompose hydrogen peroxide. It would seem, therefore, that the power to decompose hydrogen peroxide and the oxidase and peroxidase reactions ordinarily exhibited by plant and animal tissues and secretions are distinctly different properties. According to Loew (278), therefore, the decomposition of hydrogen peroxide by plant and animal tissues is due to a special enzyme, to which he gave the name "catalase."[a]

Still other observations point to the specific nature of catalase. Thus in 1902, Pozzi-Escot (333) observed that catalase did not give the guaiacum reaction nor oxidize hydroquinon. Somewhat later

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[a] The name "catalase" (spelled by these authors "katalase"), together with the names "oxygenase" and "peroxidase," has recently been objected to by Moore and Whitley (306) as being ill chosen. According to these authors "there is no reliable evidence of this destruction of hydrogen peroxide being due to an enzyme at all." They point out that it is not specific, and that the decomposition can be accomplished by every ferment solution of whatever type, by nearly all animal and vegetable fluids, and by means of numberless inorganic catalysts. "In any case it is absurd," according to these authors, "to give it a name which belongs to or includes the whole vast range of catalytic actions." Every true enzyme is a catalase in the sense that it acts catalytically, and why a catalytic agent which happens to act upon hydrogen peroxide and which furthermore has never been shown to be a specific enzyme should be dignified by the name "catalase" is difficult to conceive. Every investigator in this field will no doubt appreciate the force of some of these objections. At the same time there are doubtless many who would be inclined to question the exclusion of catalase from the group of soluble ferments. The mere fact that innumerable substances decompose hydrogen peroxide has nothing to do with the question. One might as well object to our looking upon invertase as an enzyme for the reason that innumerable acids can hydrolyze cane sugar, and while many names in science are ofttimes nothing more than apt and striking catchwords, they have taken such a firm hold in the minds of those dealing with the subject that it is practically impossible to replace them. An instance of this kind is met with in the term "catalysis" itself, which in its original meaning simply begs the question as to the inherent causes of all phenomena of this kind. To say that an agent simply acts by its presence is merely emphasizing the most obvious phase of the whole phenomenon, and conveys no insight into the causes thereof, which after all are the things which we are chiefly concerned in discovering, and yet it is quite likely, from the present drift of things, that the term "catalysis" will remain long after contemporary chemists have ceased to have a voice in the shaping of chemical thought. If a committee of chemists, philologists, and advocates of the simple spelling were all to get together with the express purpose of introducing new names for the oxidases, peroxidases, and catalases it is more than likely that the result would be something far less euphonious and suggestive and of less real meaning than the names which these substances now bear.

Senter ([400]) isolated from the blood a catalase of remarkable activity, which he called "hemase," and which was without action upon guaiacum even in the presence of hydrogen peroxide. More recently L. Liebermann ([269]) has shown that an aqueous extract of the mesenteric fat of the hog and rabbit decomposes hydrogen peroxide energetically, without being able to oxidize guaiacum. According to Neumann-Wender ([449]) yeast, by heating to 45° to 50° C., loses its power to induce alcoholic fermentation, whereas the yeast catalase is only destroyed at 68° to 70° C. He also showed that yeast in which the maltase has been destroyed still retained its catalytic power. L. and P. Liebermann ([270]) have also shown that the catalase of malt is destroyed by heating extract of malt to 80° C., or by shaking it with mercuric oxide and magnesia, whereas the solution can still exhibit the guaiacum reaction, especially if oil of turpentine be added. Hence they conclude that only the peroxidase is concerned in the oxidation of the guaiacum. Pure hemoglobin is powerless to effect the decomposition of hydrogen peroxide, and yet it acts as a powerful oxygen carrier in a mixture of hydrogen peroxide and guaiacum. The general drift of modern opinion seems to be, therefore, that the catalases and peroxidases are distinctly different ferments.

So far as its occurrence is concerned, catalase seems to be one of the most widely distributed of any of the enzymes. Thus from his own observations Loew ([278]) arrived at the conclusion that there does not exist a group of organisms, or any organ, or even a single vegetable or animal cell, that does not contain some catalase.

According to Loew ([278]), vegetable catalase exists in two forms, one insoluble and the other soluble in water. These he designated "*α*-" and "*β*-catalase," respectively. According to him, *α*-catalase is probably a compound of *β*-catalase with a nucleo-proteid, while the *β*-catalase is an albumose, and can be liberated from the insoluble form (*α*-catalase) by means of a dilute alkali. He found that cured tobacco contains but little soluble catalase (*β*-catalase), whereas well-sweated tobacco contains a great deal. Water alone dissolves only traces of *α*-catalase, while the prolonged action of water at moderately high temperatures gradually splits off *β*-catalase, especially if a small amount of sodium carbonate be added. Whether the vegetable catalases obtained from different sources are identical in composition and nature, and whether they are identical with the animal catalases, is as yet unknown. By most observers the catalases are regarded as enzymes. They may be obtained in perfectly clear solution; thus Senter ([400]) found that the catalase of blood passes through the Berkefeld filter. They are destroyed by heat; Loew ([278]) found that vegetable catalase is destroyed at 80° C.; according to Senter ([400]), hemase is destroyed at 65° C.; Neumann Wender ([449])

found yeast catalase to lose its activity at 70° C., although the dry yeast catalase could be heated to 100° C. without being destroyed.

The kinetics of the decomposition of hydrogen peroxide by catalase (hemase) and various inorganic catalysts, especially the colloidal metals (inorganic ferments), has been exhaustively studied by Senter ([400]) and also by Bredig ([96, 97]). The decomposition of hydrogen peroxide both by catalase (hemase) and by the colloidal metals has been shown to conform to the law of an irreversible monomolecular process. With constant quantities of the catalyst the velocity of the decomposition has been found to be directly porportional to the concentration of the peroxide within certain limits. At small concentrations, however, both with the ferment and inorganic catalysts, the decomposition is proportionately slightly greater than with greater concentrations. In other words, the hydrogen peroxide itself, or some impurity which it contains, slightly inhibits the decomposition. With constant amounts of the hydrogen peroxide, especially at small concentrations, the decomposition has been found to be proportional to the quantities of catalase (hemase) or inorganic catalyst present. With more concentrated solutions of the catalase, however, both with the hemase and colloidal metal, the velocity of the reaction increases more rapidly than the increase in the concentration of the catalyst. A rise of temperature of 10° C. increases the velocity of the decomposition of hydrogen peroxide by platinum 1.7, and by hemase 1.5, whereas, according to van't Hoff ([216]) for most chemical processes the velocity is doubled by such an increase in temperature.

The power to decompose hydrogen peroxide as shown both by hemase and the inorganic catalysts is greatly inhibited by certain poisons and foreign substances, such as hydrocyanic acid, hydrogen sulfide, hydroxylamin, metallic nitrates, etc., at very great dilutions; and in this connection Loevenhart and Kastle ([275]) made the interesting observation that the activity of the catalase of hog liver was greatly inhibited by ammonium sulfocyanide, whereas it was rendered even more active by thiourea.

Since the recognition of catalase as a specific enzyme its occurrence and distribution in various animal and vegetable tissues has been investigated by a number of observers. We have seen that Spitzer ([407]) measured the catalytic power of various animal tissues toward hydrogen peroxide with the view of determining their relative oxidizing power. The various animal tissues have been found to vary greatly in catalytic power. Thus, according to Battelli and Stern ([35]) the liver contains the most and the brain the least amount of catalase of any of the tissues examined. They found, further, that the tissues of the guinea pig contain more catalase than those of the frog. Similarly Jolles and Oppenheim ([229]) found that the tissues of warm-blooded animals have a greater catalytic activity than those of cold-blooded animals, such as the fish. In 1899 Carrière (112) examined a number of normal and pathological secretions for indirect oxidases (peroxidases and catalases). He obtained no evidence of catalase in the urine of 10 normal persons, nor in the urines of persons suffering from diabetes, hysteria, or chlorosis. On the other hand, in nephritis (Bright's disease), tuberculosis, and in acute inflammation of the lungs, the urine was found to decompose hydrogen peroxide. With other normal and pathological liquids his results are not sufficiently numerous to permit of any general conclusions.

The catalytic power of the blood toward hydrogen peroxide in normal and diseased conditions has also been investigated by Jolles (227, 228) and later by Jolles and Oppenheim (229). According to these observers the catalase of blood is contained exclusively in the formed elements, and is roughly proportional to the hemoglobin. They have determined the quantity of hydrogen peroxide in grams which is decomposed by 1 cubic centimeter of blood in normal and diseased conditions; this they have designated as the "catalase value." For normal blood this was found to be 23, whereas for blood in certain diseased conditions the catalase value was considerably less than for normal blood; thus in tuberculosis it ranged from 10 to 13, and in nephritis from 8 to 13, the most interesting and remarkable decrease occurring in carcinomatous conditions, in which condition the catalase values of the blood fall to 1.3 to 2.1. The blood of the two sexes and venous and arterial blood exhibited no differences in catalytic power.

Still more recently Winternitz and Meloy (454) have studied the occurrence of catalase in the human blood and tissues and its variation in certain diseases. These authors have reached the conclusion that there is no marked variation in the catalytic activity of human tissues due to the age of the individual. In this same connection, Mendel and Leavenworth (298) observed that catalase does not seem to be less abundant in very young embryos than in the adult. Winternitz and Meloy (supra) found the catalytic activity of the tissues to vary greatly in certain diseased conditions; thus in nephritis the activity fell off, especially in the kidney itself. In two cases of eclampsia the catalytic activity of the blood was not reduced. In pneumonia, the lung, in the stage of red hepatization, was found to have an increased catalytic activity, due in all probability to the increased number of red blood cells. In tuberculosis a decrease in the catalytic power of the various tissues was observed, but there was no reduction in diabetes mellitus nor in jaundice. The tissues in one case of congenital syphilis showed a marked lowering in catalytic activity, as did also the blood in one case of asphyxiation by illuminating gas.

THE FUNCTION AND NATURE OF CATALASE.

Very little is known regarding the function of catalase or of its mode of action on hydrogen peroxide. We have seen that according to Schoenbein's theory of oxygen-activation the inactive oxygen of the air is decomposed during processes of autoxidation, the negatively polarized atom uniting with molecular oxygen to form ozone and the positively polarized atom combining with water to form hydrogen peroxide (an antozonide), and, further, that through the action of certain carriers, such as finely divided platinum and the red coloring matter of the blood and what are now known as the peroxidases, the relatively inactive oxygen of the hydrogen peroxide is ozonized. This ozonized product can then accomplish the oxidation of easily oxidizable substances, such as guaiacum, etc., or it can react with another portion of the hydrogen peroxide, forming water and molecular oxygen after the manner of ozone itself, or of an ozonide, such as lead peroxide. In other words, the catalysis of hydrogen peroxide was of the nature of a secondary process in the sequence of changes occurring in the formation of ozone and ozonides as the result of the autoxidation of easily oxidizable substances. The occurrence of catalase in the organic world is, according to Loew, too general and widespread to be accidental, and hence the enzyme must have a certain significance. In considering its possible significance he pointed out that hydrogen peroxide results as either a primary or secondary product in the autoxidation of many readily oxidizable organic substances. Hence he regarded it as conceivable at least, that hydrogen peroxide might also be produced in the living cell as the result of the respiratory process. The accumulation of such a substance as hydrogen peroxide would undoubtedly prove harmful to the life of the organism, and hence he conceived the function of catalase to be to destroy the hydrogen peroxide as fast as formed. The ferment would thus afford an important protection against the accumulation of this poisonous substance, and the oxygen thus liberated could be again utilized for a continuance of the respiratory process. He also advanced the idea that just as catalase loosens the affinities of oxygen in hydrogen peroxide, so also it might loosen the affinities in certain other compounds, as the result of which they might be more easily decomposed or oxidized by the protoplasm.

Herlitzka (209) has found that within certain limits the greater the concentration of catalase the greater the concentration of peroxidase required to produce oxidation. This points to a protective action on the part of catalase against the peroxides of the organism. Shaffer (401) is also of the opinion that through the decomposition of hydrogen peroxide by catalase into water and molecular (inactive) oxygen, the tissues are protected against injurious oxidation. In like manner Battelli and Stern (37) claim to have shown that catalase inhibits to some extent the oxidations produced by ferrous sulfate in the presence of animal tissues. Hence they, too, are of the opinion that the function of catalase may be to prevent the excessive oxidation of organic substances in the living cell. According to Jolles and Oppenheim (227, 229) the catalases of the blood eliminate oxygen from oxyhemoglobin, and this oxygen is then transferred to the tissues by the oxidases.

On the other hand the fact that catalase can not decompose either the substituted organic peroxides, such as ethyl hydroperoxide, or the oxygenases (Bach and Chodat, 29), both of which are probably more powerful oxidizing agents than hydrogen peroxide, is difficult to reconcile with the view that the function of catalase is to protect the organism against excessive oxidation. As pointed out by Chodat (116), the only property of the catalases of which we have any certain knowledge at present is their power to decompose hydrogen peroxide into water and molecular oxygen. In this respect they differ from all other known catalysts. Thus all other catalysts of this kind can not only decompose hydrogen peroxide but they also have the power of rendering active the oxygen thereof. Thus finely divided platinum actively decomposes hydrogen peroxide. It also gives the guaiacum reaction both with hydrogen peroxide and with molecular oxygen. As shown by Kastle and Clarke (242) potassium iodide actively decomposes hydrogen peroxide at 100° C.; it was also found to greatly accelerate the oxidation of formic acid by hydrogen peroxide at 60° C., whereas potassium chloride neither actively decomposes hydrogen peroxide nor does it increase its oxidizing powers. If, therefore, the catalases are really exceptional in this regard, they certainly afford a very remarkable class of exceptions, and of such a nature, indeed, as to be altogether inexplicable at the present time. On the other hand the thought naturally suggests itself that they are not exceptional at all, but that they simply represent special cases under the general rule governing the conduct of such substances toward hydrogen peroxide. Thus it is readily conceivable that the catalases, like the peroxidases, combine with hydrogen peroxide to form an unstable holoxide derivative, thus:

$$K + H_2O_2 = H_2KO_2.$$

This might prove to be so unstable, however, that it would decompose in the sense of the equation—

$$H_2KO_2 = K + H_2O + O,$$

before it would have a chance to effect the oxidation of any oxidizable substance at hand; or in the event that oxidations occurred, it is conceivable that the catalase itself, *K*, might be more readily oxidizable than guaiacum or any of the peroxidase reagents, in which event we would have—.

$$H_2KO_2 = H_2O + KO.$$

This would explain the fact that while powerful catalysts, the catalases are not unlimited in their power to effect the decomposition of hydrogen peroxide. In this connection it is of interest to note that Senter (410) found blood-catalase (hemase) to be oxidized at all temperatures above 0° C. It is easier, however, and more in harmony with what we know regarding the conduct of other catalysts, to suppose that both of these changes would occur simultaneously, viz,

$$H_2KO_2 = K + H_2O + O,$$

and

$$H_2KO_2 + \text{Guaiacum} = K + H_2O + \text{Guaiacum-blue},$$

in which event the given substances would exhibit the properties of both a catalase and a peroxidase; and it may be after all, that when examined more closely, the catalases will show peroxidase reactions. As it is, the two sets of substances, if they are really distinct, are certainly found in the closest and most intimate association in both plant and animal tissues.

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LIST OF HYGIENIC LABORATORY BULLETINS OF THE PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

The Hygienic Laboratory was established in New York, at the Marine Hospital on Staten Island, August, 1887. It was transferred to Washington, with quarters in the Butler Building, June 11, 1891, and a new laboratory building, located in Washington, was authorized by act of Congress, March 3, 1901.

The following *bulletins* [Bulls, Nos. 1–7, 1900 to 1902, Hyg. Lab., U. S. Mar.-Hosp. Serv., Wash.] have been issued:

*No. 1.—Preliminary note on the viability of the *Bacillus pestis.* By M. J. Rosenau.

No. 2.—Formalin disinfection of baggage without apparatus. By M. J. Rosenau.

*No. 3.—Sulphur dioxid as a germicidal agent. By H. D. Geddings.

*No. 4.—Viability of the *Bacillus pestis.* By M. J. Rosenau.

No. 5.—An investigation of a pathogenic microbe (*B. typhi murium* Danyz) applied to the destruction of rats. By M. J. Rosenau.

*No. 6.—Disinfection against mosquitoes with formaldehyd and sulphur dioxid. By M. J. Rosenau.

No. 7.—Laboratory technique: Ring test for indol, by S. B. Grubbs and Edward Francis; Collodium sacs, by S. B. Grubbs and Edward Francis; Microphotography with simple apparatus, by H. B. Parker.

By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

Since the change of name of the Service the bulletins of the Hygienic Laboratory have been continued in the same numerical order, as follows:

*No. 8.—Laboratory course in pathology and bacteriology. By M. J. Rosenau. (Revised edition, March, 1904.)

*No. 9.—Presence of tetanus in commercial gelatin. By John F. Anderson.

No. 10.—Report upon the prevalence and geographic distribution of hookworm disease (uncinariasis or anchylostomiasis) in the United States. By Ch. Wardell Stiles.

*No. 11.—An experimental investigation of *Trypanosoma lewisi.* By Edward Francis.

*No. 12.—The bacteriological impurities of vaccine virus; an experimental study. By M. J. Rosenau.

*No. 13.—A statistical study of the intestinal parasites of 500 white male patients at the United States Government Hospital for the Insane; by Philip E. Garrison, Brayton H. Ransom, and Earle C. Stevenson. A parasitic roundworm (*Agamomermis culicis* n. g., n. sp.) in American mosquitoes (*Culex sollicitans*); by Ch. Wardell Stiles. The type species of the cestode genus *Hymenolepis;* by Ch. Wardell Stiles.

No. 14.—Spotted fever (tick fever) of the Rocky Mountains; a new disease. By John F. Anderson.

No. 15.—Inefficiency of ferrous sulphate as an antiseptic and germicide. By Allan J. McLaughlin.

*No. 16.—The antiseptic and germicidal properties of glycerin. By M. J. Rosenau.

No. 17.—Illustrated key to the trematode parasites of man. By Ch. Wardell Stiles.

*No. 18.—An account of the tapeworms of the genus *Hymenolepis* parasitic in man, including reports of several new cases of the dwarf tapeworm (*H. nana*) in the United States. By Brayton H. Ransom.

*No. 19.—A method for inoculating animals with precise amounts. By M. J. Rosenau.

*No. 20.—A zoological investigation into the cause, transmission, and source of Rocky Mountain "spotted fever." By Ch. Wardell Stiles.

No. 21.—The immunity unit for standardizing diphtheria antitoxin (based on Ehrlich's normal serum). Official standard prepared under the act approved July 1, 1902. By M. J. Rosenau.

*No. 22.—Chloride of zinc as a deodorant, antiseptic, and germicide. By T. B. McClintic.

*No. 23.—Changes in the Pharmacopœia of the United States of America. Eighth Decennial Revision. By Reid Hunt and Murray Galt Motter.

No. 24.—The International Code of Zoological Nomenclature as applied to medicine. By Ch. Wardell Stiles.

No. 25.—Illustrated key to the cestode parasites of man. By Ch. Wardell Stiles.

No. 26.—On the stability of the oxidases and their conduct toward various reagents. The conduct of phenolphthalein in the animal organism. A test for saccharin, and a simple method of distinguishing between cumarin and vanillin. The toxicity of ozone and other oxidizing agents to lipase. The influence of chemical constitution on the lipolytic hydrolysis of ethereal salts. By J. H. Kastle.

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No. 34.—I. *Agamofilaria georgiana* n. sp., an apparently new roundworm parasite from the ankle of a negress. II. The zoological characters of the roundworm genus *Filaria* Mueller, 1787. III. Three new American cases of infection of man with horse-hair worms (species Paragordius varius), with summary of all cases reported to date. By Ch. Wardell Stiles.

*No. 35.—Report on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle. (Including articles contributed by Ch. Wardell Stiles, Joseph Goldberger, and A. M. Stimson.)

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No. 37.—Index-catalogue of medical and veterinary zoology. Subjects: Trematoda and trematode diseases. By Ch. Wardell Stiles and Albert Hassall.

No. 38.—The influence of antitoxin upon post-diphtheritic paralysis. M. J. Rosenau and John F. Anderson.

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