Pattesten
12/6

Golden Winter Pearmain
Syn: King of the Pippins
Southampton Pippin
Hampshire Yellow

12/6

THE AUSTRALASIAN

FRUIT CULTURIST,

CONTAINING

Full and Complete Information as to the History, Traditions, Uses, Propagation and Culture of such Fruits as are suitable for Victoria, New South Wales, South Australia, Queensland, Western Australia, Tasmania and New Zealand;

ALSO

Descriptive Lists of the Principal Varieties of Fruits, With Remarks as to their Adaptability for Particular Purposes.

BY DAVID ALEXANDER CRICHTON,

Late Expert and Lecturer upon "Fruit Culture" and "Special Agricultural and Horticultural Industries" to the Victorian Department of Agriculture.

MELBOURNE:

ALEX. M'KINLEY & CO., ALFRED PLACE, COLLINS ST. EAST.

1893.

PREFACE.

NEARLY seventeen years ago I was induced to begin the publication of a work called the *Australian Horticultural Magazine*, on such lines as, when complete, would entitle the book to rank as an encyclopædia of gardening for this part of the world. Such a publication was then, and is now, greatly needed, as kindred works which have been written in Europe or America necessarily fall short of the requirements of cultivators in this part of the world. The plan I adopted was to deal with each plant specially, in an article which gave the fullest information as to its history, traditions and uses. I also gave full directions for cultivation as adapted to Australian practice, and all necessary information as regards propagation and other essential matters. The publication was carried on for two years, but circumstances prevented me from continuing it sufficieutly long to make it the complete work as desired. Among the many articles that appeared in this work were a number dealing with fruits, and these I have utilised to some extent in the present publication, consequently several of the articles that appear in the *Australasian Fruit Culturist* are based upon older writings of my own which have been previously published. Others, however, have been specially written for the present work. I may also state that the whole of the matter has been carefully prepared and arranged, so as to fully meet the requirements of fruitgrowers at the present time. The cultural directions, as also those for propagation, are thoroughly practical, and are based upon my personal experiences and observations in various parts of Australia extended over a long period. Too frequently books published in this part of the world, and purporting to deal with agriculture or horticulture, are but little more than compilations from works published in Europe or America, where the conditions are widely different to those that obtain in Australia. Then again, the compilers of these works are prone to affirm whatever opinions are expressed by their authorities, and these are often conflicting, and consequently puzzling, to ordinary persons who are seeking for information. I have

acted differently, and prefer giving advice upon my own responsibility rather than quote the opinions of others, no matter how high may be their reputations as authorities.

In compiling the lists of fruits I have closely consulted the works of Dr. Hogg, who is justly regarded as the leading British pomologist, and the late H. J. Dowling, the most prominent American authority. The description of many of the varieties, as given in the present work, are based to some extent upon the writings of these two authorities, and more especially as regards form and colour of the flesh. In such matters as the colouring of the skin, size, quality and keeping properties, neither British nor American standard works should be regarded as absolute authorities in this part of the world, as many varieties are materially modified by climatic conditions. Some varieties, and more especially as regards Apples, are more highly coloured than in England or America, and can scarcely be recognised under their original descriptions. Then again with Pears, some varieties develop far higher qualities in Australia than when grown in colder regions, and consequently are really superior to their descriptions as given in British or American works. I have endeavoured, as far as is practicable in a work of this kind, to describe varieties as we may expect them to grow in this part of the world. In order to afford as much practical information as possible, I have, in dealing with most of the varieties, given particulars as to the ripening period, quality and uses of the fruit, hardiness of the plant and other essential matters that may prove serviceable. Cultivators, however, must bear in mind that results are often modified by local conditions, and of these due account must be taken. For instance, the ripening period may be materially accelerated by a northern slope upon which the sun has great power. To some extent the ripening period may also be hastened or retarded by the nature of the stock, an influence that is not sufficiently recognised. As a matter of course, the last-named influence may also have an important bearing upon the growth, hardiness and bearing qualities of the trees.

In the lists of fruits I have used English synonyms freely, being of opinion such information will be serviceable to many in enabling them to recognise varieties that are often cultivated under two or more names. Then again, many persons from the United Kingdom and their descendants often only know certain varieties under local names, and are

unacquainted with their more general ones. Therefore I have given all the English synonyms that are likely to prove serviceable to cultivators. Foreign synonyms I have used to a more limited extent, as many of them are meaningless to all but small sections of the community. As a matter of course, I have found it necessary to give a number of French synonyms in the lists of Grapes, Pears, Apricots, Peaches and Plums, as many of the finest varieties of these fruits have originated in France or Belgium. Only such synonymous names, however, as are in use more or less have been given.

The many pictorial illustrations that appear in the work will, I trust, afford much practical information upon such important subjects as the cultivation, propagation, pruning, and training of fruit trees. In fact, it is only by this means that the writer can, in many cases, convey his meaning clearly to his readers.

In conclusion, I may state that my aim has been to produce a work that will prove serviceable to fruit cultivators of every class, in Victoria, New South Wales, South Australia, Queensland, Western Australia, Tasmania, and New Zealand. The work will give the most complete information respecting every kind of fruit used by mankind in its natural state, arranged in such a way that persons without technical knowledge can fully utilize the matter. I am sanguine that my anticipations in this respect will be realized, and that I shall in the future have the gratification of knowing that my work has proved serviceable to fruit-growers in all parts of Australasia.

DAVID A. CRICHTON.

EDIBLE FRUITS.

ALMOST without exception, the useful varieties of fruits now cultivated in our orchards and gardens have originated from types that are vastly inferior, and in some cases comparatively worthless. The process of amelioration has been gradually brought about by care, forethought, and skill in cultivation for the most part, though perhaps sometimes chance has assisted the work of improvement. We have no reliable records as to when improvements in many of our most popular fruits first began, but it is known for a certainty that at a very early period kinds were grown by ancient nations that were far superior to the original types. Pliny mentions that in his time the Romans had "Twenty-two sorts of Apples, three of Apricots, a variety of Plums, Cherries, Peaches, Nectarines, and Almonds; as also various sorts of Olives." These improvements were, no doubt, brought about by careful selection from seedlings possessing desirable properties, liberal cultivation that would pre-dispose to free development, and judicious pruning to concentrate the energy of the plants. As a rule, any substantial changes were brought about gradually, and the process of amelioration was extended through several generations. In modern practice improvement has to be effected on similar lines, but as cultivators have varieties to start with greatly in advance of the original types from which they sprang, amelioration is more quickly and easily effected. As regards nearly all our ordinary fruits, the varieties in cultivation are numerous, and in fact far more so than is necessary for practical purposes. New ones are being rapidly added to the already heavily-weighted lists, and in many cases it is hard to say what claim these seedlings have to be accepted. In too many cases they have nothing but novelty to recommend them, as in other respects they are no better than, if not inferior to, varieties in cultivation. This, in my opinion, is a very undesirable state of affairs, and it would be well if we could prevent any addition to our present heavy lists, except in the case of a variety possessing special merit. If by careful hybridization a fruit can be raised which combines the good qualities of two high-class varieties, such an addition will be an acquisition. For instance, if an Apple can be raised that possesses the high flavour and colour of the Ribston Pippin, as when grown in a cool climate, with the keeping properties of the Stone Pippin or French Crab, such a variety will be invaluable. If cultivators will work in this direction, their efforts may be useful, but to bring forward chance seedlings having no special merits lays them open to grave censure. It is very easy to raise varieties by simply sowing stones and pips of various fruits, but useful

acquisitions are seldom obtained without careful hybridization or cross-breeding. Sometimes natural crosses occur from the action of insects, but if cultivators wish to raise new varieties of merit they must cross-fertilize by artificial means. Hybridization is effected by removal of the stamens or male organs in the flowers, and dusting the stigmas or mouths of the pistils or female parts with pollen obtained from another variety. By this means some of our finest varieties of fruit have been originated, but cultivators must bear in mind that in cross-breeding there is no certainty as to what the results may be, and seedlings will often be disappointing to their raisers.

Propagation.

Fruit trees and shrubs are propagated by various means, viz., seeds, cuttings, suckers, layers, grafting, budding, and inarching.

Seeds.—Seed, as a matter of course, is the source of new varieties, but only a comparatively few cultivators devote themselves to the raising of these. But seedlings are raised in large quantities to supply stocks, upon which known and desirable varieties can be budded or grafted. Seedlings undoubtedly afford better stocks than can be obtained in any other way, and they should be used as far as practicable. The seedling is a new plant with a distinct individuality, and will, in all probability, prove more vigorous and thrifty than a stock obtained from layers or cuttings. As far as practicable, therefore, seedlings should be used in preference to stocks raised from other sources. In certain cases, as for instance in propagating the Apple or the Grape Vine, there are special reasons for departing from this practice, but it should be adopted to as great an extent as possible. In raising seedlings for stocks, care should be taken, as far as is practicable, to sow seeds of such kinds as are likely to give the best results. Varieties often differ materially in vigour, habit of growth, and in other ways; and though seedling plants often vary considerably from their parents, yet the probability is that the great majority will be of the same character. No precise directions can be given upon this point, but as a rule growers should avoid using the seeds of any varieties that in their habit of growth possess undesirable qualities, such as throwing up suckers too freely, wanting in vigour, &c. It must also be remembered that, with most of our cultivated fruit trees, varieties differ materially in their growth and requirements, and what may prove a suitable stock in one case will be quite the reverse in another. I am quite certain that the unthriftiness of trees in many cases is caused by unsuitable stocks. Fruit-growers must also bear in mind that some stocks are better adapted to particular soils than others. As a rule, strong hardy varieties will give better seedling stocks for heavy or wet soils than kinds that are less vigorous. As regards the other points mentioned, I am unable to lay down any absolute rules, but I strongly advise growers to experiment with seedlings from various sources as stocks.

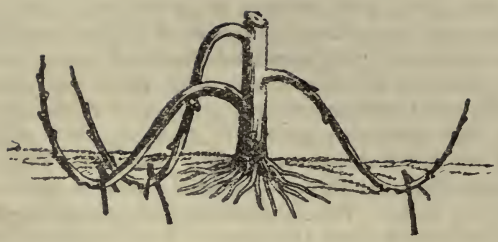
Suckers.—Varieties are perpetuated and increased by the removal of a portion of the plant, and making it by various means into a new one. In some cases this is done by means of suckers, which are shoots sent up from the roots or underground stems of many kinds of trees and shrubs. Suckers of some trees, and more particularly Pears, Quinces, Plums, and Cherries, are frequently used as stocks for budding and grafting, but they are, generally speaking, less vigorous than seedlings, and retain the tendency of their parents to throw up shoots from their roots. Figs are often propagated by removing the suckers and planting them out direct. The usual method of propagating Raspberries is also by suckers, which form the canes. The runners of Strawberries are simply overground suckers, which have power to form perfect plants.

Layers.—This method of propagation is sometimes adopted, but it is open to the objection that the plants are less vigorous and thrifty than seedlings. Sometimes it is employed for raising blight-proof and dwarfing stocks for the Apple, and the Olive is often increased by this method. Layers are simply cuttings that are rooted without being separated from the parent plants. The operation is readily performed, all that is necessary being to bend down the branches and insert a portion 3 or 4 inches deep in the ground, leaving the end above the surface. The rooting of the branch will be facilitated by cutting a notch just below a bud on the buried part, or making a slit upwards from 1 to 2 inches in length. Hooked pegs are generally used to keep the branches in their places, and in fixing the earth care should be taken that the slit portion is kept open to some extent. Deciduous trees may be layered at any time after the fall of the leaf, but the best time is just before active growth commences in the spring. Evergreens may be layered at various times, but the most favourable period is early in the autumn. What is called Hillock layering is practised by some growers, and more especially with dwarf Apples, the Fig, Quince, and Hazel. When this practice is adopted, the stocks are cut back close to the ground in spring, or early summer, and a mound of earth 6 or 8 inches deep is placed over the stump. Young stems will start, and form roots, and in the following autumn or winter these plants should be separated from the parent stems. Trees treated in this way may be layered yearly.

LAYERING.

Crook for pegging down layers.

Shrub layered by covering the shoots and pegging them down.



Tree layered with notched branches to facilitate the formation of roots.

Layer with a ring of bark removed from one branch (*A*), and a slit in the other (*B*); either practice facilitates rooting.

Layer of grape vine with branch entirely covered, making a plant at every joint. Cross marks showing where the young plants should be cut back at the first pruning.

Cuttings.—All fruit trees and shrubs may be propagated by cuttings, and some kinds are commonly raised by this method, such as the Grape,

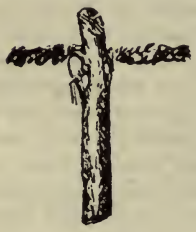
Currant, Gooseberry, Fig, Hazel, Mulberry, and Quince. Good plants of all these fruits may be obtained from cuttings, but in the case of other kinds growth is too slow and weakly to allow this method to be utilized. In fact, excepting the kinds named, cuttings will never make vigorous and thrifty plants. Cuttings of Gooseberries and Currants should be taken off when the plants are pruned, leaving them about 12 inches long, making the base just below a bud, with as clean a cut as possible. The cuttings should be inserted about half their depth in the ground, and all buds below the surface, except the two lower ones, ought to be removed, in order to check the tendency to form suckers. The cuttings may be planted at any time before the spring, but it is advisable to get them in earlier than other fruits, because growth becomes active sooner. Grape cuttings should be made from 10 to 15 inches long, with four or five joints, and ought to be planted about half their depth in the ground. They should be selected from well-ripened wood of the previous season's growth, and shoots that have borne fruit. The very best cuttings are those taken from the lower part of the shoots, and if they can be taken off with a piece of the old wood attached, or what is technically called a heel, they will root with greater facility. It is not advisable to plant Grape cuttings early, as they generally make a better start if put in after spring has commenced. Figs and Hazel nuts may be readily propagated from cuttings of the last season's wood, from 10 to 15 inches long, preparing and planting them as recommended for the Grape. Most trees propagate most readily from cuttings of the previous season's growth, but they may be formed from older wood in some cases. The Mulberry and Olive will strike freely from wood of various ages, and large branches may be rooted without difficulty. Though cuttings may be struck when planted out where the trees are to remain, yet the safer plan is to set them in nursery beds, where the cultivator can give them the necessary care and attention till they are rooted. Though in the case of a vineyard this practice will entail a little more labour, yet the chances of rooting the plants will be much better. Complaints are often made that cuttings, and more especially those of the Grape, fail to root freely; but this is in most cases due to causes that the grower can control. Sometimes the cuttings are allowed to get dried too much from exposure before they are planted, when, as a matter of course, their vigour is impaired. Then, again, they often perish through the land becoming soddened, or from its getting dried up. The greatest care should be taken to protect all shoots intended for cuttings from exposure to atmospheric influences after they are separated from the parent plants. Much injury is often the result of this exposure, and as a rule all cuttings, or wood intended for them, should be wholly or partially covered with moist soil or sand till required for planting. The rooting of all cuttings will be greatly facilitated by placing a layer of broken charcoal, say about an inch deep, underneath. Let the charcoal be broken to the size of peas and under, and let the heels of the cuttings rest upon the top of the layer. The writer, from a long experience, can confidently recommend this plan.

1. Ordinary cutting of the previous season's wood. Cross line showing the depth it should be planted.

2. Cutting with a heel or small portion of two year old wood attached.

3. Mallet cutting with a solid piece of two year old wood attached.

Eye cutting planted horizontally.



Eye cutting planted vertically.

Eye-cuttings.—This is a method of propagation adopted with some fruit-bearing plants, and more especially the Grape. It is serviceable for increasing choice or scarce varieties of Grapes quickly, as plants may be obtained from every bud; but for ordinary purposes the method offers no particular advantages. When this mode of propagation is practised, plump well-formed buds should be selected, with about a couple of inches of the wood below and half-an-inch above the eye attached. These eye-cuttings should be either planted horizontally in sand or light soil, about two inches below the surface, pressing the earth rather firmly about them; or they may be placed vertically with the eye a little below surface level. The best time for planting is just as growth is commencing in the spring, and rooting will be facilitated if the cuttings can be placed in a hotbed, which will supply a steady bottom heat.

Root-cuttings.—Some kinds of fruit trees and shrubs can be readily propagated by pieces of the roots, and this mode of increasing stocks is often serviceable. For the purpose, fleshy pieces of the roots must be taken from 2 to 4 inches in length, and in early spring these should be planted about an inch below the surface in sand or light soil. If placed in a hotbed, with a steady bottom heat, these root-cuttings will strike more readily than in the open ground. This mode

of propagation is often practised successfully with Currants, Gooseberries, and Raspberries.

Grafting.

This is a method most generally adopted in the propagation of fruit trees, and more especially those having pips, such as the Apple, Pear, and Orange. Grafting has been practised from a remote period of the world's history, and its value was well known to the ancient Greeks and Romans, according to some of their historians. By grafting, the cultivator is enabled to establish a particular kind of fruit upon a plant of another variety. The theory of grafting is based upon the power of union between the young tissues of the stock or rooted plant and the scion or branch that is worked upon it. When these parts are in perfect contact, the ascending sap of the stock passes into the scion, and this is excited into activity and a perfect union is formed. It must be understood, however, that the union does not extend over the whole surfaces of the cut stocks and scions, but only at the points where the sap exudes between the wood and the inner bark. Consequently, the success of the operation of grafting depends upon the smoothness of the cut portions of stock and scion and the accuracy of the joining. There must be an exact meeting of the inner barks of the two, or otherwise the union will not be perfected, and the scion will die. Grafting is confined within certain limits, and can only be usefully employed between plants that are allied, and which have a similarity in structure. As a rule, trees cannot be grafted successfully out of the natural order to which they belong, and the closer the affinity between stocks and scions the more perfect will the unions be.

The Uses of Grafting—The fruit cultivator obtains advantages in various ways from the practice of grafting. In the first place, it enables him to perpetuate particular varieties readily which are slow to propagate by cuttings or layers, and cannot be raised with certainty from seed; secondly, it enables him to work choice but delicate varieties upon more robust stocks than their own, and consequently to obtain better returns; thirdly, it allows the cultivator to improve old-established trees of inferior varieties by working better sorts upon them; fourthly, it enables the grower, as in the case of blight-proof Apples, to utilize particular stocks that are obnoxious to insects or fungi; fifthly, grafting enables the grower to obtain dwarf trees, as in the case of Apples worked upon the Paradise or Doucin, and the Pear upon Quince stocks; sixthly, by means of grafting the cultivator can hasten the bearing of trees and test seedling varieties quickly, which otherwise would not bear for a number of years.

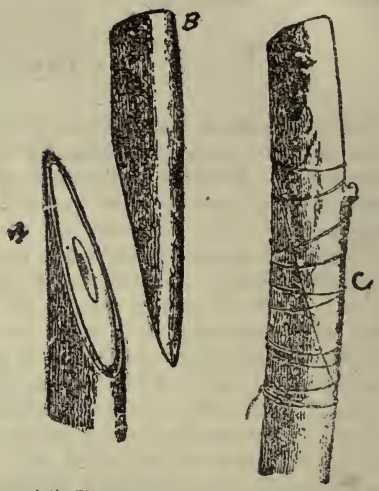
Modes of Grafting.—There are a great number of ways in which grafting may be effected, but the same principle applies to each one. The variety of methods is due mainly to the differences in the sizes and ages of the stocks, and no practically useful purpose would be served by describing all the modes of grafting that are practised, as in many cases

there are but slight differences, and in others they are more fanciful than serviceable. The following methods are most generally practised, and are ample for the requirements of cultivators :—

Splice or Whip Grafting is one of the most simple forms, and can be practised in cases where the stock and scion are equal in size. All that is necessary is to make a perfectly smooth cut, slanting upward, in the stock, and a corresponding one downward with the scion, to make the two fit precisely; bind the two firmly together with a strip of calico or other material that will answer the purpose, and cover with grafting wax or clay to exclude the air. This is a very sure and neat way of grafting.

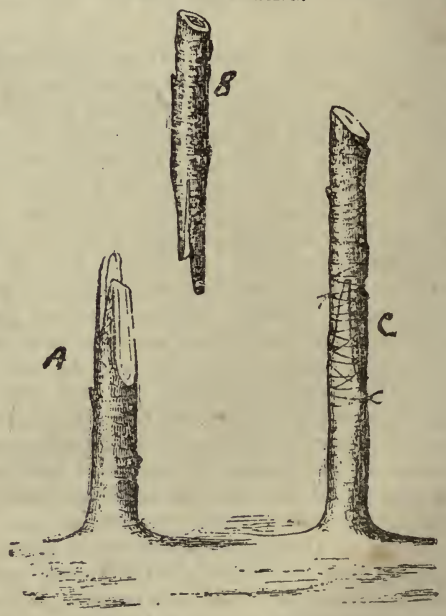
Tongue-grafting resembles very nearly the method last described, except that, instead of the simple splice or join, a tongue is made to hold the stock and scion together more firmly. This is an advantage in some cases. The tongue is formed by making a downward slit, from half-an-inch to an inch deep, commencing near the top of the prepared face of the stock, and taking out a thin tongue of wood; then make a slit on the cut face of the scion, to form a tongue or wedge to fit into the opening made in the stock. In fixing the parts, make the inner bark of each meet exactly, at least on one side. After the operation

SPLICE OR WHIP GRAFTING.



(*A*) The stock. (*B*) The scion. (*C*) Fixed in position.

TONGUE-GRAFTING.

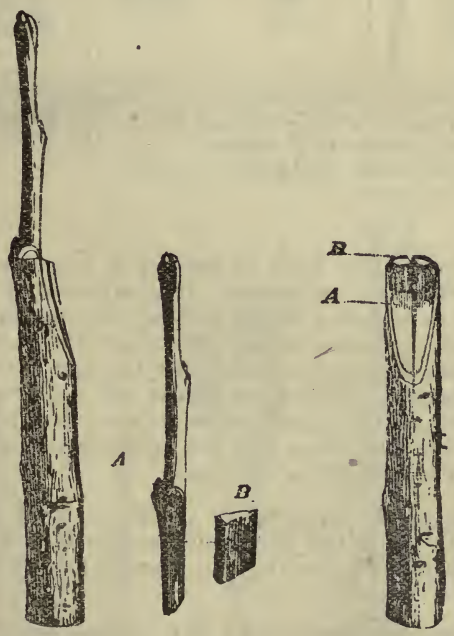


(*A*) The prepared stock. (*B*) The prepared scion. (*C*) Fixed in position.

is complete the parts must be securely tied and made air-tight by the use of clay or wax, as recommended for splice-grafting.

Cleft-grafting is a mode commonly practised for large stocks or trees that have been headed back, and whose branches are too thick for tongue or splice grafting. It is effected by cutting off the branch of the stock at a right angle, smoothing it with a sharp knife, and splitting one or more clefts about 2 inches deep with a mallet and chisel. The scion is prepared by sloping the lower portion in the form of a wedge about an inch and a-half long, taking care to make a smooth surface and keep the bark perfect on the side that is to be outward, which should also be a little thicker. The cleft must be then opened with a chisel and the scion carefully pushed into its place, taking care that its inner bark fits that of the stock. One, two, or more scions may be inserted upon the one stock, in accordance with its size and the purpose of the cultivator.

CLEFT GRAFTING WITH A SINGLE SCION.

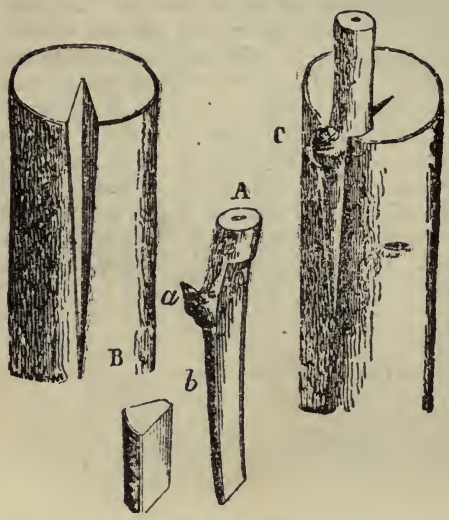


1. The scion inserted in the stock.

2. The scion with sloping cut like wedge. (*A*) Bud at the shoulder. (*B*) Section showing shape of the wedge.

3. The stock cut and split. (*A*) Sloping cut. (*B*) Horizontal cut.

CLEFT GRAFTING WITH A SINGLE BUD.



(*A*) The scion furnished with a single bud (*a*), (*b*) showing cut portions of the scion.
(*B*) Stock with cleft ready for the scion.
(*C*) Scion fixed in its place.

CLEFT GRAFTING WITH TWO BUDS.

(*A*) The stock.
(*B*) Top of stock headed back.
(*C*) Cleft in stock.
(*D*) Scions.
(*E*) Mode of tying.

Saddle-grafting.—This mode of grafting is largely practised, and is very popular with many cultivators. It is performed by cutting the top of the stock so as to form a wedge, splitting the scion in the centre and paring the inner parts so as to make two tongue-like pieces. These must be placed astride the stock, secured by tying, and covered with some grafting composition. This mode affords the largest surface for the union of stock and scion, and the latter has a firm hold. It is best adapted for stocks and scions that are equal, or nearly so in size, but may be applied successfully in other cases.

Shoulder-grafting is performed by cutting a shoulder in both stock and scion, as shown in the illustration, and making a perfect union. This method is useful in enabling the operator to get a firm and secure join.

Notch-grafting is a substitute for cleft-grafting, over which in some cases it has an advantage. It is effected by taking out a triangular piece of wood from the head of the stock, instead of splitting a cleft, and shaping the scion to make a perfect fit. For large branches it is a neat and effective method, but it is not so quickly done as other modes.

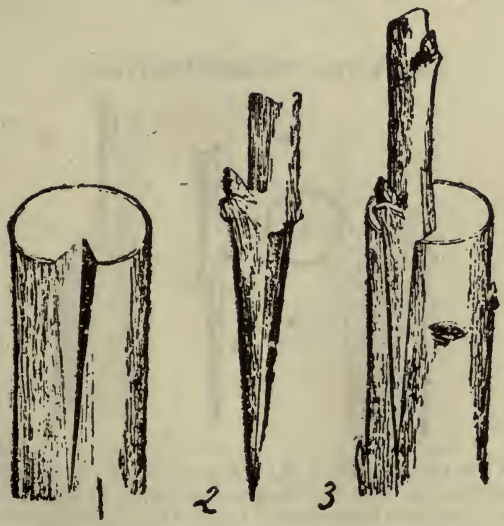
SADDLE GRAFTING.

1. Prepared stock and scion.
2. Stock and scion fixed.

SHOULDER GRAFTING.

(*A*) The scion. (*B*) The stock.
Stock and scion fixed in their places.

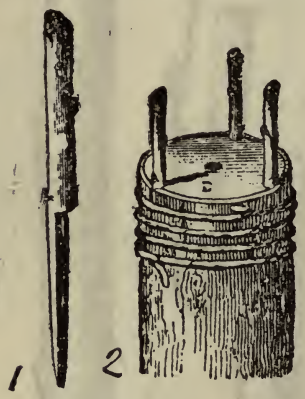
NOTCH GRAFTING.



1. Prepared stock. 2. Prepared scion. 3. Stock and scion fixed.

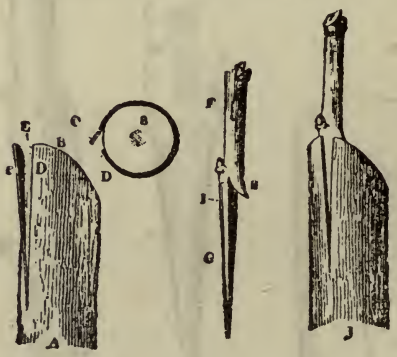
Crown or Rind Grafting.—This is a method of grafting which is often practised with old trees. With this method the branches are cut across as directed for cleft-grafting, and slits are made on the sides from the top, so as to penetrate through the inner bark. The scion is cut sloping as in whip-grafting, and the bark of the stock raised carefully. Then the scion is inserted, without bruising, between the wood and the inner bark. The edges of the bark of the stock are then brought close to the scion, and the graft is bound and waxed or clayed. An improved method, now extensively practised by European fruit propagators, differs from the ordinary system of crown-grafting in two important points. In the first place, the stocks are cut obliquely instead of at right angles, by which means they are better protected from the weather. Then, by leaving a tongue on the inner side of the scion, which fits accurately on to the sloping face of the stock, there will be a correspondingly larger space in contact, and consequently a better chance of a strong union.

ORDINARY CROWN GRAFTING.



1. Prepared scion.
2. Stock with scions fixed.

IMPROVED CROWN GRAFTING.



(*A*) The stock with top cut obliquely at (*B*); bark raised on one side of the stock at (*C*). (*D*) Bark not raised. (*E*) Alburnum and (*G*) Lower part of scion to be covered by the lip (*C*). (*I*) Strip removed from lower part of scion. (*J*) Union completed. Section of the stock shown by (*B*), with lip or portion of the bark raised from the wood.

Root Grafting.

Root-grafting.—This is often practised when ordinary stocks are scarce. Also with Apples, which must necessarily be worked on blight-proof stocks that cannot be obtained from seedlings, as with other fruits. Pieces of the roots from 3 to 5 inches in length are used, and these are simply splice or whip grafted. The union may also be effected by cleft or veneer grafting.

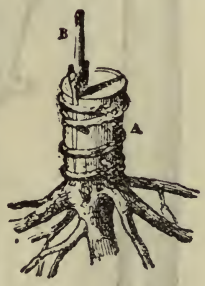
The stock. (*A*) The sloping cut. (*B*) The tongue.

The scion. (*A*) The sloping cut. (*B*) The tongue.

The stock and scion united.

Root Grafting With a Tongue.

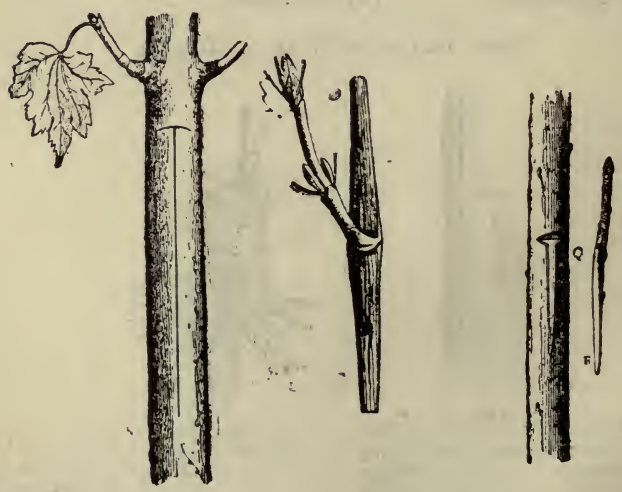
Cutting of an Apple grafted with a piece of root. (*a*) Piece of root. (*b*) Cutting and root united. Black cross line showing the depth for planting.



An old root stock cleft grafted.

Side Grafting.—This mode is practised for supplying deficiencies in the branches of a tree or shrub. In a great many cases, owing to accidents of various kinds, wood or fruit branches are destroyed, and this mode of grafting is employed to replace them. Then, again, it enables the cultivator to place branches where they will be serviceable, but have not grown naturally. In fact, this mode is well worthy of more attention; and more especially in the case of young trees, as it affords a good means for repairing deficiencies in growth. It is effected by inserting the scion between the bark and alburnum, or into the latter itself, without heading back the stock. The operation may be performed with a dormant bud early in the spring, as in ordinary grafting, or when growth has advanced in the early summer, as with budding. When the scion is an evergreen it should not be cut from the parent tree till the last moment, and its leaves must be left. Scions of deciduous trees should have their leaves removed. There are two modes of side grafting, one being with a simple branch from four to eight inches long, the lower part being shaped with a long splice cut. A T slit is made in the stock and the scion is inserted, as in budding. The second mode is with a based branch, which is prepared and inserted the same way. After being fixed in their places the scions must be securely bandaged, and covered with grafting wax or clay to exclude the air.

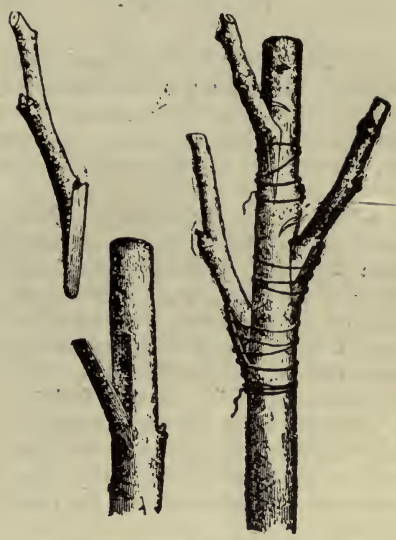
SIDE GRAFTING.



Grafting with a based branch Side-grafting with a single branch.

Veneer Grafting.—This method is somewhat similar to "Side Grafting," and may be practised either with dormant buds in the early spring, or towards the end of the summer and autumn. By this method the scion, with a very smooth splice cut, is made to fit the side of the stock exactly, the bark of the latter being either removed altogether or simply raised. There are several forms of veneer grafting, but the same principle applies to all. This mode of grafting is useful in supplying deficiencies in the branches of trees and shrubs.

VENEER GRAFTING.



Veneering with Strips.

TERMINAL GRAFTING.

(*A*) The scion, cut with an even double slope (*a*). (*B*) The stock, with cleft in the centre. (*B C*) The stock and scion in place.

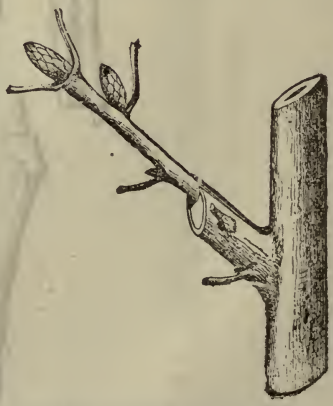
Terminal Cleft Grafting.—This mode is found useful with the Walnut, and trees that are coniferous. It should be performed in the spring when the sap is rising. The top of the stock is split as represented in the illustration, and the scion with its terminal bud inserted, or, if necessary, the terminal bud is removed and another leading one is left.

Grafting with Fruit Buds.—European fruit growers often adopt the practice of grafting branches bearing fruit buds upon others that are not fully supplied. These branches may be either from one portion to another of the same tree, or they may be taken from other plants of the same family. This method will often be found useful in practice, as it is a common thing for some trees to have a superabundance of fruit buds, while others have but few. The operation is performed as in side grafting.

GRAFTING WITH FRUIT BUDS.

Grafting with scions bearing fruit buds.

Season for Grafting.—The proper time for grafting deciduous trees is in the latter part of the winter, or early in the spring, just before active growth commences. As a matter of course, the precise time will vary to some extent according to the climate and other local conditions. Some kinds of fruits also begin to make growth before others, and the earlier they are the sooner should they be grafted, as a rule. The Grape, however, is an exception to this rule, and generally takes best when grafted after growth is in full activity. When grafted earlier the plants bleed too freely, and a union is less certain. Oranges and other evergreens should be grafted a month or six weeks later than deciduous trees. Evergreens may also be grafted successfully late in the summer or early in the autumn, when a fresh growth of wood usually commences. It has been found by experience that in the case of deciduous trees the success of grafting is more certain when the growth of the stocks is a little in advance of the scions, and the circulation of sap more active. In



Grafting with a fruiting spur.

order to secure this advantage, the cuttings for scions should be removed from the trees in the winter, and kept in a cool place till they are required. Straight thrifty shoots of the previous season's growth must be selected for the purpose, and the scions should each have three or four buds. It is advisable that scions should be selected only from healthy vigorous trees, and those from weakly or sickly sources ought to be rejected, as being likely to inherit the failings of their parents. Care should also be taken, as far as may be practicable, to use scions from trees that are most perfect in character, as they often vary considerably in this respect. Scions should not be allowed to suffer from exposure to the air, and losses often occur through carelessness in this respect. If the bark is much shrivelled it will be advisable to discard the wood, as when it gets into that condition the vitality of the branch is greatly impaired.

Preparing Grafting Wax.—In modern practice grafting wax is extensively used by propagators, as it is a much neater and a more perfect protection than clay, as generally used formerly. Ordinary grafting wax is made from beeswax, resin, and tallow in equal proportions. It may be applied directly round the graft, or spread in a melted state over strips of cloth or paper, which can be wrapped round the stems. What is known as French grafting wax is of two kinds, one being made of one part each of pitch and beeswax, and two parts of cowdung boiled together; this is applied in a fluid state direct to the graft. The other kind is composed of equal parts of beeswax, resin and turpentine, which mixture is spread warm upon slips of cloth or strong paper, which are wrapped around the graft. Various other grafting compositions are in use by European cultivators, but all are to a large extent made of resinous materials. One of the most popular is composed of 28 parts of Burgundy pitch, an equal quantity of black pitch, beeswax 6 parts, yellow ochre and grease of each 14 parts. These materials are thoroughly mixed by boiling. When used the composition is warmed sufficiently to bring it into a liquid state, but not made hot enough to injure the tissues of the bark when applied.

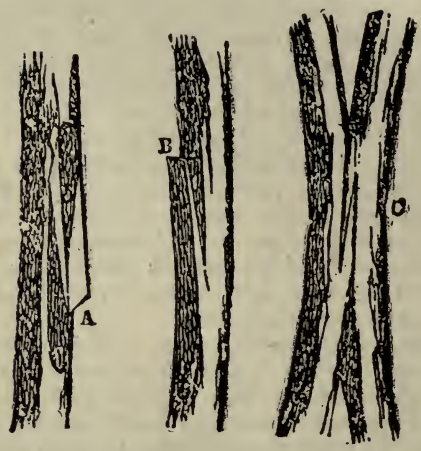
Preparing Grafting Clay.—This material is obtained by taking two parts of clay or stiff loam, and one-third cowdung, with a little hair as used by plasterers. Work the mass well so that the materials are thoroughly incorporated, and of such a consistency that the clay will be plastic and easily spread over the grafts.

Inarching or Grafting by Approach.

This is one of the oldest methods of grafting, nature having taught it to mankind by examples of plants growing near to each other, being joined together by their branches, stems or roots, through contact. By this practice the stems or branches of two plants may be united with less risk than by ordinary grafting, as the scion is attached to its parent plant, and therefore able to obtain sustenance from it, till it becomes independent through a union with the stock. Inarching is also serviceable in enabling the

cultivator to make good deficiencies in the branches of trees readily and expeditiously. In order to practise this method, however, the plants to be worked must either be growing close to each other, or the one from which the branch is to be taken will have to be portable. European cultivators, who largely follow this practice, grow trees in pots specially for the purpose. It is considered to be an excellent and sure way of working evergreen plants. There are different ways of inarching, but, as in other modes of grafting, whatever plan is adopted there must be a smooth and perfect union between the bark of the stock and the scion. In some cases the union is effected by simply paring smoothly a piece of the stock and scion, and fixing them firmly together, and in other cases notches or tongues are made so that the parts may be perfectly and securely fitted. The joined parts must be securely bandaged to keep them firmly in position till the union is perfect.

INARCHING WITH A TONGUE.



(*A*) The scion. (*B*) The stock. (*C*) The union.

INARCHING BY INLAYING.

The scion (*D*) is pared at two sides at (*d*). The stock (*E*) is pared by forming an angular groove at (*e*) into which the cut portion of the scion will fit accurately, as shown at (*F*).

INARCHING TO FILL A VACANT SPACE IN A GRAPE VINE.

INARCHING TO INCREASE THE SIZE OF FRUIT.

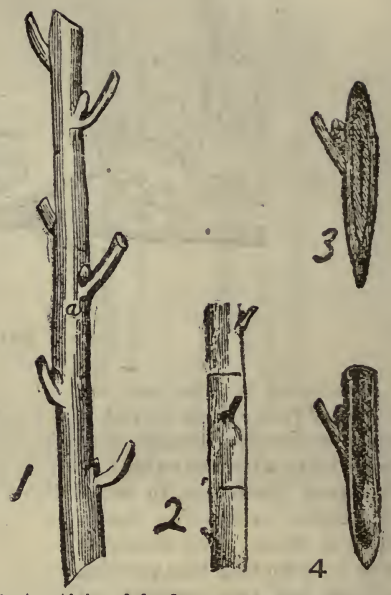
Inarching to increase the size of Fruit.—This is not a common practice, though it is followed to a limited extent by European gardeners, in order to obtain extra fine specimens of fruit. The theory is that by adopting this practice a fruit has two sources of nourishment—viz., from its parent branch and the one to which it is united. The operation is performed by taking a young shoot and forming a union with the stalk of the fruit. The best time is when the fruit is about half-grown, and kinds with short stalks are unsuitable.

BUDDING OR BUD GRAFTING.

This is merely a form of grafting in which buds are used as scions instead of branches as in other methods. Each bud is an individual plant in embryo, and is capable of forming a tree under certain conditions. By budding, the cultivator can attain precisely the same objects as by the ordinary modes of grafting, and it is a method better adapted for some kinds of trees. Stone fruits are more usually budded than grafted, as they take more freely. Budding is also largely practised with the Orange and other evergreens, and is preferable to ordinary grafting. It may also be successfully practised with all other trees. As with grafting,

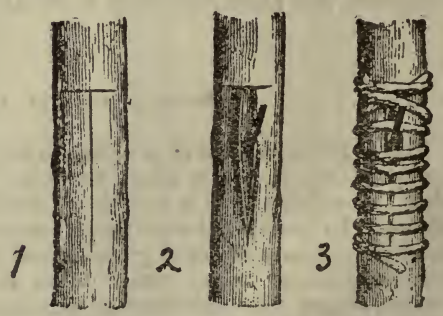
the operation may be performed in various ways, but the most general mode is what is called shield or T budding. This is effected by making a straight incision in the bark of the stock, about an inch and a-half long, and at the top a cross-cut, so that the whole will form a T. The bark is then raised from the top with the handle or blade of the knife for the reception of the prepared bud. Taking hold of the footstalk of the leaf the bud is then gently pushed down, as far as is necessary, and the knife withdrawn. The bark is then brought close and bandaged with a strip of worsted or other suitable material, both above and below the bud. Buds are prepared by cutting them with a sharp knife from the stems, with a portion of the bark and a thin piece of the wood attached. Then cut the top of the bark square, and remove the inner slip of wood, excepting a little near the bud. Care must be taken that the eye or bud is not injured when the wood is removed, and if so it should be rejected. Some propagators prefer to leave a thin slice of wood in the shield, and when this plan is adopted there is less risk in preparing the buds, and they do not dry up so readily. On the other hand, if there is much wood it is likely to prevent the bark of the shield from coming into perfect contact with the stock. In preparing buds, the leaves should be

SHIELD BUDDING.



1. A stick of buds. 2. Marks showing where bud should be taken from branch. 3. Bud as taken from branch, with slice of wood adhering. 4. Bud with inner slip of wood removed and ready for use.

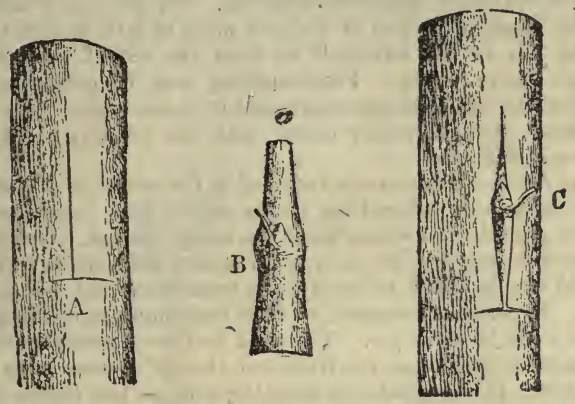
INSERTING AND TYING THE BUD.



1. T slit in stock. 2. The bud inserted. 3. The bud tied.

cut off, but it will be advisable to leave a portion of the footstalks to facilitate the insertion of the shields in the stocks. In a few weeks the buds will have "taken," and this will be known by their beginning to swell. Then the bandages must be loosened to allow growth to expand.

INVERTED T BUDDING.

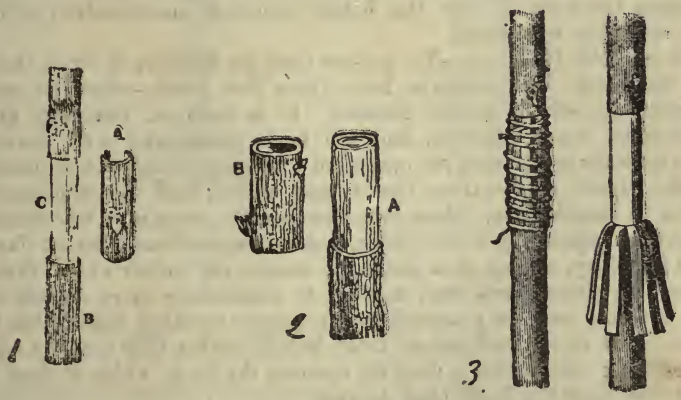


In the incision (*A*) the bud is inserted from below upwards.

The bark of the bud (*B*) is cut with a point at (*a*) to facilitate its insertion.

The bud fixed in position, as shown at (*C*).

FLUTE BUDDING OR GRAFTING.



1. (*A*) The scion. (*B*) The stock. (*C*) Bark of stock removed to receive scion.

2. (*A*) The stock. (*B*) The scion.

3. Flute-grafting with strips.

Flute Budding or Grafting.—This mode of propagation is practised to a limited extent, and is serviceable for particular purposes. It is effected by removing a cylinder of bark from the scion branch, furnished with one

or more buds, and fixing it in a prepared portion of the stock. The scion shield may be one or more inches in length, leaving the bud about the centre. As a matter of course, the piece of bark removed from the stock must be of the same size as the scion shield, as it is essential that the union should be exact. If the scion shield is larger than the diameter of the stock, a longitudinal strip of bark, equal in width to the difference, should be removed. On the other hand, if the stock is the larger, a portion of its bark must be left, so that there will be no void. It is not advisable to head the stocks back until the scions have fairly taken. Flute-budding may be performed in the spring, when the sap begins to move, and in the autumn. The practice may be found more especially useful with the Cherry, Fig, Chestnut, Mulberry and Walnut.

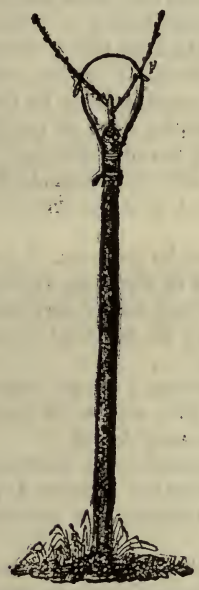
Selecting Buds.—Some care is required in the selection of buds. They should be invariably taken from thrifty shoots that have nearly completed their growth, and whose wood has fairly ripened. Over-luxuriant shoots should be rejected, as likely to form trees deficient in fruitfulness. Care should also be taken to select buds from trees that are perfect in character. Imperfect, immature, or fruit buds must be rejected, leaving only single wood buds for use. The wood bud may generally be known by being more pointed than the fruit bud, though in some cases they are both together. It is advisable to keep the buds on the shoots till they are required for use, and if prepared previously they must be kept moist, or otherwise they will dry up quickly and be useless. The operation of budding should be performed on dull or moist days, or in the mornings and evenings, when the air is cool and still, so as to lessen the risk of the buds drying. It should also be borne in mind that in budding the smarter the work is done the better, as quick manipulation is one of the essentials to success.

Season for Budding.—The proper time for budding is when the bark of the stock will separate feely from the wood—after the current season's growth is nearly finished. It is essential that this growth should be nearly matured, and the buds plump and well developed. The time for performing the operation will vary to some extent according to the nature of the trees, locality and season; and the difference will often be considerable. As a rule, however, the work may be commenced about midsummer or a little later, and can be continued during January and February, taking, as a matter of course, the earlier kinds first. It should be remembered that, in order to successfully carry on this work, the operator must be provided with a proper budding knife; this has a fixed blade at one end and an ivory handle with a thin rounded edge at the other; the latter is used for opening the bark, which it does more perfectly than if a knife blade is used.

Ligatures.—In all modes of budding and grafting a ligature is required to secure the scions in their places. The tying should be done as soon as possible after the stock and scion is fixed, as if not done quickly the action of the air will have an injurious effect upon the bud or graft. The best ligatures are those that will not contract or expand to any extent under the influences of changes of weather, but which,

at the same time, possesses sufficient elasticity to accommodate themselves to the growth of the trees. Woollen thread possess all the qualities required in a perfect ligature, and is the best material—for budding, more especially. As a matter of course the stronger the stocks the firmer should the ligature be. Many plants afford fairly good material from their leaves and bark for ligatures, and for economical reasons they will often have to be used. The ligatures should be allowed to remain in position till the unions between stock and scion are complete, when they must be loosened.

Securing Graft or Bud Shoots.



Mode of tying up and securing the graft on a tall standard.

Mode of tying up several grafts on the same stock.

Aspect for Orchards and Vineyards.

In the cooler districts, cultivators will do well in selecting a site for an orchard or a vineyard to choose one having an aspect between north and east, when practicable. This aspect gives the full advantage of the early morning sun, which is advantageous to the trees, and lessens the risks from spring frosts. Care in this respect is more particularly required for the more tender trees, such as Oranges and Lemons. As a matter of course, trees may be grown successfully with other aspects,

but when possible the writer would advise the one he recommends. In many cases, however, the cultivator has but little or no choice, and has to adapt himself to fixed local conditions. Aspect in the warmer districts is of less importance, and fortunately so, as in these localities the ground is frequently too level to afford much choice.

Soils and their Treatment.

In the selection of soils, the cultivator is often limited, and he has to utilise such as he has to the best advantage. Fruit trees are more cosmopolitan in the matter of soils than is generally supposed, and each kind will adapt itself to a comparatively wide range. Some soils are, however, better suited for particular kinds of trees than others, and these peculiarities should be utilised by the cultivator as far as practicable. Then, again, the cultivator has it in his power to modify the character of the soil to suit special requirements by the introduction of other materials. Something may also be done to modify its natural character by working, draining and the use of manures.

Classes of Soils.—There are considerable variations in soils, which are broadly divided into several classes, and, as a matter of course, there is every intermediate form.

Clay Soils are those that contain over 50 per cent. of pure clay. They are characterised by heaviness, stiffness in working, and impenetrability to the admission of air and water. A very heavy clay soil is not well adapted for fruit culture, though it may be modified to some extent by thorough working and perfect drainage.

Clayey Loamy Soils are those containing a large proportion of clay, but from 20 to 30 per cent. of sand. This soil, when well worked and effectively drained, is well adapted for many fruits.

Loamy Soils are intermediate between pure clay and sand, and may contain from 40 to 60 per cent. of either. Soils of this class are, as a rule, well suited for most kinds of fruits, and are worked without difficulty.

Sandy Loamy Soils are those containing 60 per cent and over of sand. This class of soils is among the best the fruit-grower can find, as most kinds will thrive in them, and they can be worked with facility.

Sandy Soils are such as contain 70 per cent. and over of sand. These soils, unless they contain a large amount of vegetable matter, or are improved by the use of clay, marl, or manure, are not well suited for fruit culture.

Calcareous Soils.—These are such as contain over 20 per cent. of lime, and are well suited for most fruits, especially the Grape.

Marly Soils.—These contain lime in the proportion of from 5 to 20 per cent., and are excellent for fruit culture. Marly and calcareous soils are often used with advantage to improve other kinds of land, owing to the lime and phosphoric acid that they contain.

Volcanic Soils.—This term is applied to those soils which have been directly formed by volcanic action. These are to be found in several

parts of Australia, and are mostly rich deep chocolate land, well adapted for the growth of Potatoes and many other farm crops. Raspberries, Strawberries, Peaches, and a few other fruits seem to do well upon these soils, but experience has proved that they are not so well suited for the Apple, Pear, and various other kinds as the clayey and sandy loams. Though the trees grow freely for the first few years, yet they give but poor returns as compared with those obtained from other classes of soils.

Alluvial Soils.—These are formed along the courses of rivers and creeks by the action of water, which has brought down and deposited materials from higher land. Soils of this class are generally very deep and fertile, as they contain a large proportion of vegetable matter. They are, however, less adapted for fruit trees than many other soils, as, lying low, they are usually more subject to sharp frosts and cold fogs when the crops are forming. The trees have also a tendency to make an over-luxuriant growth of wood at the expense of their fruit-bearing powers.

Vegetable Soils.—This class is those soils that contain 5 per cent. or upwards of vegetable matter, and they may be embraced by any of the classes previously mentioned. A proportion of decayed vegetable matter up to about 15 per cent. will materially assist in making any soil fertile.

Peaty Soils.—These contain vegetable matter or humus, in excess, sometimes to the extent of 60 or 70 per cent. As a rule, they are not well adapted for fruit culture, except for Cranberries, unless they are improved by the use of lime and other materials.

Sub-soils.—The sub-soil is of equal importance to the cultivator as the soil, though this fact is too often ignored in planting orchards or vineyards. It must be remembered that the drainage of the soil is regulated to a large extent by the physical condition of the sub-soil. Sometimes the soil and sub-soil are similar in character, but more generally they differ materially in their natures. An open free sub-soil, either sandy, gravelly, or limestone, gives the advantage of good natural drainage, and will, to a large extent, save the cultivator the expense of providing for it artificially. These sub-soils also make the work of preparing the land easier, as there is not the same necessity for deep stirring as in heavy ground. Sometimes sub-soils are too open, as is often the case in limestone country, and as a consequence the land dries up too quickly. Heavy clay sub-soils, on the other hand, require artificial drainage, or otherwise they will often be too wet, when the trees must necessarily suffer. Then again, if the surface soil is too compact in texture to permit the air to penetrate to the subsoil, the latter becomes sour, and to some extent poisonous to vegetation. Through the imperfect decay of vegetable matter, unwholesome acids are generated, which may have injurious effects for a long time. This will account for the unsatisfactory results that so often occur, when a bad sub-soil is brought to the surface in trenching land.

Draining.

The draining of land for orchards and vineyards is too often ignored in the Australasian colonies, and this neglect is productive of serious evils. A good many people seem to be under the impression that because the rainfall is very uncertain in this part of the world, and we are subject to prolonged and severe droughts, that the longer the land will hold the water the better. This, however, is a wrong conclusion, as well drained land actually retains moisture for a longer period than when undrained. At the same time, it has a more even temperature, being higher in the winter than undrained land, which is an advantage to trees. There is also less danger from late spring frosts when land is relatively dry and warm, as compared with cold wet ground. The main objects to be attained by draining are :—

1st. To provide a quick outlet for surplus water that would otherwise remain in the land for a long period.

2nd. To allow the rainfall to pass through the soil more freely, carrying with it valuable fertilizing matter, by preventing water from stagnating in the sub-soil.

3rd. To allow the air to pass into the sub-soil more freely, to act upon the plant food, and make it available for use.

Water stagnating in a soil or sub-soil makes the land cold, sour, and wholly or partially unworkable for a time. Then again, an excess of water causes the exclusion of air, and without a good supply of that element the plant food will not become soluble. It must also be remembered that the small roots of plants often suffer severely when growing in ground that is in a soddened state for long periods. Then again, when the rainfall can pass through the soil freely, the land gets the benefit of the ammonia, carbonic and nitric acids that it contains, and these are valuable materials.

Modes of Draining.—Necessarily the system adopted in draining land must vary according to the local conditions, *and the means at the command of the cultivator.* Pipe drains are decidedly the most effective and durable, and where the materials can be obtained they are the best. But in many localities pipes will be too costly, and other materials must be used, such as can be readily obtained. Stones broken to the size of two or three inches make very good drains, and will remain effective for years. These drains should have a layer of sods, with the grassy side downwards, placed above the stones. Slabs make excellent drains, as do also saplings and small branches of trees when covered with sods. In laying drains, care should be taken that they are deep enough to be well below the reach of cultivating implements. It is also advisable that the drains should be a little below the depth to which the land has been worked, so that they may draw the water freely. As to the distances apart for drains, much will depend upon the nature of the ground, its conformation, and other local conditions. Stiff soils, as a rule, will want drains closer to each other than ground of a more open texture. Then again, land that is nearly level will require drains, to be a less distance apart than in the case of sloping ground. The

drains should also be so arranged as to catch the soakage in the easiest way. It is also advisable, as far as may be practicable, to lay the drains in such a way that they will be in the centres, between the rows of trees.

DRAIN PIPES.

Pipes required to drain an acre of land at various widths of trenches.

Drains apart.		Feet required.	Drains apart.		Feet Required.
Ft.	in.		Ft.	in.	
3	0	14,520	22	6	1,936
4	0	10,990	24	0	1,815
4	6	9,680	25	9	1,708
6	0	7,260	27	0	1,613
7	0	6,223	28	6	1,529
8	0	5,445	30	0	1,452
9	0	4,840	31	6	1,383
10	0	4,356	33	0	1,320
12	0	3,630	36	0	1,210
13	6	3,227	39	0	1,117
15	0	2,804	42	0	1,037
16	6	2,640	45	0	968
18	0	2,420	48	0	908
19	6	2,234	50	0	871
21	0	2,074			

Preparation of the Land.

Ground for trees and vines, as also the smaller fruits, should be carefully prepared, so that the plants may be placed under the best possible conditions for making strong and healthy growth. A good root-bed is required in the first place to provide the materials for feeding the plants, and secondly, to enable the trees to get a firm hold of the soil. Deep stirring of the soil, and loosening the sub-soil, is the most perfect mode of preparation, as this treatment, by allowing air to penetrate freely, assists in making the mineral plant food soluble, gives the widest field from which the roots can obtain nourishment, and allows them to get a firm hold of the ground. Heavy soils, more especially, require deep cultivation, as otherwise they will, as a rule, be too compact and wet. Lighter soils, and more particularly those resting upon open, gravelly, or limestone sub-soils, may from motives of economy be treated in a more superficial manner, but even this class of land will, as a rule, give better results if deeply worked.

Selection of Kinds and Varieties.

It is a matter of some importance to cultivators in planting fruit trees or vines, that they should select kinds and varieties that are likely

to give the most satisfactory results. There are various matters deserving of the most careful consideration, in order to avoid serious mistakes, and consequently unsatisfactory results. The first consideration should be to plant such kinds of fruit as are best adapted for the particular locality. Some kinds are more cosmopolitan in their requirements than others, and will adapt themselves to a comparatively wide range of climate and soil. Many of these, however, though they may be cultivated under various conditions, will thrive better, and give more satisfactory returns in some places than others. Cultivators will do well, therefore, to give a preference to such kinds of fruit as their localities are specially adapted for. This object should more particularly be kept in view by cultivators for market, whose object is to get as good returns as possible. In the warmer regions of Victoria, New South Wales, South Australia, Western Australia, and in many parts of Queensland, the fruits that should receive special attention are the Grape, Peach, Apricot, Fig, Orange, and Lemon. All these fruits reach the highest degree of perfection in the warmer districts, as the strong heat and light at the ripening period develops their flavours to the fullest perfection. Though the Apple, Pear, Plum, Cherry, and other fruits, that naturally belong to cooler regions, may be grown with a fair amount of success in the moderately warm districts, yet better results will be obtained from other localities. These fruits, when grown in the cooler portions of the Australasian colonies, will generally be higher in quality, and keep better than if raised in the warmer regions. Then again, the trees are not likely to prove so durable in warm as in cooler regions, as their constitutions become weakened more rapidly. For the colder parts of Australasia the Apple, Plum, Cherry, and Pear should receive special attention, as also the Currant, Gooseberry, Raspberry, and Strawberry as the fruits that will give the best returns. The Banana, Pine Apple, Bread Fruit, Mango, Mangosteen, and other tropical fruits are only suitable for the warmer regions of Queensland, Northern River districts of New South Wales, and other tropical or semi-tropical localities in Australia. These fruits all require a very strong heat to bring them to perfection. In some districts, however, there is a sort of intermediate climate, between the warmer and cooler regions, and in those localities planters may indulge in a wider range of fruits with success. Special care should be taken in planting to select varieties of each kind that are best adapted for the particular requirements of the grower, who should decide as to the way in which his fruit will be utilized before starting. If his object is to supply fresh fruit to the market, he must, as a rule, have varieties that will yield in succession, and those that will keep well, so that he can meet the demand for a long period. In some localities early varieties will pay well, but in the later districts they will often prove unprofitable, as they will be anticipated by supplies from the warmer parts of the colony. If the object is to grow for an export trade, such fruits as Apples and Pears only late and long keeping varieties should be planted. It is also advisable in the case of all dessert fruits that they should be good-looking varieties, as well as possessing other desirable qualities.

Good-looking Apples, Pears, Peaches, and other fruits will always find a more ready market than varieties that are less attractive in appearance. In growing for culinary purposes, cultivators should be careful to get the most suitable varieties, as some are greatly superior to others. For canning and drying special qualities are also essential, and as a rule the finest dessert varieties are quite unsuitable for these purposes. In planting Grapes for wine, the grower should take particular care to select varieties that are likely to yield satisfactory results, as some are much better adapted to particular localities than others. The writer also specially advises cultivators, no matter what their purposes may be, not to plant many varieties of any kind of fruit. This is a mistake that many have made to their detriment. More satisfaction will be obtained from ten or even fewer varieties of Apples or Pears than a hundred, and the same remark will apply to all other fruits. Whether for dessert, culinary purposes, drying, canning, or wine-making, the grower will be in a better position if he has large quantities of a few kinds rather than small lots of many varieties. If a grower has say a ton of any particular variety, he will be more likely to find a ready and good market for it than he would for the same bulk made up with twenty different sorts. With tender-fleshed fruits, such as Peaches, Cherries, Plums, Grapes, Strawberries, &c., cultivators must also take into consideration the suitability of particular varieties for packing and carrying, as some are much better adapted to these purposes than others.

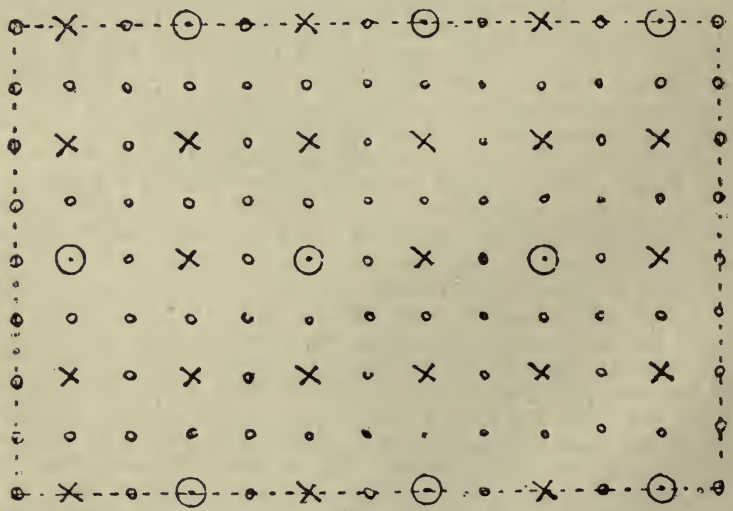
Planting.

Season for Planting.—There is some difference of opinion among cultivators as to the most favourable times for planting, and too many are content to follow the practice of others without giving the subject much consideration. Many suppose that if the trees are planted at any time between the autumn and early spring that is all that is necessary. Others favour planting early in the winter, and some prefer to wait till the spring is close at hand. According to the experience of the writer, the most favourable time for planting deciduous trees is towards the end of the winter. When planted earlier, and more especially in the months of June and July, when the soil is cold and wet, the trees often suffer materially from their inactive roots being soddened. They have to remain in this condition for some time before their roots are fully active, and if they have escaped injury they have made no headway, and might just as well have remained in the nursery beds. On the other hand, if planted later in the season root action commences at once, and the trees quickly recover from the shock caused by removal. Late planted trees will necessarily be just as far advanced as those put in early in the winter, and there will be less risk of their being injured. Oranges, Lemons, and other evergreens should, when practicable, be transplanted late in the summer, or very early in the autumn. The ground is then warm, root action commences at once, and the plants get fairly established before the cold weather sets in. It must be remembered,

however, that plants cannot be safely shifted with a soft woody growth upon them, as is often the case in the autumn. When suitable plants cannot be obtained in the autumn, it will be advisable to delay the planting of evergreens till late in the spring, or even the beginning of summer, and on no account should it be done during the dead winter months. Many young trees perish through being planted at an unsuitable time of the year. The very best time for planting evergreens is just after midsummer, if the necessary care in shading and watering can be given. At this season of the year they are nearly stationary, though soon afterwards active growth commences. This the plants would have the advantage of, and be able to get thoroughly established before the winter sets in.

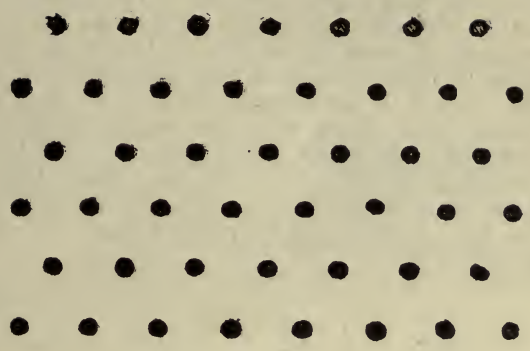
System of Planting.—Orchards and vineyards should be invariably planted in straight lines, so as to enable the ground to be worked in the most convenient manner. They should be either planted in squares, or in the Quincunx style, which allows the ground to be worked in three directions. As a rule, it will be advisable to plant each kind of fruit, or even varieties, by themselves, to facilitate treatment. This is more especially essential with irrigation, as one kind may require watering when another does not. In order to economise space, some growers plant intermediate trees, and this is a very good plan provided it is not allowed to interfere with the growth of the permanent plants. These temporary trees will often give good returns, and have also a beneficial effect by acting as nurses to the permanent ones. It is a common practice in Europe to plant dwarf trees or bushes between the larger trees, and this plan may often be adopted with advantage in this part of the world.

MIXED PLANTING.



O Permanent Trees. × Temporary Trees. o Bushes.

QUINCUNX PLANTING.



Care in Lifting, Packing, and Planting.—Trees are too commonly taken up in such a way that their roots are seriously injured, and though in removing them from the nursery beds the plants must necessarily suffer to some extent, yet care will reduce the injury to a minimum. Every care should be taken in lifting the trees to preserve as many of the roots as possible, and more especially the small and delicate fibres. The more there are broken and bruised the greater will be the loss to the trees, as they are all required to assist growth. If trees could be lifted with every fibre intact, as may be done with a plant turned out of a pot, it would be an advantage. This, however, is impossible, but the closer we can approach this state of affairs the better. When the trees are taken up, the roots should not be exposed to the atmosphere more than can be helped. Too frequently trees are left exposed for long periods, and consequently they are seriously injured. Deciduous trees will stand a little more neglect in this respect than others, but exposure is hurtful, and should be avoided. Evergreens, and more especially the Citrus family, will be seriously injured if their roots are exposed only for a very short period to a dry atmosphere. Exposure of the roots for a few minutes to a harsh drying wind will, in most cases, cause the leaves to wither and fall, and the loss of foliage is a serious drawback to the plant, and may prove fatal. Every care should, then, be taken in handling and packing that the roots are covered from the time the plants are lifted till they are fixed in their places. In planting all kinds of fruit trees and Grape vines, care should be taken to allow ample room for development, or otherwise they cannot become thrifty, large, and long-lived plants. Particular directions upon this point will be found in the articles dealing specially with each kind of fruit. Care should also be taken not to plant too deeply, a mistake that is very often

made Many of the losses that occur with young trees may be credited to over-deep planting. Trees should be planted but a very little deeper than they were in the nursery beds, the upper roots being merely below the surface. The roots should be carefully spread out in every direction, to enable the young trees to get a firm hold of the ground on each side, and to obtain the widest area for getting nourishment. Before planting it will be advisable to carefully remove any broken or bruised roots; these, if allowed to remain, cannot in their mutilated condition assist in supplying the plant with nourishment, though they may rot off and affect the sound roots. Trees will often require to have their tops reduced or "headed back" at the planting time, so that the roots and branches may fairly balance. As a rule, the greater the quantity of roots they have lost by removal, the more should the heads be cut back. On the other hand, if there has been only a slight loss of roots, the heads may be left fuller.

BAD AND GOOD PLANTING.

Roots arranged properly.

Roots badly arranged.

(*a*) Planted too deep.

(*b*) Planted properly.

Table showing the number of trees required to plant an acre of land at distances from 30 to 10 feet apart:—

Distance.	Number per Acre.	Distance.	Number per Acre.
Feet.	Number.	Feet.	Number.
30	48	17	150
28	55	16	169
26	64	15	193
24	75	14	222
22	90	13	257
20	100	12	302
19	120	11	360
18	134	10	435

The Use of Manure.

Soils cannot remain fertile unless they contain *all* the materials that are necessary for the support of the plants. And not only is the presence of these materials necessary, but they must be in soluble forms, so that they can be absorbed by the roots of the plants. A soil may contain lime, potash, phosphoric acid, and other mineral materials in abundance, yet it will be wholly or partially barren if these substances are in an insoluble condition. For this reason cultivators must not depend too much upon soil analyses to show them what their land can produce. These tests are all very well in their way, and no doubt they will afford information that may be usefully applied, but it must be remembered that the agricultural chemist merely ascertains the proportion of minerals held by the soil, whether they are immediately available for plant food or not. These minerals must be rendered soluble by certain decomposing forces, to enable them to be absorbed by the small rootlets of the plants. Water and air are the chief factors in making the soil materials soluble, and, therefore, the land should be placed under such conditions as will allow these elements free action. This will in a large measure be effected by working the ground thoroughly and providing for perfect drainage.

Fruit trees and shrubs, like other plants, must be able to obtain the

necessary amount of food from the soil, otherwise they cannot perform their functions properly. These trees are, when bearing, very exhaustive to the soil, as they are always abstracting from it materials in the same proportions. In the case of an ordinary farm or garden crop, by changing the plants, as some absorb different materials to others, the drain can be more equalized. There may be naturally a large amount of plant food in the soil, which the trees may draw upon for a considerable time, but sooner or later the land must become exhausted more or less, without assistance from the cultivator. A great many trees fail prematurely through the lack of proper nourishment. Sometimes they will grow to some extent, but fail to produce crops, through some deficiency in the soil. The dropping of the blossom without setting, or the young fruit after it has set, is, in many cases, the result of the lack of proper food for the trees. Old fruit trees will often require a dressing of manure to keep them in a thrifty condition; without this assistance they cannot possibly give satisfactory returns to the cultivator when the land has become more or less exhausted. The condition of these trees and the returns they give should be a sufficient guide to cultivators as to when manure is required. If growth is not satisfactory, and the trees have been treated well in other respects, it is certain that the plant requires some kind of food. It must also be borne in mind that the food requirements of trees are many, as various substances are necessary to insure perfect growth. Among these substances are several minerals, such as lime, potash, silica, phosphoric acid, magnesia, and others, all of which are essential to the growth of the trees. Sometimes a soil may fail through one or more of these minerals being absent, while others are there in abundance, as the minimum governs the whole. Soils naturally contain often but small proportions of some of these essential minerals, and, as a consequence, they soon become infertile.

The following table shows how essential minerals are removed from the soil by fruit crops:—

SOME ANALYSES OF 100 PARTS OF FRUIT-ASHES.

—	Potash.	Soda.	Lime.	Magnesia.	Iron Oxide.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Estimated amount of Mineral Matter removed from an Acre of Soil by a fair Crop.
Almond...	27·95	0·23	8·81	17·60	0·55	43·63	0·37	...	...	98 lbs.
Orange ...	38·72	7·64	22·99	6·55	0·92	14·99	2·95	5·24	...	120 lbs.
Strawberry	21·07	28·48	14·21	...	5·89	13·82	3·15	12·05	1·69	68 lbs.
Olive ...	60·07	...	15·72	4·38	1·19	8·35	1·19	5·58	4·55	91 lbs.
Apple ...	35·68	26·09	4·08	8·75	1·40	13·59	6·09	4·32	...	54 lbs.
Pear ...	54·69	8·52	7·98	5·22	1·04	15·20	5·69	1·49	...	82 lbs.
Grape ...	63·21	0·40	9·07	5·04	0·07	10·43	5·62	5·11	1·02	72 to 168 lbs
Plum ...	59·21	0·54	10·04	5·46	3·20	15·10	3·83	2·36	...	80 lbs.
Cherry ...	51·85	2·19	7·47	5·46	1·98	15·97	5·09	9·04	1·35	86 lbs.
Fig ...	28·36	26·27	18·91	9·21	1·46	1·30	6·75	5·93	2·69	64 lbs.
Quince ...	27·39	4·40	7·79	13·11	1·19	42·32	2·68	0·75	1·57	40 lbs.
Lemon ...	34·00	4·37	12·90	8·66	0·25	34·85	3·35	0·35	1·45	100 lbs.
Gooseberry	38·65	9·92	12·20	5·85	4·36	19·68	5·89	2·58	...	...
Chestnut	39·36	21·73	7·84	7·84	1·03	8·25	3·88	2·32	...	...

General Manures.—These are such as, owing to their complex composition, contain all the varied substances that have been removed from the land by crops or the grazing of animals. The only one, however, that fully deserves the title of general fertilizer is farm-yard or stable manure. This fertilizer consists of a mixture of the liquid and solid excreta of animals with straw that has been used for litter. As a matter of course, this material will vary to some extent in composition and value, according to the nature of the animal, the food it has been fed upon, and the proportion of straw it contains, but all the essential matter for plant food will be there more or less. A compost formed of a mixture of vegetable and animal substances makes a fertilizer only second in value to farm-yard manure. In addition to their direct value as fertilizers, general manures have a physical and chemical effect on soils which should not be overlooked. The decomposition of the vegetable and animal substances produces carbonic acid in large quantities, which acts upon other materials in the soil and sets them free for the use of plants. These manures also have a useful mechanical action upon soils, by making them more open, and favouring the admission of air.

Special Manures.—These may contain one, two, or more of the essential constituents of plant food, but not all. They are a useful class, and may often be used with great advantage to supply the soil specially with some material which it lacks. Though these deficiencies may be made good by general manures, yet they can often be more readily and economically supplied by special fertilizers. The principal of the special manures required in fruit culture are lime, bone-dust, potash, soda, magnesia, phosphoric acid, and silica. But before using these materials, the cultivator must know exactly what his soil requires, otherwise he may do more harm than good. Though special manures are effective and economical when properly used, yet it will be a waste if they are not required. It is not well to supply lime to land that is already rich in that material, or potash to soil that contains plenty of that mineral, and so on. First ascertain the soil deficiencies, and then these fertilizers may be utilised to advantage, but not otherwise. As will be seen by an examination of the table showing the essential mineral matter removed from land by various crops, that fruits vary considerably in their requirements. Some kinds, such as the Grape, Olive, Plum, Peach, Pear, Apricot, and Cherry, take up potash in very large quantities. This is why these fruits often thrive to perfection in volcanic soils. An ample supply of potash is, therefore, a primary requirement with all these fruits. The Orange, Lemon, Fig, Olive, and Plum require lime in large proportions, and this material is abundant in many soils. Phosphoric acid is required in very large proportions by the Almond, Quince, and Lemon, and also to a considerable though a lesser extent by the Plum, Pear, Cherry, Orange, Strawberry, and Apple.

The principal artificial manures that may be used with advantage in fruit culture are as follows :—

Lime.—This material is required to some extent by all fruits, and is

generally to be found more or less in most soils. Very often, however, the land does not contain a sufficiency, and then a dressing will be beneficial. For soils rich in vegetable matter lime is useful in neutralising the acids that form, and it helps to make the alkalies, potash and soda, soluble, and the land more open and friable. The best mode of applying lime is by annual surface dressings of from seven to ten hundred weight per acre. Lime can also be supplied to the land in the form of marl, gypsum, bone dust and superphosphate.

Potash.—In a good many soils this material is deficient, but it is generally abundant in volcanic soils. It may be supplied economically to the land in the form of wood ashes, which has also a useful mechanical action upon the soil. In more concentrated forms this manure can be supplied by chloride of potash, nitrate of potash and sulphate of potash, but these materials at present are somewhat too costly for general use.

Kainite.—This valuable potash manure merits special attention, as in Europe it is found to be cheap and effective. It is found in natural deposits in Germany, and its use is extending rapidly. Kainite is not only rich in potash, but also magnesia, and it contains about 25 per cent. of common salt.

Nitrate of Potash —This is known commonly as nitre or saltpetre, and in addition to potash yields nitrogen in large proportions.

Nitrate of Soda.—In Europe this fertilizer has become very popular of late years, and large quantities are used. It is found in the rainless regions of Chili and other South American countries. This material contains nitrogen to the extent of about 17 per cent., and is a good stimulating manure for fruit trees. Apply in two dressings, one when growth is starting, and the other when the fruit is half grown.

Sulphate of Ammonia.—This valuable fertilizer is obtained from a bye product in the manufacture of coal gas. It contains from 20 to 25 per cent. of ammonia. When used singly it should be applied in two dressings of half a hundredweight per acre in the early spring, and when the fruit is about half grown. It is applied most effectively when mixed with three times its weight of bone-dust or superphosphate.

Bone-dust —The fertilizing value of bones is well known to all cultivators, and they make one of the best manures for fruit trees. Bones contain a large amount of phosphoric acid, one of the principal requirements of plants, in the form of phosphate of lime and other useful substances, such as nitrogen and ammonia. Bones may be applied when simply broken into small pieces, and in this form they make an orchard fertiliser that will last for a long period. But bones are generally reduced to the form of *dust*, or *meal*, when, of course, the action of a given quantity is quicker, but less durable. The action of bones as a manure will also be increased by rotting them previous to applying the material to the land. This is effected by placing the bones in heaps, moistening them with water, urine, etc., and covering them with earth. Bone-dust may be applied in annual dressings of four or five hundredweight per acre. The best time to use it is in the autumn or early winter.

Superphosphate of Lime.—This is a valuable fertilizer, and a main

source of lime and phosphoric acid. It is formed by the action of sulphuric acid on bones and various mineral phosphates. Superphosphate is the base of various fertilizers that are sold for special purposes. A dressing of three or four hundredweight per acre will be useful in orchards that require lime and phosphoric acid. It should be applied annually, and early in spring is the best time to use it. Superphosphate may be applied freely to most soils with advantage. In chalk, or lime soils, however, there is a risk of the soluble phosphate being rendered insoluble, and therefore useless.

Sulphate of Iron.—Most soils contain iron in sufficient quantities for the requirements of plants, but very often this material is not in a sufficiently soluble state, and, therefore, not available. The deficiency may be made good in the shape of sulphate of iron applied in the spring after rain, at the rate of 60 lbs. per acre.

Guano.—The value of guano depends upon the proportion of ammonia and phosphates contained in the material. These vary considerably, from a high percentage, as in Peruvian, to a comparatively small amount in some kinds from other parts of the world. Guano is somewhat too forcing for fruits, though it may be used with advantage sometimes, and more especially for strawberries. It should be used when growth is active, at the rate of about three hundredweight per acre of Peruvian, and of other kinds larger proportions in accordance with quality.

Wood Ashes.—This is a very useful material, and a good source from which potash is economically obtained. It has also a useful mechanical action on heavy soils.

Gypsum (Sulphate of Lime).—This material occurs naturally in many parts of Australia, and where it can be got cheaply may be turned to good account as a fertilizer. It is not required in soils that are freely supplied with lime, but is a good dressing for heavy clay, alluvial, or peaty land. Fruit trees and vines will often derive great benefit from this material, which should be applied annually at the rate of about half-a-ton per acre.

Salt (Chloride of Sodium).—This material may be used to a moderate extent in land that is deficient in saline matter, and will also prove useful in helping to keep down slugs and other pests.

Soda is a special requirement for the Strawberry, Apple and Fig, and to an important though lesser extent by the Pear, Orange, Lemon and Quince. It may be applied in the form of nitrate of soda.

Compound Fertilizers.—By mixing special fertilizers, according to the particular requirements of the different fruits, cultivators are enabled to manure their orchards to the best advantage. As a matter of course the proportions must vary, but the particular material that will supply the leading want must be dominant.

To Ascertain the Special Requirements of the Land.—This is not always an easy matter for the cultivator, and even if he can afford the cost of an analysis, the report of the chemist, as explained before, is not altogether reliable. To a fairly satisfactory extent, however, the desired information may be gained by trials of crops between the trees. Rye absorbs potash and phosphoric acid in large quantities. Potatoes must

have potash and magnesia; oats and wheat, phosphoric acid, nitrogen, and lime; peas, potash and phosphoric acid. If any of these crops fail, wholly or partially, from lack of nourishment, it will enable the cultivator to have a pretty good idea as to what fertilizers are required.

The annexed table will give an idea as to the value of some of the manures that are most generally used. Their composition, however, will necessarily vary frequently owing to local conditions. Animal excreta will vary according to the nature of the food consumed, and the value of stable manure will also in a measure depend upon the nature of the straw or other material used as bedding.

TABLE SHOWING THE CONSTITUENTS OF VARIOUS MANURES.

Fertilizing Materials: 1000 or 100 lbs., Contain—	Water.	Organic Matter	Ash.	Nitrogen in Organic Matter	Potash.	Soda.	Lime.	Magnesia.	Phosphoric Acid.	Sulphuric Acid.	Silica and Sand.	Chlorine and Fluorine.
1000 lbs.—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Stable Manure, fresh	710	246	44·1	5 5	5·2	1·5	5 7	1·4	2·1	1·2	12·5	1·5
" moderately rotted ...	750	192	58·0	5·0	6 3	1·9	7·0	1·8	2·6	1 6	16·8	1·9
" thoroughly rotted ...	790	145	65·0	5·8	5 0	1·3	8 8	1 8	3 0	1·3	17·0	1·6
Dungheap Liquor	980	7	10 7	1 5	4 9	1·0	0·3	0·4	0·1	0 7	0·2	1·2
Fæces, fresh	772	198	29·9	10·0	2 5	1·6	6·2	3 6	10·9	0 8	1·9	0·4
Urine (human), fresh...	963	24	13 5	5·0	2·0	4·6	0·2	0·2	1·7	0 4	—	5·6
Nightsoil, fresh	935	51	16·0	7·0	2·1	3 8	0 9	0 6	2 6	0·5	0·2	4·0
Commercial Fertilizers (100 lbs.)—												
Peruvian Guano	14·8	51·4	35·8	13 0	2·3	1·4	11·0	1 2	13 0	1 0	1·7	1 3
Dried Blood	14 0	79 0	7 0	11 7	0·7	0·6	0 7	0·1	1·0	0·4	2·1	0·4
Phosphates (100 lbs.)—												
Bone Meal, average	6 0	31·3	60·7	3·8	0 2	0·3	31·3	1·0	23 2	0·1	3·5	0·3
" solid parts	5·0	31·5	63 5	3 5	0·1	0 2	33 0	1·0	25 2	0·1	3 0	0·2
" porus	7·0	37·3	55 7	4·0	0·2	0 3	29 0	1·0	20 0	0·1	3·5	0·2
Bone Ash	6 0	3 0	91·0	—	0·3	0·6	46 0	1·2	35·4	0·4	6 5	—
Superphosphates—												
Rectified Peruvian Guano	16·0	41·9	42 1	10·5	2 0	1·2	9 5	1·0	10 5	15·0	1·5	1·1
Bone Meal, superphosphated ...	13·0	23 8	63·2	2 6	0 1	1·2	22·4	0·7	16·6	19·5	2·5	0·2
Miscellaneous—												
Sulphate of Ammonia	4·0	—	—	20 0	—	—	0 5	—	—	58·0	3 0	1·4
Nitrate of Soda	2·6	—	—	15 5	—	35·0	0 2	—	—	0·7	1·5	1·7
Ashes, Evergreen Trees	5 0	5 0	90·0	—	6 0	2·0	35 0	6·0	4·5	1·6	18 0	0·3
" Deciduous Trees	5·0	5 0	90·0	—	10·0	2·5	30·0	5·0	6 5	1·6	18·0	0·3
Anthracite Coal	5·0	5·0	90·0	—	0·1	0·1	?	3·0	0 1	5·0	?	—

How and when Manures should be used.—In the case of young trees, when it is necessary to use manure, the material should be thoroughly incorporated with the soil to beyond the radius to which the roots are likely to extend the first season. It is not always necessary to give manure to young fruit trees, but when the soil is of poor quality it may be used with advantage. As regards older trees, the writer has found by experience that the best way of applying manure is by surface dressing as far, or a little farther, than the roots extend. The material should either be left upon the surface, or very lightly pointed in with the spade or other implement, taking care not to injure the roots more than can be avoided. Care must be taken not to give heavier dressings than are necessary, a mistake that is too often made. Cultivators should bear in mind that trees require a constant and moderate supply of food, rather than heavy dressings of manure at long intervals. It is not

desirable that the trees should be forced into abnormal growth for a time by an excess of plant food, and then remain in an almost stationary condition for a period. This state of affairs is injurious to the constitutions of trees, and is possibly the cause of disease very often. The aim of the cultivator should be to encourage moderate and regular growth, in preference to that which is irregular. An annual and moderate dressing of manure will therefore be better than heavier ones given every two or three years. The most favourable times for applying manure is while the trees are at rest, or when making the least growth.

Mulching.

In this part of the world cultivators should adopt every possible means for counteracting the effects of long summer droughts. To a material extent this may be done by practising mulching, which is one of the greatest aids to the cultivator in a warm climate during the summer months. When the surface soil is covered with a layer of litter, or other suitable material, it is protected from the direct effects of a burning sun and drying winds. Consequently, the ground retains moisture for a longer period than it would were the surface exposed, to the great advantage of the trees. The retention of moisture for several weeks longer than would be the case under other conditions may mean the difference between success and failure, as the most critical time for most fruit trees and shrubs is early in the summer, when the weather is often very dry. Mulching may be applied with advantage to all kinds of fruits, and is a specially valuable practice in the drier parts of Australia. It is also of great value in the cultivation of bush fruits, such as Gooseberries, Currants and Raspberries, which are readily affected by hot weather. Mulching should be applied early in the summer, before the hot weather sets in, and while there is some moisture in the surface soil. Too often the work is delayed till the soil has become thoroughly dry, when, as a matter of course, less benefit will be derived from the practice. The material used should be spread as far as the roots extend, and ought to be kept away from the stems of the trees. Too often instances are met with where the material is piled in a heap round the stem, to the great detriment of the trees. Very frequently trees are seriously injured when their stems are covered deeply, and more especially if the material used is in a condition to ferment. Another mistake, often made in mulching, is to cover the ground too deeply. When this is the case the warmth of the sun cannot penetrate the covering, and the ground is kept colder than it ought to be. From 4 to 5 inches will be a sufficient depth to mulch any kind of tree. Various materials may be used for mulching, but cultivators necessarily must use such as are most readily obtained. The best is long stable manure, as this not only protects the surface soils, but also supplies nourishment to the tree. Straw or grass makes a fairly good material for mulching, and when a large area has to be treated should be specially

grown for the purpose. Sea-weed may also be utilised with advantage for mulching in localities where it can be readily obtained, and it has an additional value because it is a material that is rich in potash.

Shelter.

Shelter is of great advantage to all kinds of fruits, and particularly so as regards the Citrus family. Too often, however, no provision is made for it by the cultivator. When exposed to the full effects of strong harsh currents of air, many fruits suffer severely, and in various ways. In the first place the trees often become stunted in growth or lop-sided, and, as a rule, they do not bear so freely as when sheltered. The fruit is also apt to be inferior in quality to what it would be under more favourable conditions. This is more especially the case with Oranges and Lemons, which are usually coarser, and have thicker rinds than when grown with shelter. Then, again, fruit is more likely to be blown off the trees when growing in exposed situations. Sometimes the cultivator can utilise natural shelter, but more frequently he will have to make provision for it. Belts of quick growing trees with dense foliage and compact in growth should be planted for the purpose when necessary. Various kinds of trees may be used, such as *Pinus insignis*, *Schinus molle* (Pepper tree) and *Cupressus macrocarpa*, which are all of strong and rapid growth. Good shelter belts can also be formed from the Osage Orange, Cherry Plum, Almond and Olive, though the latter is somewhat slow in growth for a year or two. Care should be taken not to plant any of the trees named so that their roots will be likely to interfere with those of the fruit trees, as they are all great robbers, and will soon exhaust the soil.

Guarding Against Frost.

Among the many evils that fruit-growers have to contend with not the least is the occurrence of late frosts, which often cause an incalculable amount of injury. Very frequently a whole crop is suddenly destroyed by this means, to the great loss, and, perhaps, ruin, of the grower. Vineyards are, perhaps, more injuriously affected than orchards, and in some localities losses occur very frequently. Now it should be generally known that danger from frost may, in a large measure, if not altogether, be avoided by adopting a practice that is generally followed in Italy and other parts of Europe. This practice is to make small fires at various points in the vineyard or orchard on nights when frosts are anticipated. These fires are made of such materials as straw, weeds, or rubbish, with a mixture of tar, the object being to obtain a dense and heavy smoke. These fires are kept up till after sunrise, when all danger has passed. The smoke has the effect of preventing the dew from condensing and freezing upon the tender foliage and shoots, and if by chance they do get touched, they are screened from the sun's power till the increasing temperature causes them to thaw gradually. This precaution against

frost can be taken at a very small cost, as the danger only lasts a week or two, and the probability of frost can be ascertained overnight pretty surely.

The Use of Water in Fruit Culture.

The command of a supply of water, by means of irrigation, will be of great service to the fruit cultivator, and more especially in the drier portions of Australia, where the rainfall is light and uncertain. In fact, a supply of water that can be utilised at the right times may make all the difference between the failure and success of fruit trees or vines. By means of the various irrigation schemes now in operation, and others that will be adopted in the future, large areas will be made available for fruit and other culture in localities where, without supplies of water, growth would be uncertain, owing to the light and irregular rainfall. But though a good supply of water is a great advantage in fruit culture some care and judgment is required in using it. Some people have the idea that the command of water is all that is necessary, and that bountiful crops will always be obtained by its free use. This is a mistaken idea, as when water is used without judgment more harm than good may be done. As regards deciduous trees and shrubs, a supply of water may, if required, be given with advantage while the fruit is increasing in size, *but not after it is fully grown.* When fruit has attained its full size then the period of decay begins, of which the ripening process is the commencement. Trees then are better when their roots are a little dry than otherwise, and water supplied at that time will do harm. The same remarks will apply to Grape vines. An excess of water when the fruit is fully grown will cause deterioration in quality, and in some cases destroys to a large extent peculiar flavours that are highly appreciated. The fruit will also be more tender, and wil not keep so well, as if grown without water. The use of water, when growth is well advanced, is, in the case of deciduous trees, also apt to cause a prolonged and weakly growth of wood that is not required. This growth is at the expense of the constitution of the plant, and its fruit-bearing powers in the future. When the trees have made a fair summer growth of wood, and brought their fruits to maturity, they have done their work for the season, and should be allowed to rest, or sleep, to recuperate for the next year. If they are kept in a state of excitement, instead of getting the rest they require, the trees must necessarily suffer severely. In supplying water to deciduous trees, the local conditions, such as climate, soil, and period of bearing, must necessarily be taken into consideration. If necessary, but this is not often the case, trees may receive a watering just as growth is starting in the spring. On no account should water be given while the trees are in bloom, or immediately before, as it may cause the flowers to drop too soon. A second watering may be given, if required, after the fruit has set. Water may be again supplied, if necessary, when the fruit is about two-thirds grown. No more water will be required after this stage is reached in ordinary soils, as a rule. Cultivators must bear

in mind that in dealing with deciduous trees or shrubs water should never be given before growth commences in the spring, or after it ceases in the summer. Orange trees and other evergreens require to be treated somewhat differently, as they are always more or less in an active state of growth, and consequently absorb more moisture from the soil. These trees may require several waterings during the year, and at any time, according to the weather; but, as a matter of course, their demands will be greater in the summer than at other periods. There is another matter that cultivators must give attention to in connexion with the irrigation of fruit trees and shrubs, and that is to make ample provision for quick drainage, when necessary. In sandy, gravelly, or open limestone soils there will often be sufficient natural drainage to free the ground quickly; but in tenacious, clayey, or loamy land the conditions are somewhat different. This kind of soil is in danger of becoming a bog if water is supplied in addition to the rainfall, and no provision is made for effective drainage.

Pruning.

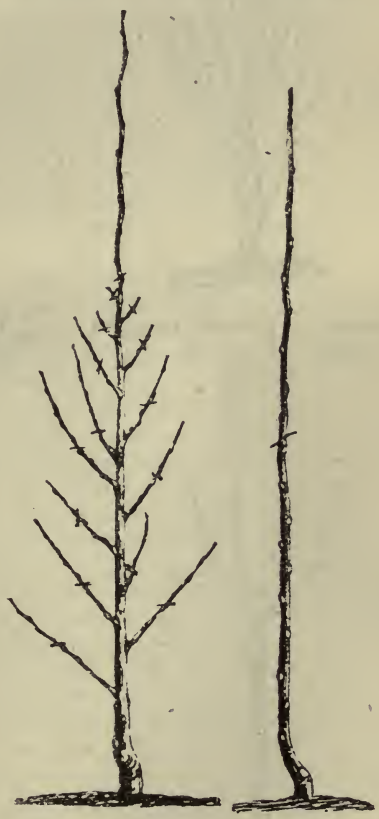
Pruning is one of the most important operations in horticulture, but it is too often practised in a "rule of thumb" fashion, without any clear ideas as to the principles upon which the art is based. It is one of those essential operations that cannot possibly be practised with full success unless the worker clearly understands the principles of the art. Pruning is a means to an end, and in performing the operation the system adopted must be governed by the character of the plant and the object to be attained. The theory of pruning is to promote development in certain directions by checking it in others. There are two ways in which this may be done, one being the cutting of the branches, and the other the reduction of the roots. One method produces precisely the opposite effect to the other, and by practising both in various degrees, according to the local requirements and conditions of the trees, the cultivator has the greatest command over growth that it is possible to have by pruning, and the art of the gardener. The art of pruning is to apply to the trees such treatment as will best accomplish some particular purpose, and to do this successfully the operator must take into consideration the peculiar circumstances of each tree before touching it, and fully understand the result that will be the outcome of his proposed treatment.

Objects to be attained by Pruning.—Various and very dissimilar objects are promoted by pruning, and they are as follows:—First, to modify the form of a tree or shrub by checking the growth of certain parts, and increasing the vigour of others by concentrating more sap into them. Second, to promote growth and bulk by reducing the number of branches, and diverting the strength of the plant into fewer channels. Third to increase the productiveness of the plants by checking over-luxuriant growth, and encouraging the development of fruit buds. Fourth, to prevent the spread of disease by the removal of affected branches. Fifth, to improve the size and quality of fruit by reducing the number of bearing shoots and buds. As a matter of course, different systems must be adopted in order to attain these various objects.

Pruning to modify Form.—In pruning to assist a tree or shrub to attain a desired form, it will be necessary to take into consideration its natural habit, the modification required, and how it is to be effected. Globular and pyramidal heads are the forms most suitable to fruit trees in this part of the world. The object of the cultivator should be to get well-balanced trees or shrubs, and as perfect in form as possible. Trees should be trained to assume the desired forms from the time they are planted, removing and shortening back such shoots as may be necessary. Care should also be taken that the foliage is so distributed as to give the necessary shade to the stems and branches.

Pruning to promote Growth. — In pruning young trees it should be the main object of the cultivator for a few years to obtain a strong growth of wood, and the production of fruit ought to be a secondary consideration. The stronger their growth the sooner will they make thrifty and profitable trees. By the removal of some of the shoots, the strength of the plant is concentrated into fewer channels, giving an increased supply of nutriment to the branches that are left, and consequently these increase more rapidly in bulk than they would do otherwise. In the case of young fruit trees, it is a primary object with cultivators for several years after planting to encourage a strong growth of wood, so that the plants will rapidly increase in size and advance towards maturity. Trees, as a rule, will not bear freely until their

PRUNING TO FORM THE TREES.



A two year old tree pruned to form a pyramid. The small cross lines indicating where the branches should be cut.

A yearling tree without branches. The cross line indicating where the stem should be cut back.

Pruning a pyramid tree the third year.

Pruning a pryamid tree the fourth year.

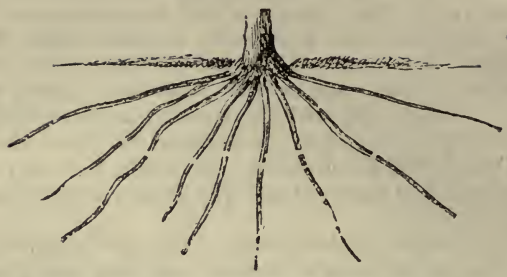
Pruning a globular standard the second year, and a cross-line showing where cuts shall be made.

Pruning a globular standard the third year; cross-lines showing where cuts should be made.

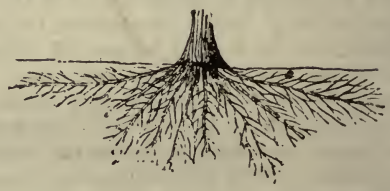
growth is matured to a certain extent, and the stronger the wood while they are young the sooner will they be able to produce full crops. It is one of nature's laws that plants, as well as animals, are usually only impelled to reproduce their kinds after a certain stage of maturity is reached. Trees, it is true, will sometimes bear early, but any fruit produced before a certain age or size is attained lessens the vigour of the plants. The time required for trees to reach maturity will vary, often considerably, according to the kinds of fruit and the local conditions under which they are growing. As a rule, trees may be considered to have reached a fair degree of maturity in four or five years after they are planted.

Pruning to increase Productiveness.—Very frequently when trees are growing in rich natural soils, or manure has been used too freely, they will continue to expend their energies chiefly in the production of wood and increasing in bulk, after the time when they ought to be yielding good crops of fruit. Sometimes these strong-growing trees will bloom freely, but the flowers wither off without setting fruit, or perhaps the latter may form, but drop soon after. This result is often due to the shoots being so strong that they divert the material that is required for the development of the fruit into woody growth. This state of affairs is likely to continue unless the excess of vigour is checked by the cultivator. It is the too common practice in dealing with such trees to thin out and head back the branches severely, under the mistaken idea that the remedy lies in taking some of the wood away. But this is precisely what the cultivator ought not to do, as such treatment only aggravates the evil. The more the branches of a tree are cut away the greater effort will the plant again make to restore the balance between roots and branches, which has been disturbed. These over-vigorous trees should be kept rather full of branches than otherwise, to lessen the tendency to rampant growth. The remedy in such cases is not to cut away branches, but to check the excessive vigour of the trees by curtailing the supply of nourishment through lessening the power of the roots. This object may be effected by root-pruning. The usual way of performing this operation is to cut a semi-circular trench on one side of the tree at such a distance from the stem as will depend upon its size, and separate all the roots that come within that radius. Make the trench as deep as the roots extend, spade wide, and separate the roots with clean cuts. In the following year treat the other side of the tree in the same way. This treatment will often bring these refractory trees into fruit-bearing condition. The most effective way of root-pruning, however, is to carefully bare the roots of the tree to be operated upon, and then to shorten back the coarser roots and those having but few fibres. At the same time, all vertical roots that are over 18 inches deep should be cut through. By adopting this plan, a better selection of roots is obtained by the operator than by following the ordinary method, and he, consequently, has a more perfect control over the trees. On the other hand, however, this system entails more labour, and the operator must have special knowledge to enable him to work judiciously. Root-pruning may be done at any time between the fall of the leaf and the

Root Pruning.



Roots before Pruning marked where they should be cut.



Showing growth of fibrous roots induced by Root Pruning.

spring in the case of deciduous trees, but it is not advisable to delay till after active growth has commenced. As regards evergreens, root-pruning when necessary should be performed either late in the summer or in the spring when growth is becoming active.

The productiveness of fruit trees may also be increased by checking the growth of the current season's shoots, as the more the sap is retarded in its circulation, the greater will be the tendency to develop fruit buds. This practice also encourages the formation of fruit bearing spurs. Growth may be retarded by pinching back the young shoots, and twisting, bending or fracturing wood of an older growth.

Pruning to prevent the spread of Disease.—Whenever branches become affected with any disease that may have caused injury to the wood, it will be advisable to cut them off as far back as the evil can be traced. Trees are often seriously injured by diseased wood being left upon them. It will also often be advisable

Pruning to Increase Productiveness by Fracturing the Branches.

to remove branches that have been seriously injured by insects or fungi.

Pruning to renovate Old or Badly-Trained Trees.—Very frequently trees become straggling in growth when they get old, if they have not been well attended to, and it is necessary to head them back. By adopting this plan a fresh growth can be obtained, which, if properly regulated, may be made to form compact, well-furnished trees in a couple of seasons. The extent to which trees ought to be cut back for this purpose will, as a matter of course, depend on their condition, and the object to be attained, but, as a rule, the branches should be cut back freely. Sometimes trees after bearing heavy crops for several years do not make enough growth of wood, and will be improved by cutting back. Trees of this class should simply have their branches shortened back sufficiently to cause a strong young growth to break. It will also sometimes be advisable to cut back severely young trees with deformed stems, in order to obtain more perfect specimens. In the case of young trees this practice may often be adopted with advantage, and without any material loss of time in bringing the plants to maturity.

PRUNING TO RENOVATE OLD TREES.

Tree before Pruning.

Tree one year after Pruning.

Pruning to improve the Size and Quality of the Fruit.—When trees have a tendency to bear fruit too freely, which is specially the case with some kinds, and more particularly with old trees, it is necessary to remove some of the shoots. By this means the strength of the plant will be concentrated in fewer channels. This will cause the fruit to be

larger and better in quality than if growth is not regulated. Sometimes it will be advisable to shorten back old spurs as shown by the illustration. Peaches, Nectarines and Apricots require somewhat special treatment, as not only should the last season's shoots be reduced in number, but those that are left must be shortened to about half their length. The Grape also requires special treatment in pruning in order to get satisfactory results. This fruit plant has at each joint of the previous season's wood a shoot in embryo, and if all these are allowed to grow the branches will be numerous and weak, and the bunches correspondingly small. In order, therefore, to get growth that will yield serviceable fruit, it is necessary to cut the shoots back every season to a few buds. It is also necessary, in order to keep up the size and quality of fruit, to thin out the branches of trees when overcrowded, in order that light and air may freely penetrate.

SPUR PRUNING.

A. Mark showing where cut should be made.

Pruning newly-planted Trees.—It is a very common practice when trees are planted to reduce the tops considerably without any regard to their special requirements. Trees are often injured through being treated in this indiscriminate way. The proper treatment is to carefully preserve a perfect balance between the roots and the branches. If the plant has a large number of roots, and has lost but a small proportion by removal, the tops want to be cut back to a less extent. Roots cannot perform their functions properly without a corresponding leaf action. Instances are common of robust young trees being taken up with plenty of tops and roots, which have, owing to the unreasonable practice of cutting away the greater part of the branches, only been able to make a weakly growth the first season after they were planted, instead of the strong vigour expected. This result is brought about by a diminished flow of sap, through the branches being so reduced that the leaf surface is not in proportion to the roots, which consequently become somewhat sluggish in their action. Leaves are as necessary to the roots as the roots are to the leaves, and the more perfect the balance the better. On the other hand, when, as frequently happens, trees lose a large portion of their roots by removal, it will be necessary to reduce the heads proportionately, so that the branches can obtain proper support from the diminished number of feeders. In all cases, therefore, as regards newly-planted trees they must be pruned back according to their individual requirements, and in such a way that the balance between roots and branches is equalised as much as possible.

Summer Pruning.—Summer pruning is a very useful practice in fruit culture, and should be more generally adopted in this part of the world than it is. The practice is more especially valuable for young trees, but may be applied with advantage to older ones when circumstances will

permit. Summer pruning, in the first place, prevents the formation of a great deal of useless wood, and consequently lessens the work of winter cutting. It also enables the cultivator to equalise growth, and distribute the wood to better advantage than when the trees are left to themselves. The term summer pruning is to some extent a misnomer, as the work, when properly carried out, should commence in the spring, soon after growth has started. If the trees are gone over then, and all shoots removed that are not likely to serve a useful purpose, a great waste of energy is prevented, and the strength of the plant is concentrated into useful channels. But it is not advisable at this early period of growth to remove all the shoots except the permanent ones, and it will be necessary to allow about twice the number to remain that will be eventually required. The reason for leaving a full number of shoots is that a proportionate amount of leaf growth is necessary to stimulate a vigorous root action. When the shoots are 6in. or 8in. long they should receive a second and final thinning out, leaving only those that are actually required. Care must also be taken that a sufficient number of shoots are left to furnish enough foliage to shade the stems and branches, a most important matter in a country where the sun has great power in the summer. Then, again, cultivators should remember that the leaves are the lungs of the plant, and that unless it can breathe freely there cannot be proper root action. It is essential to the well-being of these trees that the spread of foliage should be in proportion to the quantity of roots, in order that the plants may breathe with freedom and absorb from the atmosphere the necessary amount of carbon. When growth is carefully regulated the trees have a much better chance of ripening their wood properly than when the branches are overcrowded. The rubbing off the shoots in the early part of the season is specially serviceable with stone fruits, as it lessens the tendency to "gum," to which these trees are very liable when the mature wood is cut. Care must, however, be taken in summer pruning not to cause an over-luxuriant growth when it is not required. When a tree has a tendency to make an over-strong growth it should be kept rather full of wood than otherwise, as the greater the number of shoots removed the more vigorous will the remaining ones be. The second stage of summer pruning is the stopping of the shoots after they have made a certain amount of growth, a practice that is specially useful in the case of young trees. Young shoots often make a very strong growth, and, if unchecked, will attain a great length. As these shoots will have to be shortened back it is a better plan to check them early by pinching off the points. A fresh growth will then start, and the branches will not only be better furnished, but the young trees will make greater progress. If pinching back at the proper time is neglected, the young shoots may be shortened, but the former plan is the best. It will, however, be advisable that shoots, if necessary, should be cut back before the summer is far advanced, so that there will be time enough for a fresh growth to start. Pinching back the shoots, while checking woody growth, also induces the formation of fruit buds. Summer pruning is also useful in assisting the fruit-bearing powers of trees, as by pinching back the shoots the growth of wood is

retarded, and the tendency to form fruit buds is increased. No precise time can be fixed for summer pruning, as much will depend on the nature of the trees and their state of growth. Most generally, pinching back should be commenced in November or December, and may be continued, if necessary, up to the end of the summer. Very often trees will require a second stopping. The most effective system of summer pruning is to go over the trees two or three times in the season.

SUMMER PRUNING.

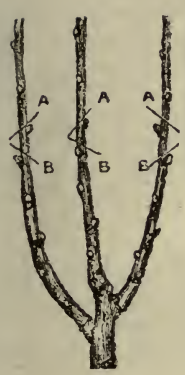
A. Black mark showing where shoot ought to be stopped.

B. Shoot pinched too far back.

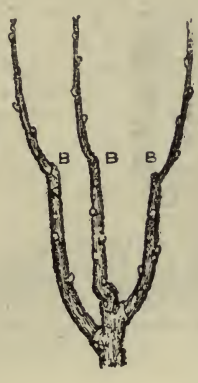
C. Pinched shoot, with a new shoot.

System in Pruning.—The full advantages that the cultivator can obtain from his trees by pruning will be best secured when the work is carried on systematically from the time the trees are planted till they reach maturity. In the case of a young tree, the pruning for two or three years may be termed its education, as like a child it can in the earlier stages of growth be more readily trained in the way it should go than when it gets older. Only such branches as are required to form the tree should be allowed to remain, and no strength ought to be permitted to go to waste in the production of useless wood that must afterwards be removed. The energy of the plant expended in this manner will, for all practical purposes, be thrown away. Besides, whenever useless branches are allowed to mature, they, as a matter of course, weaken those that are required, by dividing the nourishment supplied by the trees. In pruning young trees cultivators must bear in mind that the primary considerations should be well-balanced heads, with a regular proportion of branches on every side. Older trees, of

How a Young Tree Should be Cut.



Branches with black lines (*A A A*) showing buds shooting inwards and (*B B B*) others pointing outwards.

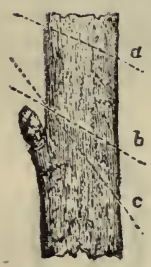


Branches cut at the (*B B B*) or right buds.

Branches cut at the (*A A A*) or wrong buds.

many kinds of fruits, will not require so much pruning as is generally supposed if they have been carefully trained in their youth. Among these are the Apple, Pear, Cherry, Plum, Fig, Mulberry, Orange and Lemon, which are too frequently pruned more than is necessary, to their great detriment. In fact, these trees are often injured by being over-pruned. All that is necessary with mature trees of the fruits named is to thin-out the heads when the branches are over-crowded, to remove rank and misplaced shoots, and to shorten back others that are making too much headway, and which will, if left to themselves, destroy the symmetry of the plants. Sometimes, when old trees have borne freely for several years, they will make but a weakly growth of wood, and in such cases it may be advisable to head the trees back, to encourage a fresh start. By cutting the trees back to where a fresh growth is wanted, they will often be, to a great extent, rejuvenated. In all classes of pruning the operator should take care to make the cuts exactly where they are required, and in the proper directions. By the making of wrong cuts young trees are often spoiled, more or less, as explained by the illustrations. Care should also be taken that the cuts are clean, which is a matter of some importance.

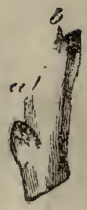
How Cuts Should be Made.



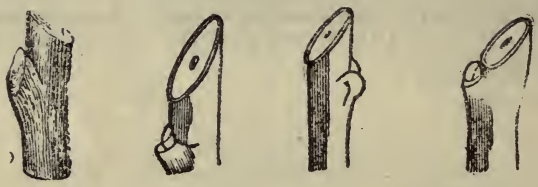
Line *a* too far above the bud. Line *b* a perfect cut. Line *c* too close to the bud.

Line *a b* too far from the bud. Line *c* proper place for cut.

Line *a b* a perfect cut.



Line *a b* cut in the wrong direction.



Showing Cuts too much above the Buds or in wrong directions.

Showing Cuts too close to the Buds.

Pruning must be in accordance with the Habit and Requirements of each Plant.—In pruning, the circumstances of each individual tree or shrub should be taken into careful consideration by the operator. Methods must of necessity vary according to the habit, age, mode of

bearing, and other local conditions. As instances, the Apple and Pear require very different treatment to the Peach and Apricot, while a system different from either is required by the Citrus family. Some varieties of Apples and Pears also differ in their requirements to others, in accordance with the habit of growth. Then, again, take the Gooseberry ; the upright-growing kinds must, in pruning, be handled somewhat different to those that have a pendulous habit. In pruning, the operator should thoroughly understand what the effect of each kind of treatment will be, so that he will be able to use the right method to effect the desired object, and avoid mistakes that may be serious. When the principles upon which the theory of pruning is based are understood, it is as easy to apply them as to cut the trees indiscriminately, without clear ideas as to what the effect will be. Success will also be far more certain than when the beneficial result is, in a great measure, obtained by chance.

Pruning Season.—The pruning season, to speak correctly, may be said to extend throughout the year, according to the habits of the various fruit trees and shrubs, and their special requirements. In the case of deciduous kinds, the general pruning must be given at some period between the fall of the leaf and the rising of the sap in the spring. As soon as the leaves have fallen and the plants are at rest, operations may be commenced. Early pruning is conducive to robust growth, and when this requirement is the chief one, as in the case of young trees, no better time can be chosen. But it must be clearly understood that early pruning is not conducive to fruitfulness. It accelerates the blooming period, and increases the risk of the fruit not setting, as the earlier the flowers make their appearance the greater the danger from spring frosts. This is one of the greatest risks the fruit-grower has to contend with in many localities, and, as a matter of course, in pruning he should endeavour to retard the flowering period as far as he can. The most favourable period for the general pruning of deciduous trees and shrubs is in the latter part of the winter, immediately before the sap commences to rise. Pruning at this time of the year, when the wood is more fully ripened, and the fruit buds are more easily recognised, is conducive to late flowering, and consequently the danger from frost is not so great. Then, again, the wounds heal more rapidly after late than early pruning. Care must, however, be taken not to delay the work too long, as if done when the sap is in full motion, the trees are apt to bleed too freely from the freshly-made wounds. The operation should be performed before the buds begin to swell, which in some trees will be earlier than in others, as certain kinds start sooner in the season. Apricots, Peaches, Nectarines, Currants and Gooseberries should be treated first in pruning, then Grapes, Cherries, Plums and Pears, finishing with Apples, Quinces, Figs and Mulberries. Oranges, Lemons, Loquats and other evergreens may be pruned when necessary, at any time of the year. The most favourable period, however, is when the trees are making but little growth, and a particularly good time is just after the crop has been taken off.

Ringing to Promote Fruitfulness.—This is a practice that may often

be adopted with advantage with trees that do not bear freely, and it is in some measure a substitute for root-pruning. The effect of ringing strong growing trees is to check the flow of sap, lessen the tendency to make wood, and encourage the formation of blossom buds. Ringing may also be useful in the case of trees that flower profusely, but do not set any fruit. This is a very common state of affairs, and more especially with Pears, Apricots and Plums. It is no uncommon thing for trees to be covered with blossoms, which drop off without leaving any fruit behind, to the disgust of cultivators. Now this result may be brought about by some soil deficiency, or a sharp frost, but in many cases it is owing to the flow of sap being too strong. An excess of sap when the trees are in blossom has a tendency to clog the reproductive organs in the flowers, and prevents the proper distribution of the pollen from the stamens to the pistils, and, as a consequence, fertilisation does not take place. If this excess of sap can be checked at the right time the fertilising organs can perform their functions more perfectly. The writer, some years ago, had a number of Pear and Apricot trees, which for several years in succession failed to bear crops owing to the excess of sap at the blooming period, and after due consideration he decided to try ringing as a remedy. It was very successful, and can be confidently recommended as a practice worthy of attention by fruit cultivators. Ringing for this purpose should be done *just before the trees come into bloom*, as after that stage of growth it is useless. The ring should be made *only half-way round the trunk*, and on no account must it be carried further. The cut should be quite through the bark, and just wide enough to break the flow of sap, or about a quarter of an inch. It must be borne in mind that it is desirable that the wound should heal quickly, and a narrow cut will close sooner than a broader one.

Bending down the Branches to Promote Fertility.—This is an old method of treating shy-bearing trees, formerly practised to a large extent by gardeners in the United Kingdom. Latterly, however, root-pruning, which serves in a great measure the same purpose, is more generally preferred. The theory of "bending-down" is that it retards the circulation of sap, and consequently checks the formation of wood, and encourages the production of fruit buds. The operation should be performed in the autumn or early part of the winter, all that is necessary being to bend down and fasten the branches at a *lower level* than where they spring from the trunks of the trees. They must be securely tied in this position till it becomes natural to them, and no further assistance is required. Trees are often greatly improved in fruitfulness by the adoption of this method, and as it can be easily practised it is worthy of attention from fruit growers.

Treatment of Wounds.—In the removal of small branches by pruning, if the cuts are clean the wounds will generally heal quickly without any assistance. When, however, large limbs are removed from trees, either by way of pruning or in heading back old stocks for grafting, the exposed surface of the cut wood is liable to shrivel and crack from the effects of frost, drying winds or heat. Serious injury

is often caused in this way to the trees, as the cracks admit air, water, insects and fungi, which often cause permanent trouble. It is advisable, therefore, to dress these wounds with some composition that will exclude the air, prevent cracking, and keep the wood in sound condition until it is covered with a layer of bark. Various compositions are in use, of which a gum is the base, such as "Gum lac," Gum arabic, &c. Either of these, or any of the gums which exude from wattle trees, are well adapted for the purpose. The gum should be dissolved in spirits of wine till it becomes liquified to the consistence of paint, and must be kept ready for use in securely-corked bottles. The composition should be applied with a brush, covering the wood with a thin layer as in painting. The composition will quickly harden and adhere firmly, so that the air will be effectively excluded.

The Requirements in Pruning of the various Fruit Trees and Shrubs.

Apple.—This tree bears its fruit upon wood of the previous season's growth, and also upon short spurs of two or three years old and upwards. Mature trees, as a rule, want but little pruning, all that is necessary being to thin out crowded branches, and to remove rank and misplaced shoots. Some kinds have a tendency to bear near the end of their shoots, and these should be pinched back by summer pruning. Young trees must be pruned freely, so as to encourage strong growth. Root-pruning will be useful in the case of over-luxuriant trees, and should be done in the winter.

Apricot.—The fruit of this tree is mostly produced upon wood of the previous year's growth; but also, to some extent, upon older spurs. Mature trees require to have the last year's shoots thinned out, and those that are left should be shortened back to about half their length Summer pruning will be very serviceable. Young trees must be pruned more freely to encourage vigorous growth. Root-pruning is seldom required.

Cherry.—This tree bears upon spurs of two or more years' growth. It requires but little pruning, except the removal of crowded branches and rank shoots. Summer pruning will often prove useful. Root pruning may be sometimes practised with advantage in the case of strong-growing trees that do not bear freely.

Chestnut.—The fruit of this tree is borne upon wood of the previous season's growth, and but little pruning is necessary, merely the removal of rank or misplaced shoots, and thinning out the branches when over-crowded. Sometimes, in the case of over-luxuriant trees, root-pruning will have a beneficial effect.

Currant.—The Black Currant bears chiefly upon the shoots of the previous season; but also, though less abundantly, upon older spurs.

The pruning required is to keep the plants compact in shape, and thin out the branches when too numerous. Red and White Currants bear their fruit upon one, two and three-year-old wood, also on spurs from older branches; generally, however, they bear more freely upon the last year's shoots. As a rule, they require more pruning than the Black Currant, and the shoots should be reduced in number when too numerous, and shortened back to three or four buds. Root-pruning is not often required, but sometimes it may be useful.

Date Plum.—This tree bears to a large extent upon the previous season's wood, but also upon older branches. When the branches are too numerous they should be thinned out, and the last season's shoots must be shortened back, as a rule. Summer pruning may be practised with advantage. Root-pruning will often prove serviceable.

Fig.—The Fig usually bears two, and often three, crops in one season, and the fruit is produced upon wood of various ages. But little pruning is necessary, merely the removal of rank and misplaced shoots. Root-pruning is sometimes very useful in checking over-luxuriant growth and promoting fertility. It is also serviceable in keeping trees dwarf.

Gooseberry—The fruit of this plant is borne upon the last season's wood, and also upon spurs from older branches. The branches should be thinned out sufficiently to allow light and air to penetrate freely, and none ought to be allowed to rest upon the ground. Root-pruning is rarely necessary.

Grape.—The Grape Vine bears its fruit upon the current season's growth, and in order to get strong shoots it is necessary to shorten back the last year's wood. In spur-pruning, the shoots are cut back to one, two or three eyes, according to their strength. When pruned upon the long-rod system, half the shoots are left about half their length, and the others cut back to a single eye. Summer pruning is necessary. Root-pruning is not often required.

Hazel.—This plant bears its nuts at or near the extremities of the branches, and should be pruned so as to get an equal distribution of bearing wood. Root-pruning is useful for plants that have a tendency to over-luxuriant growth.

Loquat.—The fruit of this tree is borne at the extremities of the current year's growth, and but little pruning is usually required, merely the removal of misplaced branches, and reducing their number when too many. The most favourable time for pruning is immediately after the fruit is gathered. Root-pruning is seldom necessary.

Mulberry.—This tree bears its fruit upon young shoots of the current season's growth, and on spurs from two-year-old wood. In pruning, all that is necessary is the removal of rank shoots, and crossed or crowded branches. Root-pruning may be practised with advantage in the case of over-luxuriant trees.

Olive.—This tree requires but little in the way of pruning after the heads are formed, all that is necessary being to regulate growth by thinning, and the removal of rank shoots. Root-pruning is useful in bringing over-luxuriant trees into a fertile condition. The most favour-

able time for branch-pruning, when necessary, is just after the fruit is gathered

Orange and Lemon.—The fruit of these trees is produced upon the current season's wood, and but litttle pruning is required, as a rule ; all that is necessary is to remove the inner and useless branches that impede the admission of light and air, and to keep down rank shoots. Root-pruning is rarely required. The most favourable time for pruning is directly after the crop has been removed.

Peach and Nectarine.—These fruits are practically the same, and as a matter of course, require similar treatment. The fruit is produced chiefly upon wood of the previous season's growth, and the trees require more pruning than any other stone-bearing kinds. It is necessary, in order to keep up a supply of vigórous young wood, that the shoots should be thinned out and shortened back to about half their length. Summer pruning is very serviceable, and should be generally practised. Root-pruning is sometimes serviceable for over-vigorous trees.

Pear.—This tree bears in a similar way to the Apple, and must be treated in the same way to a certain extent. Root-pruning is, however, more often required than with the Apple ; in fact, no fruit trees require root-pruning to the same extent as Pears, as they are prone to make woody growth in abundance and bear but little fruit. Root-pruning will often conduce to the fertility of trees in this condition. Summer pruning is useful.

Plum.—The fruit of this tree is borne upon spurs of one, two and three years' growth ; but chiefly upon those of the previous season. But little pruning is, as a rule, required with mature trees, except the thinning out of crowded and the removal of misplaced branches. Summer pruning is sometimes useful. Root-pruning will often have a beneficial effect when trees are making an over-strong woody growth, and yielding but little fruit.

Quince.—This tree bears in a similar manner to the Apple and Pear, and the main branches require but little pruning, except the thinning out of crowded shoots. The tree has, however, a great tendency to produce rank shoots from the stem, and these should be cut away in pruning. Root-pruning will often prove useful when there is an over-luxuriant growth.

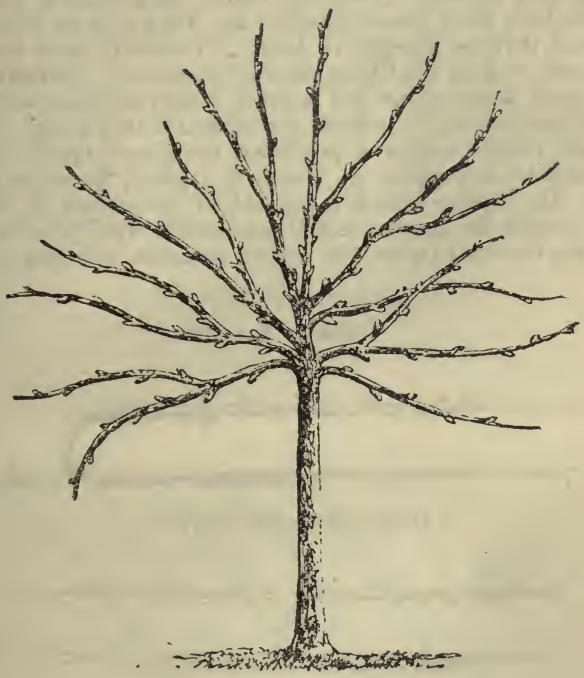
Raspberry.—The fruit of this plant is produced upon canes of the previous season's growth. Immediately after the fruiting season is over, the canes that have borne should be cut away, and all the suckers or young ones, excepting from three to six of the strongest, which must be left to supply bearing wood for the next crop. These young canes should during the winter be shortened back to 3 or 4 feet, according to their strength. Root-pruning is not required.

Walnut.—This tree bears upon wood of the previous year's growth, and requires but little or no pruning. All that is necessary is to remove rank shoots, and thin out crowded branches. Root-pruning is seldom practised, though it may prove useful for over-strong trees that are shy bearers.

Training.

Fruit-bearing trees and shrubs should be trained according to their natural habits of growth, the peculiarities of climate, and the special requirements of cultivators. In the United Kingdom and other parts of Europe, various methods of training are practised to effect particular purposes, but in this part of the world trees are mostly grown as standards, and to a great extent allowed to develop their natural forms. There are no reasons for resorting to various expedients to counteract climatic conditions in this part of the world as in colder countries. But, at the same time, our fruit-growers should train, as far as possible, so as to mitigate the effects of extreme heat with which they often have to contend In the case of all standard trees, the pyramidal or globular form will, as a rule, be the most serviceable in this part of the world. Some cultivators favour the thinning out of the centres of the trees to allow the stronger exposure to sun and light, but the writer strongly condemns this treatment. This "egg-cup" system is all very well in a cold country, where it is necessary to make the most of the sun's power, but in this part of the world more shade and less exposure will be of greater advantage to the trees. For this reason, trees should also be trained with low heads, which afford a more perfect shade to the stems than taller ones, a matter of some importance in this part of the world. Low-headed trees are also less liable to injury from the effects of high winds than tall ones, and they afford greater facilities for pruning and gathering the fruit. All these are advantages that should not be overlooked by the cultivator.

Tree trained as a pyramid.

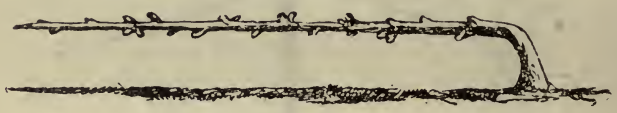


Tree trained with a globular head.

Dwarf of bush tree trained with a globular head.

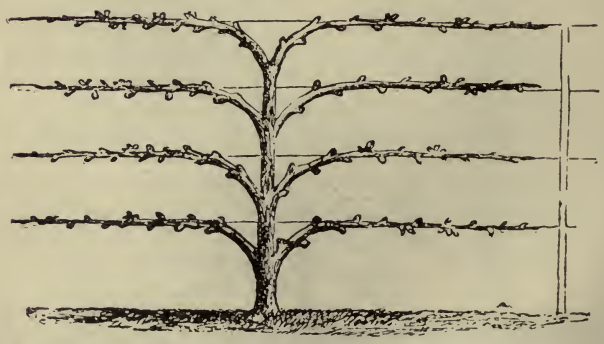
Training for Special Purposes.—Though a natural form of growth is best adapted for fruit trees and shrubs, as a rule, yet it may be necessary to modify the training to suit particular purposes and to attain special objects. Trees and bushes of pendulous growth may require to have their lower branches cut away to a far larger extent than those that are upright in habit. The rule in these cases should be that every branch must hang clear of the ground. In small gardens, where space is an object and a great variety of trees are required, the European methods of cordon and conical training may be adopted. There are various modes of practising the former system, but those most generally adopted are the lateral or espalier, the upright, and the oblique. The espalier system is adapted for the borders of walks, and is more suitable for Apples and Pears worked upon dwarfing stocks. In training for this purpose, one or two branches, according to whether

CORDON TRAINING.

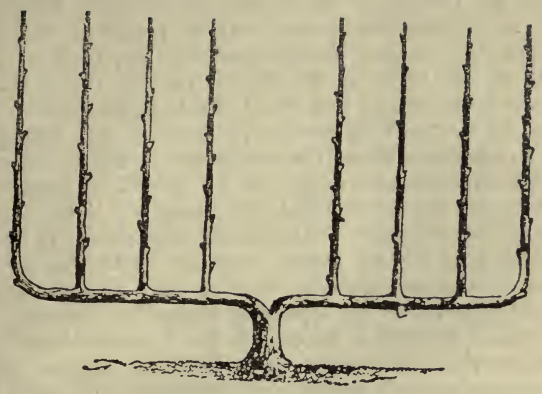


Dwarf espalier with one arm.

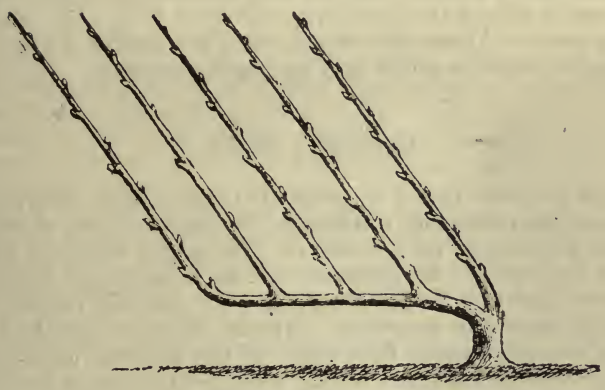
Dwarf espaliar with two arms.



Espalier with several arms.



Vertical cordon.



Oblique cordon.

growth is to be made in one or two directions, are formed at the top of a short trunk; these are trained horizontally to stakes, or upon trellises, in the required directions, and their growth regulated and kept within bounds by pinching back the shoots from time to time. Espaliers may also be trained with two, three, or more tiers of horizontal branches. The oblique-cordon system is practised by training each tree with a single horizontal stem from which several branches are inclined at an angle of about sixty degrees. Trees for this purpose are planted closely, and, as with espaliers, are kept compact by frequently pinching back the shoots. In the conical system of training, the trees

are encouraged to assume the shape of an acute pyramid or cone, and the branches are tied in so as to hang pendulous. For dwarf trees, when space is limited, the system may be practised with advantage. Fan and horizontal training, though commonly practised in the United Kingdom, is of but little service in this part of the world. It is a system by which the foliage and wood can be spread out so as to fully expose them to the heat of the sun, a practice that may prove very serviceable in a country where the summers are short. In this part of the world, however, no advantage can be gained by spreading out the branches, but, on the other hand, the trees are liable to suffer from exposure to the sun's power. When trees are trained in this manner they must, as a matter of course, have due attention in frequently stopping and otherwise regulating their shoots. Grapes have, owing to their habit of growth, to be especially treated in training. They are commonly trained in what is known as the "currant-bush" style, that is, upon stems from 12 inches to 2 feet in height, with several branches, the last season's shoots from which are cut back to one or more eyes every season. Another system is known as the "long rod" or "renewal," and consists in allowing half the canes to be left from a half to two-thirds in length, while the others are shortened back to one or more buds; the next year the long canes are shortened back, to one or more buds, and the shoots from the spurs become the rods of the following season. Under this system, vines, as a matter of course, must be trellised, so that the shoots may be properly secured.

Gathering Fruit.

Fruits of all kinds should be gathered at such a stage of maturity as will develop their desirable qualities to the fullest extent, or best serve the special purposes of the cultivators. The proper degree of maturity at which fruit should be gathered will, as a matter of course, vary considerably according to the kind, and even different varieties of one often want dissimilar treatment. Apples should be gathered immediately before they become fully ripe. If left too long upon the trees, the fruit, when kept, is apt to become mealy, and to lose in flavour more or less. Pears are somewhat peculiar in ripening, and fruit in perfection is seldom obtained if allowed to mature upon the trees. There are exceptions to this rule, but they are very few. Many superior varieties, remarkable for their luscious and high flavours, do not develop their finest qualities when left to ripen upon the trees. The time the fruit will take to come to perfection, after it is gathered, will vary considerably according to the variety. From three to four days may be sufficient to bring a Jargonelle or Windsor to perfection, whereas as many months will be necessary for such kinds as L'Inconnue, Josephine de Malines and Winter Nelis. Quinces should be fully ripe before they are gathered. Plums for dessert should be allowed to hang till they are quite ripe, in order that their flavour may be fully developed. If required for prunes, or drying in other forms, it will be an advantage,

when practicable, to let the fruit hang till it begins to shrivel. For culinary purposes, the fruit will be in a better condition if gathered before it is fully ripe. Peaches, Nectarines and Apricots for the dessert should not be gathered till fully ripe, as then their flavour is best, and they are also in the finest condition for canning and drying. Cherries, Gooseberries and Currants require to be fairly ripe before they are gathered. Grapes, either for table, wine or drying, should be fully ripe before they are gathered, as only then will their best qualities be fully developed. To the makers of wine, raisins or currants, the degree of ripeness is a matter of material importance. Oranges should be fully ripe before they are gathered, as they must reach that stage before their sweetness and flavour is perfectly developed. Too frequently they are gathered before they are fully matured, and consequently their quality is more or less inferior. When required for packing and exporting to distant places, it may be necessary to gather the fruit somewhat early, but this should never be done for a local market. Lemons should be gathered somewhat earlier than Oranges, as no advantage is gained by letting them remain long upon the trees. Cultivators must bear in mind that Oranges, Lemons and other species of the Citrus family should have their stalks cut or broken, and the fruit ought never to be pulled from the trees. This is more specially necessary when the fruit is required for keeping or packing. Strawberries require to be fairly ripe before they are gathered, and the fresher they are eaten the better, as their flavour soon passes away. Even a passing shower of rain will, in a large measure, spoil the flavour of this fruit. In gathering and packing, Strawberries should be handled as little as possible, and when used as a table fruit the berries when picked ought to be placed at once in the basket, or other receptacle, in which they are to reach their destination. Raspberries require even greater care than Strawberries, when used as a dessert fruit, as their rich flavour rapidly passes away. The berries must be fully ripe, and gathered with the greatest care. When required for preserving, such extreme care is unnecessary, but still it is advisable to secure the fruit in the best practicable way. A great deal of the fruit that is converted into jam is seriously deteriorated for want of more care and judgment in gathering and sending to market. The Date Plum should be allowed to hang upon the trees till it is dead ripe before it is gathered, as a certain stage of decomposition must be reached before the fruit is perfect. The same remarks will apply to the Medlar. The Walnut, Cob and Filbert may be safely left till the nuts are ripe enough to fall, though if necessary they may be gathered a little earlier. In gathering any kind of fruit care should be taken, as far as is practicable, that it is perfectly dry, and more especially if it is required for keeping. Dews should be allowed to disperse before the work commences, and on wet days it ought to be suspended.

Keeping Fruit.

It is a matter of some importance to cultivators that they should be able to keep some kinds of fruit for as long a period as possible, in order

to extend the seasons, and the demand for their produce. Apples are the principal fruit for keeping, and most growers have to place the main bulk of their crops in store for a shorter or longer period, according to requirements. As a matter of course late ripening firm-fleshed varieties will keep better and longer than others, and they should have the preference for the main stock, as far as is practicable, and more especially if the grower desires to share in an export trade. There is some difference of opinion between growers as to whether fruit should be kept dry or moist, and equally good authorities take opposite views. On the one hand it is asserted positively that dampness is against the keeping of any kind of vegetable matter, and that, consequently, it must injure fruit. The opponents of this view declare that dryness is more injurious to fruit in store than moisture, and quote instances of wet cellars where it has been kept in good condition for long periods, though water has been standing on the floors for several days at a time. Now both these opinions may be to some extent right, and proved to be so under certain conditions. But it must be borne in mind that dampness and dryness have really less influence upon the keeping properties of fruits than temperature. Great and rapid changes of temperature will tend towards decay. On the other hand, if the fruit can be kept at a low and uniform temperature it is likely to remain sound, independently of other influences. There need be no difficulty in settling the question as to whether fruit houses are too dry or damp. If the fruit, after being stored for a few weeks, begins to shrivel it is a sign that the air is too dry. On the other hand, if the fruit decays without shrivelling it indicates that the place is too damp. The fruit should be kept in a cool room or cellar, where the extremes of heat or cold will not materially effect the temperature, which must be kept as uniform as possible. Cool and serviceable stores for keeping fruit may be readily and economically formed by an underground cellar, with the roof slightly raised above the surface. This will always be cool and the temperature will not vary considerably if the roof is thick and covered with earth. As a matter of course, care must be taken that the drainage is good, and that water will not soak in. If the excavation is made on the side of a slope it will be easy to provide against a flow of water by a pipe drain, which will also be of assistance in supplying cool air to the cellar. Air should be freely admitted by openings just below the roof, but so arranged that they can be effectively closed on very hot days, or such other times as may be necessary. The air in fruit rooms or cellars should be kept moderately dry, but not too much so. If too dry the fruit has a greater tendency to shrivel than it would have under other conditions. It is also advisable that the cellar or room should not have much light. Before Apples are packed away in the rooms, it will be advisable to let them lie in heaps for a few days. This causes a moisture to exude from the skins, and assists in preserving the fruit. The Apples should then be spread out upon shelves, taking care that every one is in sound condition. Growers in the United Kingdom often preserve Apples well by simply placing them in heaps and covering with straw and soil, in the same way as is done with potatoes. This plan, however, cannot

be commended to growers in this part of the world, as the cellar or store room is better in many ways. Possibly the American method of storing Apples in unheaded barrels might prove serviceable to some of our growers. Pears, as a matter of course, require considerable attention in storing, as most kinds have to be kept for a shorter or longer period before they are fit for use. They require the same treatment as Apples, but will require looking over more frequently, as some kinds ripen very quickly. Peaches, Nectarines, Apricots, Cherries and most of the Plums can only be kept for a few days after they are gathered, and they are seldom stored. Some of the later Plums, however, such as Coe's Late Red, Ickworth's Imperatrice and others, may be preserved in good condition for several weeks after they are gathered. Kinds that decay quickly will all keep somewhat longer than otherwise if placed in a cool cellar. Oranges may be kept in good condition for three or four months if gathered before the fruit is over-ripe. The writer has kept them four months without the slightest deterioration. They should be treated in the same way as recommended for Apples. Lemons will not keep so well as Oranges, as a rule, as they have a greater tendency to shrivel; but they will remain sound for several weeks if carefully handled and stored in the same way as directed for Apples. The Date Plum must be stored for two or three weeks after it is fully ripe before it is in perfect condition. A chemical action, resulting from decomposition, seems to be essential to the perfection of this fruit. Medlars must be kept till the period of decay has fairly advanced before they can be utilised. Bunches of Grapes may be kept fresh for a considerable time by various methods. One plan is to hang the bunches in moderately dry sheds or rooms in such a manner that they will not touch each other. Another plan is to place the bunches in boxes or jars in such a manner that they will not touch each other, filling the space between with dry bran or sawdust. The bunches may also be kept for some time by cutting them with a few inches of the wood attached, and inserting the ends of these pieces in tubes or bottles filled with water. A small quantity of charcoal should be placed in each vessel to assist in keeping the water sweet, and as it is absorbed the deficiency must be made good. The bunches must be looked over frequently, and all decaying berries promptly removed, as if left they will soon affect others. The thick-skinned and firm-fleshed varieties are better adapted for preserving by any of these methods than others, and it may sometimes be to the advantage of cultivators to practise them.

Packing Fruit.

This is a subject of some importance to the cultivator, and more especially as there is a prospect of a large export trade in many fruits being developed. But even in sending fruit to local markets, growers will find it to their advantage to have their produce packed so that it

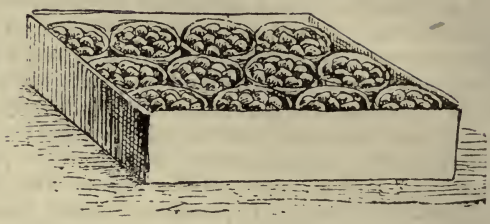
will arrive at its destination in the best possible condition. There is a growing demand for Apples in the United Kingdom and other parts of Europe, and before long a large and steady export trade will be established. For export to distant countries like England, Apples should be packed with the greatest possible care. The fruit should be carefully selected, so that the contents of each case are uniform in variety, size and colour. Each fruit should be wrapped singly in white tissue or blotting paper, which will absorb the moisture that may exude from the Apples. The writer is of opinion that, owing to its greater absorbent power, blotting-paper will prove the most serviceable. On no account must coloured or printed paper be used for wrapping. Before the fruit is packed, it will be advisable to spread it out in some place where it will dry or wilt slightly. By adopting this plan the fruit will exude less moisture in the packages than it would do otherwise. The fruit should be packed as close as possible in regular layers, filling the cases so that a gentle pressure is required to fasten down the lids. Cases should be made to hold from 40 to 50 lbs. of Apples, and must be made from some kind of wood that will not affect the flavour of the fruit. Cases vary considerably in size and form in different parts of the world. In the Australian colonies the case most generally used for Apples, Pears and Oranges is 2ft. 4 inches long; 1ft. 2 inches deep, and six inches wide, inside measurement. As to the most suitable form of case, some difference of opinion prevails, but it ought not to be difficult for Australian exporters to adopt a particular standard. Pears for export require to be treated in precisely the same way as Apples. Quinces may also be exported under similar conditions, and possibly this excellent fruit may eventually be in demand for this purpose. Oranges and Lemons are fruits that pack and carry well, and can always find good markets. They should be packed as directed for Apples, but require to be dried to a greater extent before they are put in the cases. Let them be spread out and fully exposed to the air for four or five days previously, or, what will be better still, place them in a room with a current of dry warm air passing through. This treatment causes a good deal of the moisture contained in the rind to evaporate, and, as a matter of course, a less quantity will be given off after packing. The fruit may be exposed till it begins to shrivel before it is wrapped and packed. In sending Apples, Pears, Oranges or Lemons to the London or other markets, it will be advisable to brand the cases with the names of the fruits and varieties, and also the number each one contains. This extra care is sure to be well appreciated by purchasers when the fruit is sold. Grapes may possibly be one of the fruits that can be profitably exported from Australia to Europe. The only kinds likely to prove suitable for the purpose are those that have firm-fleshed berries which hang loosely on the bunches, such as the well-known Muscat of Alexandria, and others of a similar class. The bunches should be packed closely in layers in moderately-sized boxes, filling up the spaces with some thoroughly dry and absorbent material that will take up any moisture that may come from the fruit. Fine cork dust is to some extent used in Europe for this purpose, and has proved very suitable. Trials made

in Australia with this material have also given satisfactory results. Though, as a matter of course, less care is required in sending fruit to colonial markets, yet growers should always pack well and neatly. Apples, Pears, Quinces, Peaches, Apricots, Oranges or Lemons should be packed so that each case will contain fruit that is uniform in variety, size and colour. The fruit should also be packed firm, so that it will get to market in the best possible condition. Cherries should be packed closely in small cases containing from 10 to 12 lbs. each. Strawberries will reach the consumer in the best possible condition if packed in small boxes or baskets containing about 1 or 2 lb. each. These may be packed again into larger cases that will hold from one to three dozen of the smaller ones, arranged in close layers. If wanted for preserving, boxes holding from 10 to 12 lbs. may be used. Raspberries must be packed carefully in 1 or 2 lb. boxes, if required as dessert fruit. For preserving, the fruit must necessarily be sent away in buckets or casks, according to the general method. As regards small fruits it is usual, in most parts of the world, to let the boxes or baskets be retained by the purchasers, as after being used for berries they are generally stained and unfit for further use. Grapes when sent to the market must be firmly packed in layers, and the cases should be sufficiently full to require some slight pressure in fastening down the lids.

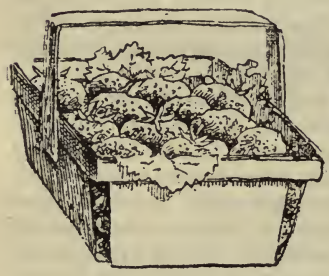
Packages for Small Fruits.—There is a great deal of confusion in the way small fruits are sent to market in this part of the world, as they are packed in all sorts of receptacles, varying greatly in form and shape. It would be well for growers to bring about a more systematic mode of packing on a uniform basis. The following illustrations show the packages most generaly used in England and America, and some of them have been recently introduced to Australia. The English round chip punnet has been for many years the receptacle used in the United Kingdom for Strawberries and Raspberries, it having superseded a conical one known as the "pottle." Punnets are made of different sizes, the one most generally used being six inches in diameter and two deep. The punnets are packed in boxes, as shown in the illustration. Of late years square chip baskets with handles have come into favour, and seem likely to supersede the round punnets. The handles are made to bend down when not in use, and this facilitates the packing in boxes, which are the same as those used for punnets. The Jersey basket, as shown in the illustration, holds about one pound, but though much used in Europe and America, is objected to by some as being rather too deep for tender fruit. The American baskets hold from one to two pounds, and are very useful receptacles for any kind of small fruits. This class of baskets has been introduced to Australia, and probably their use will soon be general. The fruit crate shown in the illustration is of American design, and is worthy of attention from fruit growers in this part of the world. It is constructed to hold 32 quarts, and is furnished with a lock attached to a small chain. The party who sends the fruit away has a key and locks the crate, and the one to whom the fruit is consigned has a duplicate to open it upon arrival. By adopting this precaution pilfering during transit will be avoided.

Packages for Small Fruits.

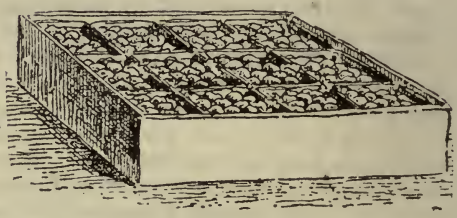
English Chip Punnet.



Packing Punnets for Market.

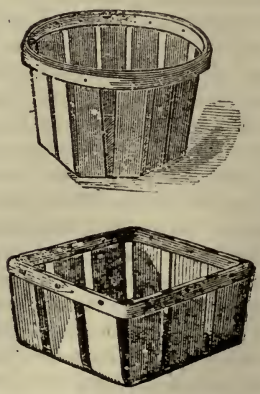


Square Chip Punnet.

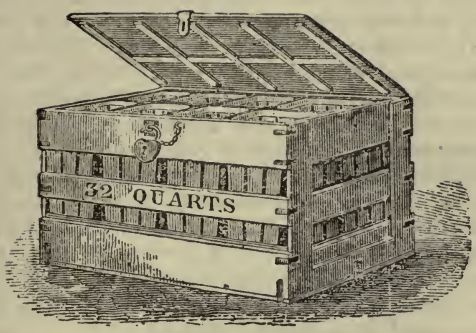


Packing Square Punnets.

Jersey Basket.



American Baskets.



American Crate.

Drying Fruits.

Various fruits can be utilised to advantage by drying, and some kinds are in extensive demand when preserved in this way. The more prominent of the dried fruits of commerce are the Raisin, Currant and Fig, all of which, as has been proved, can be produced to perfection in many parts of Australia. Among the less prominent kinds are the Apple, Pear, Peach, Apricot, Plum, Cherry, Loquat, Date Plum and Strawberry. All these fruits are excellent when dried, and, if carefully prepared, may be kept for years. In Europe and America, fruits of the kinds named are dried in considerable quantities, and there is a great demand for them. There are two ways by which fruit may be dried, one being by the power of the sun, and the other by artificial heat, and, in some cases, both methods can be utilised. Sun-drying is the system most generally adopted in Europe, and more especially in making raisins and currants. Grapes intended for these purposes should be allowed to hang till they are dead ripe, when they ought to be cut and spread out upon trays or mats, and fully exposed to the sun. The bunches should be turned daily, so that each side is equally exposed to the sun. In order to save labour in turning, and this is sometimes an important object, a second tray of the same size may be placed over the fruit, and the position of both reversed by a single movement. The size of the trays is of no material importance, but they should be uniform and not too large, so that they may be easily handled. The time required for sun-drying raisins will, as a matter of course, vary to some extent, according to the weather and the size of the Grapes. Ordinary raisins, under favourable conditions, will be sufficiently dried in about three weeks. If the conditions are favourable, sultanas will be fit a few days earlier, and currants

will take less than a fortnight. While the fruit is drying, care must be taken to protect it from rain and dew. As soon as the fruit is sufficiently dry, it should be stemmed, if necessary, and placed in boxes or casks, leaving it two or three days to slightly ferment, or "sweat." The fruit is then spread out and left for about twenty-four hours, when it may be packed finally. The fruit should be firmly and equally pressed in packing, so that it will keep well and turn out in prime condition. In Valencia, and some other parts of Spain, where the raisin-making industry is a leading one, it is customary to dip the bunches before they are spread in a hot lye made from the ashes of the Grape-vine and Rosemary, to which a small proportion of slaked lime is added. The fruit is merely dipped in the lye for a few seconds, and the process is supposed to hasten the curing, which doubtless it does, but no further benefit can be derived from it. On the other hand, there is a danger of the fruit being injured by remaining too long in the hot solution, when there will be a probability of the skin cracking, and a portion of the grape sugar escaping. Raisins and currants may be more quickly prepared in kilns, especially constructed for drying, a method much practised in America. They may also be prepared by means of artificial heat in "fruit evaporators." Some prefer to dry the fruit partially in the sun, and finish by artificial heat, and the grower must decide which method will suit him best. Sun-dried fruit is, however, generally considered to be superior to other kinds. Figs, for drying, should not be gathered till they are perfectly ripe, and should be treated in nearly every respect as recommended for raisins. They, however, require to be dipped in boiling lye, and, being larger, are longer in drying. Another mode of drying not so generally practised is to dip the figs in boiling syrup for about three minutes, and then spread in the sun. Though Figs may be dried with greater facility in kilns and evaporators, yet they are rarely equal to those prepared by sun heat.

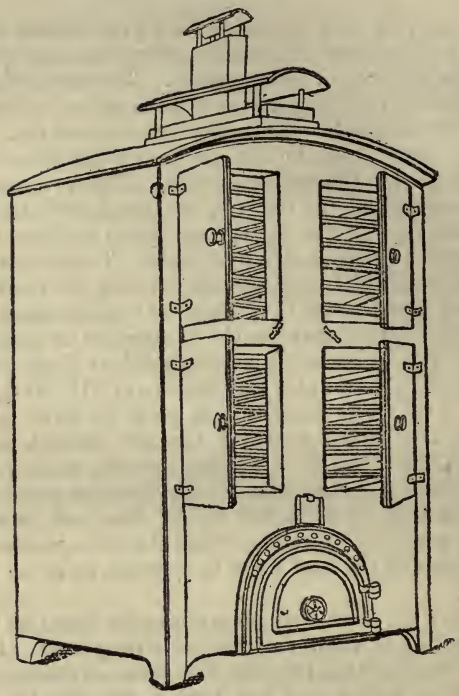
Plums are dried extensively in Europe, and form an important article of commerce known as prunes. Certain kinds of Plums are used for the purpose, and these are dried whole. Perfectly ripe fruit is chosen, and this is prepared by partially drying it in the sun, and finishing it off by artificial heat. Full details of the process will be found in the article dealing specially with the Plum. Various sorts of Plums are also dried extensively by halving, removing the stones and spreading them in the sun, or passing the fruit through an evaporator. Peaches, Apricots, Apples, culinary varieties of Pears, Cherries and Strawberries may be turned to good account when sun-dried, or prepared by artificial heat. Peaches and Apricots must be peeled, stoned and sliced or quartered, Apples and Pears should be sliced, peeled and cored, the Cherries must be split in two, and the Strawberries may be dried whole. When fully dried, these fruits should be tightly packed in boxes or casks, and if carefully prepared they may be kept in sound condition for some years. As regards Peaches, Apricots and Cherries, the varieties best adapted for drying are those whose flesh is firm. As a rule, the very luscious melting varieties are quite unsuitable. In the case of Apples, good cooking kinds only should be used.

Drying by Artificial Heat.

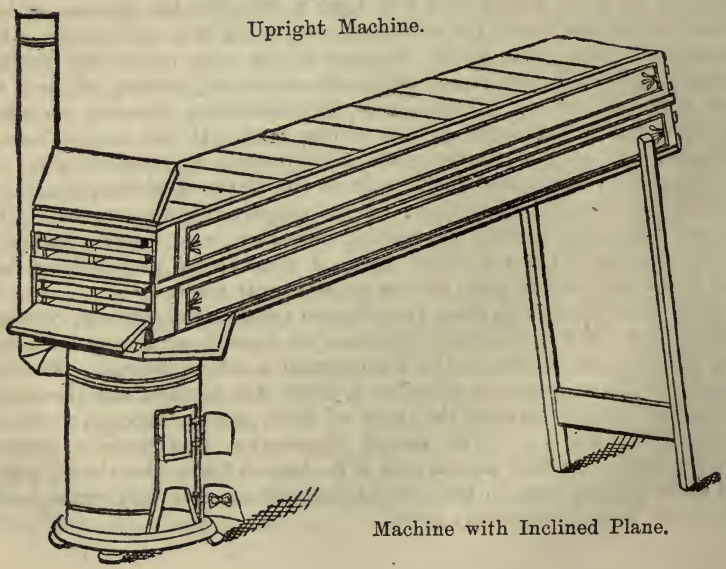
Though sun drying may be utilised to a great extent in many parts of Australasia, yet artificial evaporation must necessarily be the method adapted by the majority of fruit growers. This method can be practised successfully in every district where fruit is grown, whereas sun drying will only be serviceable in regions that are hot and dry. Various kinds of evaporators are in use, but though they differ considerably in detail yet they all work on the same principle. This principle is to remove the water contained in the fruits by means of swift moving currents of strongly heated air. If the air current is not sufficiently hot and rapid the fruit cannot be thoroughly well dried. The air may be sufficiently heated, but if it does not pass through quickly the fruit will be more or less cooked and deteriorated in quality. It is necessary to heat the air to a much higher degree than would be required to bake the fruit in an oven; but the rapid circulation prevents injury from burning. Apples will cook in boiling water at a temperature of 212° Fah., or bake in an oven at 225° Fah.; but they will not cook or burn in an evaporator heated up to 300° Fah., provided the air current is strong. The evaporation of the water is a cooling process, and as the particles of vapour are driven from the minute cells the heat surrounding the fruit is reduced. A heat of from 240 to 250° Fah. will be sufficient for the purpose. As a matter of course, when the main portion of the vapour has been evaporated the heat must be reduced, so as to prevent all risk from burning.

The necessary chemical changes are brought about in the most perfect manner by the use of rapid currents of strong heat. In the first place the albumen is coagulated precisely the same as in an egg when boiled, whereas by slow drying with fire heat a considerable portion is lost. There is also less loss in the soluble starch, which is an advantage. The pectine, or fruit jelly, either remains in the cells or on the surface, instead of decomposing to a considerable extent and passing off, as is the case with slow drying. Then, again, the saccharine ferment contained in all fruits is destroyed by the strong heat. If the natural starch, albumen and glucose are not made indestructible by perfect drying, the prepared fruit will absorb moisture from the air, be liable to get mouldy, and finally turn sour and decay. Fruit prepared by evaporation, in the proper way, may be kept for years if necessary, when tightly packed in boxes or casks. On the other hand, if imperfectly prepared, it will not keep long, and is quite useless for an export trade.

The illustrations represent two distinct types of evaporators, of which there are a number of kinds. The first of these is what may be termed the upright class, to which the Zimmerman machine belongs. In these machines the evaporating chamber is above the furnace, and the heated air, after passing through the trays of fruit, escapes through a covered chimney at the top. The second illustration represents a machine known as Dr. Ryder's patent, and it is claimed for it that the air passes off more quickly than in the upright evaporators, and that consequently the fruit is more effectively dried.



Upright Machine.



Machine with Inclined Plane.

Sulphuring.

It is customary to subject pared and sliced fruit, when freshly cut, to the fumes of sulphur for a short period. This process is called bleaching, and prevents the discoloration of the fruit, through contact with the air, that would otherwise take place. In the case of apples, and many other kinds, it is essential that the dried fruit should be of a light colour.

The reasons for sulphuring fruit are twofold. One is to brighten the appearance and give the prepared material a lighter colour than it would have otherwise. The second object is to prevent the dried fruit from being attacked by insects, as the sulphuring kills any eggs that may exist, and prevents others from being deposited. But special care must be taken that the sulphuring is not too strong or long continued. When the freshly-sliced fruit is subjected to sulphur fumes for *a few minutes* the gas merely penetrates the surface, and afterwards escapes during the process of drying. But if the sulphuring is heavy and long continued, or *done after the fruit is dried*, as is sometimes the case, the gas penetrates deeply. Badly-dried fruit that is too dark in colour is often treated in this way to bleach it, and make a more marketable article. Fruit sulphured over-much, or after drying, is unwholesome and very indigestible, as the "sulphurous" acid originally introduced becomes after a while "sulphuric" acid.

Sulphuring must be done in a building specially erected for the purpose, and so arranged that the fumes may be equally and effectually distributed. The fruit is arranged on the same trays as for drying, and these, if constructed with cleats on the ends, to bear the weight, may be piled on each other. A very small bleaching-room will be sufficient for a large quantity of fruit. The time required to complete the sulphuring process will vary according to the amount of sulphur used, and the kind of fruit; and some little experience will be necessary before the operator is thoroughly expert. From a quarter to half-an-hour is the time generally allowed. The sulphur bleaching process is applied equally to sun-dried fruit and that prepared by artificial evaporation.

Packing Dried Fruits.

When the process of drying is complete, the prepared fruit should be bulked in heaps or boxes, so that it may slightly ferment, or "sweat," as it is technically termed. This process softens the fruit and improves its condition. Care must be taken that the fermentation is not too strong, and in order to avoid this the fruit should be turned occasionally, or, if in boxes, poured from one to another. The time required to complete the process will vary somewhat according to the fruit, and will range from forty to sixty hours. When the fruit is placed in the boxes for market, it should be packed with care, so that it will open out with a good "face." It is customary with European and American

packers to flatten some of the fruit by passing it through rollers such as those of a clothes wringer. This flattened fruit is laid carefully the cut side down on the bottom of the box, which is then filled up with the quantity it is to contain. The fruit is then firmly pressed, and the lid nailed on. The box is then inverted, the brand or label affixed, and what was the bottom becomes the top of the package. Various kinds and sizes of boxes are in use for packing dried fruits, but it will be advisable for cultivators and manufacturers to confine themselves to a limited number. The most suitable sizes for marketing are boxes that will hold fifty and twenty-five pounds respectively. The boxes should be neatly lined with white paper, in such a way that they will have a nice appearance when opened out. Dried fruits may be packed in cotton or canvas sacks, but they show to greater advantage, and are less liable to injury, when arranged in boxes.

Canning Fruit.

This mode for preserving fruits has become very popular within the last few years, and promises a much wider extension in the future. The process can be successfully applied to most stone, pip or berry fruits, but it is confined chiefly to such kinds as can be utilised for culinary purposes. Pears are prepared by peeling, quartering and coring. Apricots may be left whole, or halved, and the stones removed. Peaches are treated in the same way, and may be either peeled or not, at the option of the operator. Plums may be halved and stoned, or left whole. Cherries, gooseberries and other small fruits are left whole. Pine Apples should be pared and sliced. When the fruit has been prepared in such form as may be necessary, it should be placed in the cans, which are then filled nearly to the tops with water or syrups of various densities, according to the nature of the fruit or the requirements of the operator. The lids are then fixed on, leaving a minute vent-hole in the centre of each. The cans are then placed on iron frames or trays, and plunged three-fourths of their depth in boiling water. As to the time the cans are left in the boiling water some judgment, based on experience, is required, as the necessary amount of cooking varies with different fruits, and even the one kind under dissimilar conditions may require a difference in treatment. When the cans are taken out of the water they are allowed to cool, and the vent is soldered up. The success of the operation depends in a large measure upon the skill and judgment of those who direct the work. As a rule canning can be carried on most successfully in factories equipped with the most perfect labour-saving appliances, and directed by skilled experts. The cost of a perfect plant, including the latest improved tin-working machinery, is considerable, and operations must be upon a large scale, with a well-arranged division of labour, in order that fruit may be canned at a low cost, so that it can compete in the world's markets. Though some of the larger orchardists may possibly make canning pay, yet smaller growers will necessarily have to depend upon factories to work up their produce.

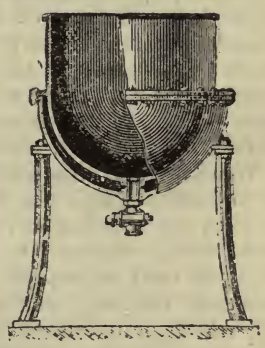
Preserving Fruit in Bottles or Jars.

This mode of preserving fruit is based upon the same principles as canning, and is, in fact, the original method. The bottles or jars are filled with fruit, over which is poured water or syrup, according to the fruit and the requirements of the operator. The bottles or jars are then plunged nearly to their tops in a tank of boiling water, and when taken out they must be corked quickly while hot. When they have cooled, the corks should be sealed to keep them air-tight, and the vessels labelled with the name of the fruit.

Jams, Jellies and Marmalade.

The preservation of fruit under these forms has been practised from remote periods, and considerable quantities are utilised in this way. Formerly fruit for these purposes was mostly treated in small quantities for family use, but latterly the work to a great extent has been taken up as a regular business, and is carried on in factories established for the purpose. From a commercial point of view these establishments have the advantage, as they are fitted up with the most perfect appliances, and are under skilled management. Consequently the factory-made articles are more uniform in quality, and can be produced at a cheaper rate than those made under less favourable conditions. These are advantages that cannot be ignored by fruit growers, and more especially as it is necessary to develop an export trade in these products. When fruit is treated by growers they should obtain the most perfect appliances for boiling that are within their reach, take the greatest care in manipulating the fruit, and to pack their products in a suitable and neat way. As a matter of course, various fruits require dissimilar treatment, and full details will be found in the special articles dealing with each kind.

Copper Preserving Pans.



Showing jacket with tap through which steam is forced.

Showing how pan is swung on a pivot to facilitate emptying.

Crystallising Fruits.

This mode of preserving is adopted to some extent in Europe for several fruits, and it may be successfully practised with most kinds. The theory of crystallising is to extract the watery juices from the fruit and replace them by sugar. In the first place, the fruit should be carefully selected, so that it is perfectly uniform in ripeness and texture. The mode of preparation will, as a matter of course, depend upon the fruit, and some kinds require very different treatment to others. Berry fruits, such as Strawberries, Raspberries, Blackberries, &c., must be left whole. Apricots, Peaches, Nectarines, Plums, Cherries and Date Plums should be halved, and the stones removed. Loquats should have their seeds removed. Apples, Pears and Quinces should be peeled, cored and sliced. Small Tomatoes may be left whole, medium-sized ones halved, and large specimens sliced. In preparing the peel of Oranges, Lemons and Citrons, the fruits are at first quartered and soaked in a strong brine of salt and water, after which they are thoroughly washed to extract the saline matter before the syrup is applied. Small Oranges of the Kumquat and Mandarin sections are crystallised whole, or they may be halved. When whole fruit is treated, the process of crystallising will be facilitated by puncturing the Oranges with wires, which enables the syrup to penetrate more freely. All fruits should be sufficiently ripe for their flavours to be fully developed.

When the fruit has been prepared in whatever form may be necessary, in accordance with the foregoing directions, it should be placed in baskets, boxes or buckets, with perforated bottoms or sides, and plunged into boiling water. The object of this is to dilute the juices, and facilitate their extraction. Care must be taken that the fruit is not immersed too long, as if so it will become partially cooked. On the other hand, if immersed for too short a time the juice is insufficiently extracted, and the absorption of syrup is checked. This is the most important part of the process, and expertness can only be obtained by practice. As a rule, the softer and smaller the fruit the less time should it be immersed in the boiling water. The next operation is to place the fruit in earthern pans or jars, and cover it with a prepared syrup. In the case of Raspberries and other small, soft fruits, a thick syrup may be used, as it will be readily absorbed. With larger and harder fruits a weaker syrup should be used at first, as the sugar is absorbed more slowly. Afterwards a thicker syrup will be necessary. In making the syrup it is necessary to use white sugar. The fruit and syrup is allowed to remain in the pans for several days, according to its size, softness and kind. It must be carefully watched, and if there are signs of fermentation the fruit should be heated to the boiling point, to check the working. This process must be again repeated, if necessary, till the operation is complete. The time necessary to complete the process of crystallisation will, as a matter of course, vary according to the nature of the fruit, and will range from two to six weeks. When the operation is complete the fruit should be lifted from the syrup and allowed to dry slowly. After it is dry it should be again dipped in a thick, hot syrup, and allowed to

cool slowly, so that a coating of sugar will cover the fruit. If glazed fruit is required it should be dipped in the same way, but must be cooled quickly.

Insects Injurious to Fruits.

The fruit cultivator has to contend against a number of troublesome insects, some of which cause a large amount of injury to trees or crops. These should, as far as is practicable, be kept under by such remedies as are at command, and by adopting this plan the injurious effects of these pests may often be considerably lessened. But though the subject is of such vital importance to fruit-growers, yet, strange to say, only a comparatively small number are acquainted with the habits of these insects, or the remedies that can be adopted against them. In addition to their scientific classification, insects, for practical purposes, are grouped according to the manner in which they attack plants. First—Insects destroying foliage, such as the Caterpillars. Second—Insects feeding upon the surface of the leaf, bark or fruit, such as the Scale. Third—Insects that bore into the fruit, such as the Codlin Moth. Fourth—Insects that bore into the stems, branches or roots. Each of these classes will necessarily require a different mode of treatment. In a book like this, the subject can only be lightly treated, and to deal with it thoroughly a perfect work upon entomology would be required. The writer proposes to draw attention to some of the principal of our troublesome insects, though it must be understood he does not profess to deal with the whole of them. This can only be done by the professed entomologist. In this part of the work only those kinds are dealt with that are generally destructive and troublesome to various kinds of fruits. Other insects, such as the Codlin Moth and American Blight, etc., which confine themselves to certain kinds, will be dealt with in treating upon the particular fruits that they prey upon. The descriptions of the insects are necessarily brief, in order that too much space will not be given to the subject. For the same reason, the remedies are given in as concise a form as possible, and only such as have proved effective are recommended.

Aphides.—There are various species of this family, more commonly known as "plant flies" or "lice," which are injurious to fruit trees. Some are peculiar to particular kinds of trees, while others are more cosmopolitan in their habits, and affect various families. The insects are minute flies, varying in colour from green to brown, black and white. They make their appearance at various seasons, thickly clustering upon the shoots, leaves and flowers, from which they extract the juices, and choke up the pores with their excreta. The most certain and effective remedies are syringing with strong tobacco water or soft-soap and kerosene. An infusion of the leaves of the Walnut and Elderberry is also a good application.

Caterpillars.—Various sorts of caterpillars are troublesome to fruit-growers, and when in large numbers they often do much damage. These pests feed upon the leaves, flowers, and young fruit, and are

somewhat difficult to deal with. Remedies :—Their ravages may to some extent be checked by dusting powdered lime over the trees. Spraying with a solution of London Purple, or with tobacco, elder, or walnut-leaf water will also help to keep them under.

Cherry Borer (*Maroga gigantella*).—This is a troublesome moth, the larvæ of which is very destructive to Cherry and Peach, as also Plum trees. The perfect insect is small, white, with a black spot on each wing. The larvæ first tunnels under the bark, then bores into the heart of the tree, and is indicated by sawdust excrescences. It is very powerful, is about an inch long, and bores very quickly. Remedies :—Syringing with kerosene emulsion, hot water, and phenyle.

CHERRY BORER.

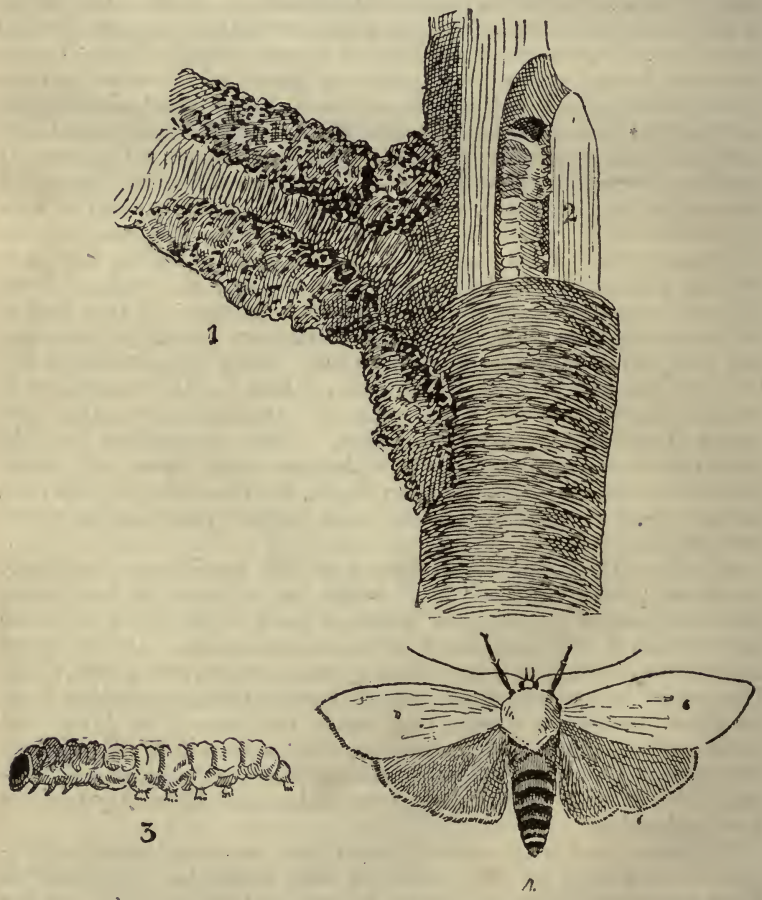


Fig. 1. Branch with sawdust-like excrescences showing the effects of the grub. 2. Larvæ working in its bore. 3. Larvæ (natural size). 4. Perfect insect (natural size).

Crickets (*Gryllus servillei*).—These insects are sometimes very troublesome in orchards and vineyards, as they eat the bark of the stems and branches, and often to such an extent that the trees are destroyed, or very seriously injured. Trees can, in a large measure, be protected from their ravages by enclosing the trunks with pieces of tin, so as to form smooth sides, up which the insects cannot travel. As a matter of course, no space should be left between the tin and the bark through which they may crawl. A mixture of soft-soap, sulphur, quassia, and Paris Green or London Purple is a good preventive. Take soft-soap and quassia at the rate of two ounces each to every gallon of water, and add the arsenical poison in the proportion of one ounce to every ten gallons. Paint the trees or vines so that they will receive a good coating. Crickets may also be kept under by poisoning them with a mixture of arsenic and bran sprinkled on the ground.

Elephant Beetle (*Orthorrhinus cylindrirostris*).—A very destructive insect, belonging to the Weevil family. The perfect insect is dark-brown, marked with patches of greyish-white, and rather less than an inch in length. The grub is yellowish-white, with a reddish-brown head. Great ravages are caused by the insect in its larvæ stage, boring into the branches of the Apricot, Peach, Orange, Vine, and other fruit trees or shrubs. Remedies :—The only successful method, as far as is known, for checking this pest is hand-picking. Possibly, spraying with some powerful solution might prove useful, as in the case of other borers.

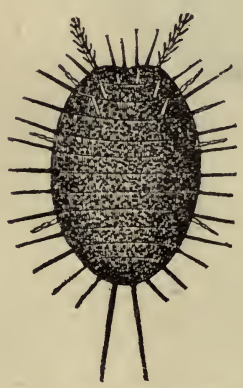
ELEPHANT BEETLE.

Fig. 1. Full-grown larvæ. 2. Pupa. 3. Perfect insect, Male. 4. Perfect insect, Female (side view).

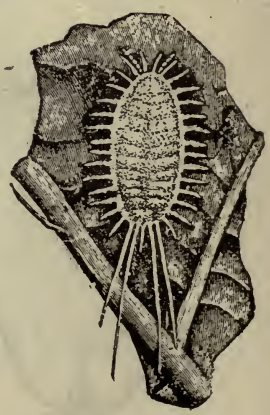
Green Beetle (*Diphucephala collaspidoides*).—This is a very troublesome insect in various parts of Australia, and more particularly in sandy soils. It belongs to the well-known "Cockchafer" family, a very destructive class of insects in European orchards. Green beetles make their appearance in great numbers, rapidly destroy the leaves of any trees they may attack, and they specially affect Cherries and Plums. The insect is about one-third of an inch in length, and in colour a bright shining green. It usually makes its appearance in the early summer and remains till the end of the year, when it lays its eggs and dies. Remedies:—Spraying with kerosene emulsion, Bordeaux Mixture, and tar water will help to destroy them, as will also boiling water. Sulphur fumes will cause them to drop from the trees, and when lying on the ground they may be destroyed by rolling, beating, or burning. The insects should be invariably attacked while young, being then more easily destroyed.

Mealy Bug (*Dactylopius*), various species.—A well-known and very troublesome small insect, which is covered with a thick powdery substance, hence its common name. It is often troublesome to Oranges and other evergreen trees. Remedies:—Kerosene emulsion and strong tobacco water sprayed over the trees.

MEALY BUG.



Insect with meal removed (highly magnified).



Insect in natural state (magnified).

Harlequin Beetle (*Dindymus versicolor*).—Rather handsome little insects, about half-an-inch in length, and richly marked with yellow, orange, red, and black. They are natives of Australia, and with other species of the same family are widely distributed. They are said to cause trouble by puncturing the skins of Apples, extracting the juice, and causing the fruit to spot. Remedies:—Use lime freely, and tar water; also shaking the trees, to cause the insects to fall, collecting

them in sheets, and spraying with benzole. When the fruit is too far advanced for the trees to be shaken, the insects can be made to fall freely by making a dense smoke under them.

HARLEQUIN BEETLE.

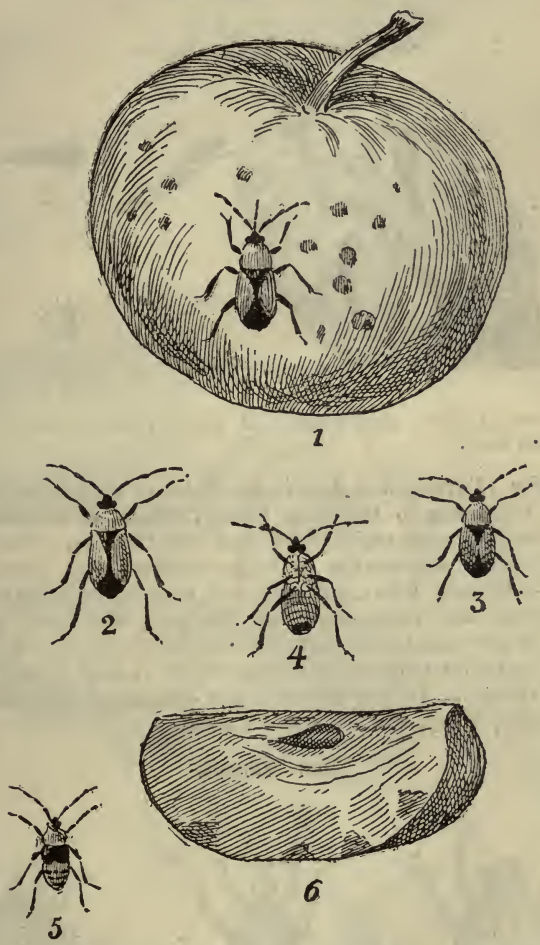


Fig. 1. Insect at work upon fruit. 2. Adult Male (natural size). 3. Adult Female (natural size). 4. Adult Female (under view). 5. Insect two-thirds grown. 6. Section of fruit showing effects of insects.

Pear and Cherry Slug (*Selandria cerasi*).—This insect, known also as the Slug Worm, is one of the "Saw flies," and is very destructive to Pear and Cherry trees. The perfect insect is about a quarter of an inch long, with a shining black body and transparent wings. The larvæ, or

slug, is about half-an-inch long, dark green in colour, and slimy. The insects feed upon the leaves of Cherries and Pears, which are often injured by them. Remedies :—Spraying with kerosene emulsion before the fruit is far advanced in growth and dusting with lime. Hellebore as a spray or powder.

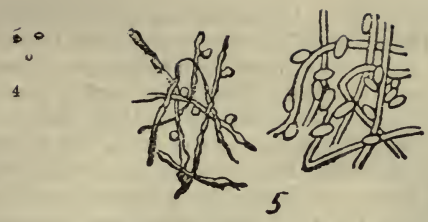
PEAR AND CHERRY SLUG.

Fig. 1. Showing larvæ upon a leaf. 2. Larvæ (natural size). 3. Perfect insect (natural size).

Red Spider (*Tetranychus telarius*).—This is a well-known minute insect pest belonging to the Mite family, which is sometimes found on fruit trees, and more especially Plums and Peaches. They are very small, make their appearance in large numbers, and spread rapidly. Remedies :—Tobacco water, soft-soap and quassia in equal proportions. The writer can also recommend for this pest, and many others, that boiling water be poured over leaves of the Elder (*Sambucus nigra*) and allowed to stand for two or three days, when it may be applied with a syringe or sprayer. It is a powerful and economical insecticide for any of the Aphides, Mites, and other small pests.

RED SPIDER.

Fig. 1. Young insect (highly magnified). 2. Perfect insect, Male (highly magnified). 3. Perfect insect, Female (highly magnified).



4. Insects (slightly magnified). 5. Webs with eggs, dry and moist (highly magnified).

Rutherglen Fly Pest.—This pest, which caused such consternation two or three years ago, and more especially in the Rutherglen district, Victoria, is said to be a species of *Rhyparochromus*, and belongs to the

RUTHERGLEN BEETLE.

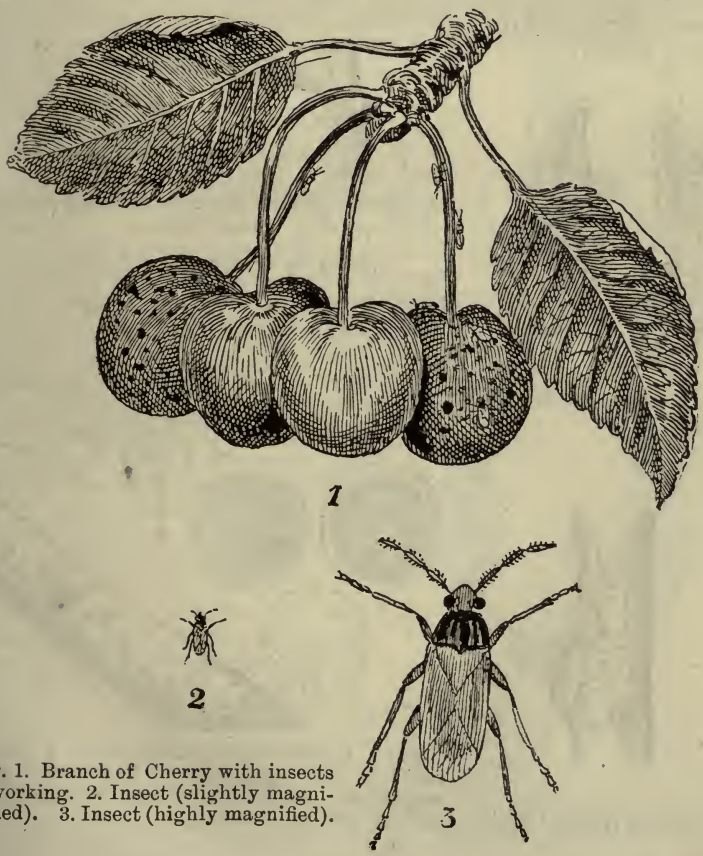


Fig. 1. Branch of Cherry with insects working. 2. Insect (slightly magnified). 3. Insect (highly magnified).

family called Wood-bugs. It is closely allied with what the Americans call the "False Chinch Bug," a very troublesome insect. The Rutherglen species is small, but very destructive, as it appears in large numbers and spreads rapidly. The insect acts by piercing through the skin of the fruit and sucking the juices, which causes it to shrivel up. It attacks nearly every kind of summer fruit, and is especially destructive to Apricots, Peaches, Plums, Cherries, and Grapes. Mr. French, Entomologist, Victorian Department of Agriculture, says that benzole alone seemed to be the only thing which had the merit of instantly destroying the pest without injury to the fruit.

Scale.—There are a great number of insects known under the name of Scale, and they belong to various families. Many fruits have their own particular Scale insects; while some of these pests are cosmopolitan

PROMINENT TYPES OF SCALE INSECTS.

COMMON SCALE (LECANIUM).

1. Insects (natural size). 2. Insect (greatly magnified).

MUSSEL SCALE (ASPIODOTIS).

1. Eggs in shell (highly magnified).

2. Insects (natural size).

OYSTER SCALE (MYTILASPIS).

Fig. 1. Perfect insect (natural size). 2. Perfect insect (highly magnified). 3. Scales (highly magnified). 4. Branch of tree showing scales natural size.

in their ravages, and attack indiscriminately various trees. They are all very injurious, as they suck the juices from the plants to a great extent. Remedies :—The Scale insects are rather difficult to deal with, owing to their hard shells or coverings. Kerosene emulsion, made rather thick, is one of the most effective applications. Common starch, mixed as by laundresses, is a favourite remedy with some. The stems and branches of affected trees should also be painted with a thick lime wash, with soft-soap added at the rate of half-a-pound to the gallon.

Slugs and Snails.—These pests are often very troublesome, and more particularly in moist weather and in old gardens. They are, however, easily detected, and can generally be kept under with little difficulty by frequently dusting lime or soot over the surface soil, or occasionally giving a light sprinkling of salt.

Thrips.—This is a well-known genus of minute and destructive insects, which includes a number of species. They attack many kinds of plants, the perfect insects and larvæ being generally found underneath the leaves. Their action is to suck the sap from the leaves, and consequently injure the trees. They are rather difficult insects to deal with. Remedies :—Dusting with powdered sulphur when the leaves are wet. Syringing with soft soap and water made rather thick, and used when warm. Spraying with water in which Elder leaves have been steeped. The stems of the trees and branches, as far as practicable, should also be painted with a mixture of soft-soap, sulphur, and lime, in about equal proportions.

White Ants. — These are very troublesome pests to fruit-growers in some districts, and often do much damage to buildings and trees. Remedies : — Making several holes round their nests from 9 to 12 inches deep, pouring into each a wine-glassful of bi-sulphide of carbon, and then covering them tightly. Another

COTTONY CUSHION SCALE (ICERYA PURCHASI).

Insects (slightly magnified).

THRIPS.

Fig. 1. The Larva (highly magnified).
Fig. 2. Perfect Insect (highly magnified).
Fig. 3. Side-view of Head (highly magnified).

plan is to make a paste of sugar and arsenic, in equal proportions; spread on a piece of soft deal board, which should be lightly buried near to where the pests are troublesome. They will soon find out the piece of board, and the paste will poison them in great numbers.

Wood-lice. — The common wood-louse (*Oniscus asellus*) is a well-known insect that is sometimes troublesome in Strawberry plantations, but otherwise causes little damage in orchards or fruit gardens. It is from half to three-quarters of an inch in length, with a flat body, and 14 feet. In colour it is a brown, slaty blue, and the back forms a shell. Remedies :— Poisoning with solutions of arsenic, in which potatoes, parsnips, or other roots have been cooked. These should be placed near the haunts of the insects.

Fig. 4. Leaf showing Insects (natural size).
Fig. 5. Perfect Insect with wings spread (highly magnified).

Useful Insects.

Though the fruit-grower is troubled by a large number of injurious insects, yet there are others, though the list is limited, that are useful. The more prominent among these friendly insects are the true Lady-birds, which embrace a number of species, the family being known scientifically as the *Coccinellidæ.* These insects, both in the adult and larvæ or young state, wage incessant war with the various kinds of Aphides and Scale, and they materially assist in keeping these pests under. All the family are very active and voracious, and they will rapidly devour large numbers of the insects they prey upon. They are widely distributed over the world, and some fifty distinct species are said to be found in Australasia. The following species are the most useful and common of those to be found in Victoria and New South Wales :—

Orcus Australasiæ.—A steel-blue species, the larvæ of which eats with avidity the orange and other scale insects, and various kinds of aphides. In colour the larvæ is black, with a whitish line extending throughout its length, and is a little more than a quarter of an inch long. The perfect insect is a steel-blue beetle, with bright red spots.

Orcus chalybeus, another small steel-blue species, is also an effective enemy to various scale insects. It is exceedingly voracious, and carries on an active warfare against the pests it preys upon.

Leis conformis is a rather large species, with large dots, which eats with avidity the orange and other kinds of aphis, as also the American or Woolly Blight that affects Apple trees.

Verania crenata and *Halyzia galbula* are two of the more conspicuous species found in the warmer parts of Australia, and both do good service as destroyers of aphides. Many other useful species might be named, but a complete list would only be suitable for an entomological work. The true Lady-birds have strongly convex backs, and the ground colour is either red, yellow, or blue. When the ground colour is red or yellow, the spots or markings are generally black—if the ground colour is blue, the markings are red or yellow. The insects are prolific, and the females lay their eggs in patches of from twenty to a hundred, on the stems or beneath the leaves of plants, and they generally choose those affected with plant lice or Scale. The eggs are very small, oval, and generally pale yellow, but in some species the colour is deeper. Considering the great service these friendly insects perform for fruit-growers, they deserve to be better known and protected, and their increase and distribution should be encouraged in every possible way.

Useful Lady Birds.

Fig. 1. Halyzia galbula (highly magnified). 1A. Ditto (natural size).

Fig. 1. Orcus Australasiæ (highly magnified). 1A. Ditto (natural size).

Fig. 1. Verania frenata (highly magnified). 1A. Ditto (natural size).

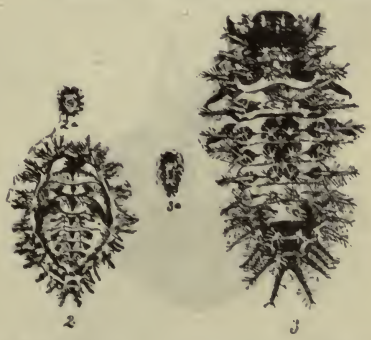


Fig. 2. Pupa enveloped in larval skin (highly magnified). 2A. Ditto (natural size). Fig. 3. Larvæ (highly magnified). 3A. Ditto (natural size).

Fig. 1. Leis conformis (highly magnified). 1A. Ditto (natural size). Fig. 2. Larvæ (natural size). Fig. 3. Pupa (natural size).

Fig. 1. Orcus chalybeus, female (magnified). 2. Head and prothorax of male. 1A. Ditto (natural size).

There is, however, one group of this family embracing several species, and known scientifically as the *Epilachninæ*, which are leaf-eating insects, and very injurious to certain plants. They are great nuisances to potatoes, tomatoes, cucumbers, melons, pumpkins, and several other plants, which they feed upon voraciously, both in their larvæ and adult stages. These insects are often mistaken for useful species, and encouraged to spread. On the other hand useful species are often condemned and destroyed in the mistaken belief that they feed in the same

INJURIOUS LADY BIRDS.

Epilachna 28-punctata, Leaf-eating Ladybird (highly magnified).

Fig. 1. Epilachna guttato-pustulata (highly magnified). 1A. Ditto (natural size).

Epilachna 28-punctata, side-view (magnified).

Larva of Epilachna 28-punctata side-view (magnified).

Pumpkin leaf showing ravages of Epilachna.

way as the plant-eating group. They are somewhat difficult to distinguish from the useful kinds by the ordinary cultivator, and the safest plan will be to take notice of the habits of any particular kind before coming to a conclusion. When it is necessary to destroy injurious Lady-birds the most effective means will be to spray with an arsenical solution.

Fungi Injurious to Fruits.

Fruits often are seriously affected by fungi, and cultivators should therefore adopt all practicable means for keeping these pests under. Some of them may be checked materially, if remedial measures are taken before the evil is wide-spread ; but others again cannot be so readily dealt with. The kinds of injurious fungi are numerous, and many are, unfortunately, too familiar to cultivators, but others again are less known, and very frequently their presence is unsuspected. As a matter of course, the writer does not propose, in a book of this kind, to

mention all the known species of fungi that are injurious to vegetation, but merely a few of those that are best known and most troublesome to fruit-growers. Some of these are more or less cosmopolitan in attacking various fruits, others again confine themselves to single kinds or families. These latter will be dealt with in the special articles upon the different kinds of fruits, and those only are noticed, in this part of the work, that are troublesome to various families. But though the list named may not be so complete as some would wish, yet cultivators must bear in mind that the treatment recommended for those mentioned is also applicable to many others.

Black Knot.—This is a peculiar and conspicuous excrescence sometimes found on stone fruit trees, and more especially the Plum and Cherry. It is rather troublesome to fruit-growers in Europe and America, but is but little known in this part of the world. There is some uncertainty as to what causes the disease, as authorities are divided in opinion as to whether it is brought about by insects or fungi. But the weight of authority is in favour of the fungoid theory. The knots vary in size, ranging from half-an-inch to twelve inches, or more, in length. The excrescence is generally on one side only of the branch, which it usually kills in time. The name is derived from the fact that the knots assume a dark colour in the winter, and the outer surface hardens. Remedy:—The only effective way of dealing with the evil is to cut the excrescences away with a sharp knife, taking care to burn them, so that the fungus germs are effectively destroyed, or otherwise the disease will again make its appearance very quickly. The cut parts of the branches should be painted over with a composition of lime and sulphur in equal proportions, with a small quantity of kerosene added.

BLACK KNOT.

Fusicladiums.—These are a very common and troublesome class of fungi, embracing several species, which cause serious injury to many fruits, and more especially Apples and Pears. Commonly the fungus is known as "Scab." They make their appearance on the leaves of the trees in the spring in the form of little dark dots. These afterwards appear upon the young fruit, often in patches, which have the appearance of scabs. The fungus grows upon the fruit, which is consequently rendered more or less worthless. Remedies:—Soap and sulphur, bluestone and ammonia, green vitriol.

Mildew.—Various fungi pass under the name of Mildew, and some are widely different in appearance and effects to others, and as a matter of course the same remedies cannot be generally employed. The greatest trouble to fruit-growers is caused by two of these fungi, which are peculiar to the Grape, and though they are quite distinct, yet both are popularly known as "Vine Mildew," or "Vine Mould." Different kinds of Mildew affect other fruits, more or less, and sometimes cause considerable injury. This class of fungi, as a rule, increase with great rapidity, and one tree may soon affect others. They are also readily spread by means of affected plants from one locality to another. But in most cases, where mildew is troublesome, there are predisposing causes. These causes, as in the case of Canker, are various, and may be induced by anything that lessens the vital energy of the plants. Probable causes are over-bearing, lack of nourishment, want of drainage and severe drought. Starved fruit trees and soddened roots may be considered the chief predisposing causes. Remedies :—In the first place, if there are any likely predisposing causes, they must be promptly removed, and the trees placed under more favourable conditions for growth. The best specifics for most kinds of fungi are lime and sulphur. These may be used separately, or blended in equal proportions, and applied by dusting the affected plants. Another way of applying these remedies is to take 1 lb. of freshly-slaked lime, and the same quantity of sulphur, adding six pints of water. Mix thoroughly and boil over a brisk fire for ten minutes, taking care to stir all the time. Allow the liquor to cool, and for each pint of the solution add six gallons of water, and apply as a spray. Particular care must be taken to deal with Mildew as soon as it makes its appearance, as all kinds, if allowed to make much headway, are not easily driven away.

Rust.—Several species of fungi are known under the general term "Rust," and they are distinguished by the addition of the name of the plant they mostly affect. Various fruits are affected with their particular "Rusts," the most troublesome being one that appears on Peaches, Almonds, Apricots, and Plums, commonly known as "Peach Rust." When the fungus is present, the affected leaves become freckled with yellow spots, and these sometimes unite so as to form large patches. As a matter of course, the tissue of the leaves is injured, and they fall to the ground. Sometimes the fruit is also affected by the fungus, to its great detriment. Remedies :—Sulphate of iron or green vitriol as a spray. Bluestone and lime as a spray.

Sooty Blight.—This fungus is often found upon evergreens, and more particularly on the leaves of trees of the Citrus family. A good many people suppose that this black matter is caused by ants, but such is not the case. Ants are really useful scavengers to the trees, as they assist in some measure in keeping down other small insects. In reality the soot fungus is mainly caused by the Scale insects, as it is developed on their sugary secretions. It also makes its appearance upon the secretions left by Aphides. Remedies :—Get rid of the insects mentioned, and the Sooty Blight will necessarily disappear. Its disappearance will also be facilitated by dusting powdered lime over the trees.

SHOT-HOLE FUNGUS.

Branch of Apricot, with Fruit, showing the effects.

Shot-hole Fungus (Phyllosticta circumcissa).—This is unfortunately a

too well-known and very troublesome fungus, that often causes great injury to stone fruit trees, and more particularly the Apricot. The fungus affects both the leaves and the fruit, and the former have the appearance of being riddled by shot, hence the common name. It is somewhat difficult to keep under, and this can only be done by constant attention. Remedies:—Spraying with (1) Bordeaux Mixture, (2) Eau Celeste, (3) Ammonia—Carbonate of Copper. Each will be found fairly effective. They should be used by several applications, and the first one ought to be given just as the leaf buds are beginning to swell. When the leaves are about half grown a second spraying may be given, and further applications every two or three weeks, as may be necessary. Care should be taken to use the same preparation through the season. Though there appears to be no absolute cure for this fungus, yet by the judicious application of the remedies named its injurious effects may be materially reduced.

Diseases Injurious to Fruits.

Canker.—Fruit trees often suffer from various diseases, in addition to the attacks of insects and fungi. One of the most destructive of these diseases is what is rather vaguely known as "Canker," which unfortunately is widely spread in this part of the world. The disease is somewhat variable in form, and affects trees in different ways; but the effects are always injurious. Canker may be confined to a particular branch, or may affect a tree generally, and sometimes it makes its appearance on the stems or roots. This disease may be caused by various means, and is very difficult to prevent or cure. One of the principal causes is lack of proper drainage and deleterious matter in the soil, as under such conditions there is a derangement in the circulation of the sap. Excessive growth may cause canker, and more especially if it is prolonged till much later than the proper period. Consequently, when water is used too freely, by means of irrigation or otherwise, this disease is not unlikely to make its appearance. Gross shoots that have not ripened their wood properly before the appearance of frosts are liable to injury in the form of a variety of canker. An over-supply of manure may also cause the disease to make its appearance. Possibly, the most common cause of canker in this part of the world is the extremes of dryness and moisture that the trees experience. During a severe drought, when the soil is exhausted of its moisture, the roots are dried up, and the sap flows slowly, while the bark shrinks more or less. When rain sets in the trees are suddenly flushed with sap, the circulation is active, the cells are often ruptured, and canker follows. The disease may be also caused by the scorching of the bark of the stems by the sun, and more especially in the case of young trees. When the scorching takes place the temperature of the sap is raised to a considerable extent, and the circulation is materially affected. To avoid this risk the stems of young trees should be invariably protected from the sun till their heads are large enough to afford a sufficient shade. Canker is sometimes caused

by severe and careless pruning and the exposure of rough wounds to atmospheric influences. Root canker is often caused by the non-removal of broken or bruised roots when the trees are planted. The disease may also, in some cases, be the result of insects that feed upon the bark and woody tissues. Fungi will sometimes be the cause, and it may be brought about by lichens and mosses growing upon the trees. As a matter of course a disease originating from such various causes, and affecting trees in different ways, cannot be treated by any general remedy. When branches are affected they should be amputated when practicable. Shoots that have their points touched should be cut back. Cankered roots should be cut away when practicable, and every effort ought to be made to prevent the disease from spreading. But when the trunks or roots are badly cankered, but little can be done towards saving the trees. The disease should be treated as soon as it can be detected, and predisposing causes must be avoided, as far as may be practicable.

Fire Blight.—This is a disease whose origin is somewhat obscure, and there are various opinions as to the cause. Some authorities consider that the disease germ is a species of bacteria, but others are of opinion that the cause is to be attributed to influences that affect the circulation of the sap. The writer's views are in accordance with the latter opinion, and a long experience has convinced him that it is a feasible one. In the summer, sometimes, when the sun is very powerful, and the bark of the trees exposed, the sap becomes unduly heated. When this occurs the sap does not circulate under normal conditions, and consequently becomes more or less poisoned. This poisoned sap will show in patches, which spread rapidly, and the wood and foliage dry up. Trees that are affected have a withered, blighted appearance, as if scorched by fire, and hence the name, "Fire Blight." Sometimes the disease attacks a tree in various places, and cause its death. In other cases it confines its attacks to a few branches, which are destroyed, though the tree in other parts is not affected. The disease is more especially prevalent among pear trees, though its ravages are not confined to them alone, as is generally supposed. As regards remedies there are none, so far as is known. Possibly its ill-effects may be reduced to a minimum by carefully training and pruning, so that the foliage will afford effective shade to the stems and branches. In the case of young trees, whose heads are not large enough to afford perfect shelter, the stems should be protected by artificial means during the hottest portion of the year. When the disease appears on the branches they should be cut back some distance beyond the affected parts, so as to get rid of as much of the poisoned wood as possible.

Gumming.—This is one of the most troublesome diseases with which fruit-growers have to contend, and, unfortunately, it is very common in this part of the world, as also in Europe and America. The disease is confined to stone fruits, and it more particularly affects the Apricot, Peach and Cherry. It is caused by the glutinous sap exuding from wounds or cracks in the bark and forming masses of gum, hence the name. The causes of this disease are not known with certainty,

and no thoroughly effective remedy for it has been found. One of the causes appears to be over-luxuriant growth and an excess of sap. Severe pruning undoubtedly is a cause of the disease, and more especially when large branches are removed. The disease may also be induced by the action of boring or bark-puncturing insects. In fact, wounds of any kind in wood more than one year old encourage the direct exudation of sap and the formation of masses of gum. The only means by which gumming can be reduced to a minimum is to practise systematic summer pruning, and avoid winter cutting as far as is practicable. The wounds made in the young shoots are small and heal quickly during the period when growth is active, consequently there is little or no loss of sap. When large wounds have necessarily to be made they should, without delay, be painted over with some composition that will prevent the exudation of the sap, and afford protection from sun, wind and rain. A good composition is formed by a mixture of two parts resin and one of shellac, melted together, with a little tallow added. Though there is no absolute cure for the disease, it will be advisable to scrape off the gum masses upon affected trees, and paint over the parts that were touched with the composition.

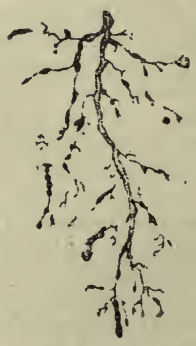
Leaf Galls.—These may be caused either by the attacks of insects or fungi, and though in most cases they are not sufficiently numerous to materially affect the vigour of the plants, yet sometimes they cause serious injury. Their formation necessarily causes a derangement of the circulatory system, more or less, and though only certain parts of the foliage may be affected, yet the plant loses in vigour. Then, again, these galls afford breeding grounds for the development of particular insects and fungi. Whenever galls make their appearance, if few in number, and they can be easily reached, it will be advisable to remove the affected leaves by hand and burn them, so as to destroy the germs of whatever may have caused the trouble. If this plan is not practicable, as will be the case with large trees, or when the galls are very numerous, the affected plants should be frequently sprayed with some solution for insects or fungi, as the case may demand. Bordeaux Mixture and Resin compound are effective remedies, as are also fresh slaked lime and sulphur dusted over the foliage.

Root Galls.—Trees are often troubled with excrescences that form upon the roots and small fibres, which consequently are unable to perform their proper functions, and the plants perish sooner or later. On their first appearance they are in the form of small swellings or "galls" of various shapes, and they sometimes increase in size up to the diameter of half-an-inch or more. Some plants will succumb in a few weeks after they are attacked, but, on the other hand, strong, well-established trees may be able to withstand the disease for several years. But the vitality of the strongest trees will steadily decrease after they are attacked, and they will gradually die off. The cause of this disease is due to Nematode worms of various species which establish themselves in the soil. These insects, commonly known as Thread Worms, or Flask Worms, are very minute, and their mode of action is to bury themselves in the roots, and whenever this is done "galls" are formed. As the insects increase

with great rapidity, they are always found in large numbers, and consequently trees are attacked in many of their roots at the same time. There is some uncertainty as to whether the same worm attacks different plants, or if each one has its own special insect. When land becomes infested with these worms it is not an easy matter to destroy them, as they spread rapidly, and are very tenacious of life. In fact, some species can remain dormant for years, and then resume activity. Leaf, bark or fruit-destroying pests that can be seen and got at are comparatively easy to deal with ; but these Nematode worms may be classed as dangerous enemies that are difficult to destroy. When trees are affected it will be advisable to uproot them at once, as there is no known cure. In this way it may be possible to destroy the worms if they are merely local. But when the insects are spread through a large area, to destroy them is a difficult matter. Possibly the most effective way of coping with the evil is to keep affected land free from vegetation for a time, so that through lack of sustenance the insects will die out. This cannot be done without the destruction of the trees or other plants, but even this heroic remedy is necessary, or otherwise the worms may spread over large areas. Various chemicals in solution have been recommended, but they are somewhat uncertain in their action, and are open to the objection that they may poison the soil as well as the worms. Possibly some effective means of destruction may be discovered and it will be well if such is the case, as the evil is serious, though not generally known. Without doubt many trees die from the attacks of these Nematode worms in what appears often a mysterious way, and the true cause unsuspected.

VARIOUS FORMS OF FRUIT TREE ROOT GALLS.

Fig.



Grape.

Peach.

Root Rot.—This disease, which often causes serious trouble, is most commonly caused by fungi, though sometimes it is due to insects.

There are various kinds of fungi that cause the trouble, some confining themselves to particular plants or families, while others take a wider range. In most cases these parasites attack plants that are wanting in vigour from some cause, in preference to those that are robust and healthy. Sometimes, however, they attack trees that are perfectly healthy. The effects of root rot are very injurious, and if unchecked the affected plants must sooner or later perish. The disease is rather difficult to cure and ordinary remedies are somewhat uncertain in their action. One remedy is to carefully amputate all diseased pieces of roots before the malady has obtained a strong hold. When plants are badly affected the better plan is to root them up altogether. But even after the plants are removed it must be remembered that fungus germs may remain in the soil, and affect trees that have replaced those destroyed. Therefore, before replanting, it will be advisable to adopt any practicable means of destroying the germs of fungi. In the case of small fruits, such as Strawberries and Raspberries, which are prone to the attacks of root fungi, affected plantations should be entirely destroyed, and the land not used again for the same purpose for at least three or four years. It will also be advisable, when orchard trees have suffered from this disease, not to replant land if there are reasonable grounds for believing that it contains fungus germs.

Sunburn.—This complaint, known also under the terms of "Sunstroke" and "Scalding," causes a considerable amount of damage in this part of the world, and more particularly in the case of young trees. It occurs on very hot days, when there is little wind stirring, and the full power of the sun falls on the bark of the trees. The effects may be noticed by patches of discoloured bark on the northern or sunny side of the trees. Very frequently in the case of young trees the bark is discoloured in a regular strip on the exposed sides. As to what extent this scorching affects the constitutions of the trees is not known with certainty, but it is reasonable to suppose that the abnormal excitement of the sap, which must necessarily take place, will prove injurious. Sometimes the burning is so severe that the affected bark is actually killed, and even the wood is often injured; and such results are undoubtedly very injurious to the trees. Then, again, it must be remembered that dead or ruptured patches of bark afford harbour for the germs of insect and fungoid parasites. Many thousands of young trees in this part of the world are seriously, and sometimes fatally, injured from the effects of sunburn. In order to prevent injury it is advisable to keep the heads of trees low, and to arrange growth, as far as may be practicable, so that the wood will be effectively shaded by the foliage. When the heads of the trees are not large enough to afford the necessary shade, the stems should be protected by covering them during the hot weather. Strips of bark from small saplings make excellent coverings, and they have the additional advantages of being easily obtained in most localities, and they require no tying. Wrappings of canvas, straw or other materials may be used if most convenient. Care, however, must be taken to remove the wrappings in the autumn, when the sun has lost some of its scorching power, as it is essential that

the bark of the trees should be exposed fully to the light for the greater part of the year.

Insecticides and Fungicides.

Fruit-growers are apt to be puzzled by the many remedies suggested by entomologists and vegetable pathologists for coping with the numerous insects and fungi that are injurious. They are also often uncertain as to the preparation of these remedies, and when and how to apply them in the most effective way. This want the writer proposes to supply, as far as is practicable, in the following remarks, but as a matter of course the subject has not been dealt with so exhaustively as some may consider desirable. The first essential in treating insect or fungoid pests is that the grower should clearly identify the particular one or the class it belongs to, in order that the proper remedies may be applied. This is a matter of primary importance, as without this knowledge time and materials may be wasted. The next consideration is how the various remedies, either simple or compound, can be most effectively applied. These specifics are used in the forms of powders for dusting, paste for painting, in a liquid form for spraying, and vapour or smoke. Consequently, the fruit cultivator must take care to utilise each form in the proper way, and in such a manner as will be productive of the best results.

The remedies most commonly used at the present time for insects are based upon arsenic, petroleum, and pyrèthrum, or their compounds. The first of these classes acts upon the stomach and are serviceable against the mandibular insects or those with biting mouths. The second and third act by contact with the bodies of insects, and can be applied more generally.

Alkaline Wash.—A useful preparation for destroying borers and other insects in the trunks of trees. It is made by mixing a strong solution of washing soda with soft soap till it has the consistency of paint.

Ammoniacal Solution of Copper Carbonate.—This mixture has been used successfully to destroy Grape Mildew, Fusicladiums, and some borers. It is prepared as follows :—Three ounces of copper carbonate dissolved in one quart of ammonia. When used, dilute with 22 gallons of water. A weaker solution is made by using 28 gallons of water. Use as a fine spray.

Benzole.—This remedy is the only proved effective one for the Rutherglen "Fly" pest, and its use is recommended against other insects that attack fruit as it is ripening. It kills insects by contact, and leaves no perceptible flavour upon the fruit. When used, the benzole must be kept well stirred, and distributed as a very fine spray.

Bi-sulphide of Carbon.—A powerful and useful insecticide for many root-feeding insects and ants. Its vapour has a deadly effect upon insect life, and all other living animals, therefore it must be used with

caution. Apply it by making small holes round the affected trees ; and into each of these pour about half a wine-glass of the material. Being very volatile, the holes must be firmly covered up immediately, and the insecticide kept in tightly-corked vessels. It is a very cheap remedy, and this is a recommendation.

Bluestone (*Sulphate of Copper*).—This material is used in several compound mixtures, as follows :—Bluestone and Ammonia, dissolve 1 lb. of bluestone in a gallon of warm water, then add 1½ pints of ammonia and 20 gallons of water. Useful as a spray for Mildews, Rusts and the softer insects. Bluestone and Sodium Carbonate (Washing Soda), dissolve 2 lbs. of bluestone in a gallon of water, and the same quantity of sodium carbonate, in separate vessels. Then add 1½ pints of ammonia and 30 gallons of water. Use as a fine spray. Useful specially for Fusicladium or Scab Fungi ; also for Mildews, Rusts and the softer insects.

Bordeaux Mixture.—Bluestone, 5 lbs., dissolved in 4 gallons of warm water ; fresh slaked lime, 3 lbs., dissolved in 3 gallons of warm water. When cold, pour the lime-water into the bluestone solution, and thoroughly mix the ingredients. Add 20 gallons of water, and use in the form of a fine spray ; or may be dried without adding water, and used as a powder. Useful for vine and some other Mildews, Fusicladiums, Peach Rust, Black Spot on vines, and is also serviceable in dealing with some of the troublesome plant insects. If the arsenical product called " London Purple," which is obtained in the manufacture of aniline dyes, is added at the rate of 1 lb. to 100 gallons of the Bordeaux Mixture, the latter will be a still more effective application against insects.

Carbolic Acid Emulsion.—A useful mixture used as a wash for bark Scales and Borers. It consists of one part carbolic acid to seven parts of a solution made of one pound of soap dissolved in two gallons of water.

Caustic Soda and Potash.—One pound of concentrated lye, the same quantity of caustic soda, and half-a-pound of commercial potash. Dissolve in six gallons of water. This is an excellent wash for deciduous trees in the winter, as it materially assists in destroying insect and fungoid germs.

Eau Celeste.—This consists of 1lb. sulphate of copper, 1½ pints of ammonia, and 22 gallons of water. Dissolve the sulphate in 2 gallons of hot water, then add the ammonia, and afterwards the remainder of the water. Considered a good remedy for Black Spot in vines and various Mildews. Use as a fine spray.

Eau Grison.—This is a popular remedy in some parts of Europe for various kinds of Mildew. It is made by mixing 3lbs. of lime, the same quantity of sulphur, and 6 gallons of water, and boiling till reduced to 2 gallons. When used dilute with 100 parts of water. Use as a fine spray.

Elder-leaf Water.—An infusion of the leaves of the Elder (*Sambucus*) is a powerful, useful and excellent insecticide, that should be generally used. It is very effective for any kind of Aphis, Thrips and Red Spider. Take leaves fresh from the tree and pour over about twice their bulk of boiling water, covering the vessel to keep the steam

in. Let the leaves soak for 48 hours, then pour off the liquid, and apply as a fine spray.

Hellebore.—Powder of hellebore, applied either dry or in a liquid form, was formerly considered to be one of the most useful insecticides for Caterpillars and other soft-bodied pests, but now it appears to be less popular, though for no apparent reason, as it is very effective. Lightly dust the powder where necessary, or if required, apply as a spray; mix 1 lb. to 10 gallons of water.

Kerosene.—This is one of the cheapest and most effective materials for destroying insect pests, and is also useful in checking the spread of some fungi. It is mostly used in the form of an emulson, in which soap is a prominent factor, and other materials may be added to effect special objects. Solutions may be made of different degrees of strength to suit various purposes. No 1 (strong) may be made by dissolving 2 lbs. of soft or ordinary soap in 2 gallons of boiling water; add 2 gallons of kerosene while boiling hot, and churn violently till the oil is emulsified; then add thirty gallons of water and use as a spray. This emulsion may be used for deciduous plants before growth commences, and on hard-leaved evergreens. No. 2 (mild) use the same proportion of soap and water, but only half the quantity of kerosene. This preparation will be better adapted for the more tender-foliaged trees. The blending of the oil with the soapy water will be facilitated by first mixing the kerosene with an equal bulk of milk and violently churning it. Kerosene emulsion is an excellent remedy for the Scale insects when sprayed or syringed over the trees. Various additions may be made to these emulsions to increase their effectiveness for particular purposes. Thus, 2 oz. of Balsam of Fir added to 20 gallons of the mixture will make the material more adherent to the surface of the leaves. A small quantity of carbolic acid will increase the effect upon some insects; so will London Purple, in the proportion of 1 oz. to 20 gallons. Kerosene mixed with castor, linseed or whale oil in the proportion of one part to four of oil makes a useful winter dressing for the trunks and branches of deciduous trees that are troubled with Scale.

Lime.—This is a very serviceable insecticide, and may be used to advantage in various forms. Slaked lime is a good remedy for Caterpillars, Slugs, Snails, Wood Lice, and other pests, when dusted over the foliage and under the trees. It also checks Scale insects to some extent, and facilitates the dispersal of the Sooty Blight upon Orange and other evergreen trees. It is useful also in combination with bluestone, as previously stated. When mixed in the proportion of two parts to one of sulphur, with sufficient water to bring it to the consistency of a thick paint, adding half a pint of kerosene to 2 gallons, it makes an excellent dressing for the stems and branches of fruit trees. When painted with this mixture, many crevices, in which lurk the germs of insect and fungoid pests, will be filled, and their development prevented. It is an excellent practice to dress all fruit trees and vines with this mixture every year. Gas lime is useful when scattered over the ground in keeping down Slugs, Snails and other pests.

London Purple.—This is an active arsenical poison, which is very highly recommended by American authorities as a powerful insecticide against various plagues ; it is a by-product in the manufacture of dyes. It should be mixed at the rate of of 1 lb. to 200 gallons of water. Being a powerful poison, it must be used with care, and only while the fruit is very small or after it is gathered. Said to be one of the best remedies for the Codlin Moth and similar insects.

Paris Green (*Arsenite of Copper*).—Another very active arsenical poison, which is strongly recommended by American entomologists. It may be prepared in the same way as London Purple, and used for similar purposes. As the powder does not dissolve, it must be kept well stirred while being used. It is an excellent insecticide for all classes of leaf and fruit-eating insects. Paris Green may also be used effectively in a dry state when mixed with wood ashes, lime or flour, and dusted over the affected parts.

Pyrethrum.—The powder obtained from the flowers of two species of *Pyrethrum* has long been known as possessing powerful properties as an insecticide, and is largely used for dressing animals under the name of "insect powder." It is very effective with Aphides and other small insects, but it is too costly to be generally used. In using, sprinkle the powder over the affected plants by a dredger or the sulphur-bellows. It may also be used as a liquid in the proportion of one ounce of powder to two gallons of cold water. Apply as a spray, and as the material is not poisonous may be used safely when fruit is advanced in growth.

Quassia.—This gives a very bitter solution that is useful in keeping down the various species of Aphides and preventing their coming. Boil 1lb. of quassia chips in 3 gallons of water for two hours. Apply as a fine spray.

Resin Compound.—This is formed by dissolving 1lb. of caustic soda in a gallon of boiling water. Take away half the mixture, then add 8lbs. of resin slowly to the remainder, keeping the whole boiling, and stirring rapidly. When thoroughly dissolved, slowly add that portion that was held back. Dilute with sufficient water till it will pass readily through a thin cloth. Before using increase the bulk to 30 gallons by the addition of water. Use with a fine syringe or spray. This is considered to be an excellent remedy for the Scale insects. Two ounces of London Purple added is said to make the compound still more effective.

Salt.—This material may be used in moderate quantities to keep down Slugs, Snails and Caterpillars, by sprinkling it over ground infested by these pests. Care must, however, be taken not to use it too freely, as though in moderate quantities it is beneficial to most soils, yet an excess may produce very injurious effects.

Soap.—In various forms soap is very useful as an insecticide, and either the common or soft soap makes an excellent wash for trees, when diluted in hot water. They are also very serviceable when used in combination with kerosene, sulphur and other things.

Soot.—This is useful as a substitute for lime when dusted over plants,

or around them, to keep down Caterpillars, Slugs or Snails. Rather more lasting in its effects than slaked lime.

Sulphate of Iron (*Green Vitriol*).—This is said to be a very effective and cheap remedy for Mildews and Rusts. Mix at the rate of 1lb. to 5 gallons of water. Apply as a spray when the atmosphere is damp, or in the evenings. This material may also be used in stronger solutions for watering the surface soil, where fungus germs are supposed to be. In addition to its value as a fungicide, sulphate of iron is also serviceable as a manure.

Sulphur.—An old and excellent remedy for various fungi, and more especially the Oidium on vines, for which it is the most effective cure. Sulphur may be used as a powder dusted over the affected plants, or as a preventive. The fumes are also very effective when the sulphur is burnt, not only for fungi, but also with some of the smaller insects. Powdered sulphur may also be used with advantage in combination with soft-soap and lime.

Tar Water.—This is of some value as an insecticide, as it is very obnoxious to many pests, such as Caterpillars, Slugs and Wood Lice. One pound of tar to 50 gallons of water will yield a strong solution, which may be used as a spray, or sprinkled over the surface soil, as may be necessary.

Tobacco.—This is an old-fashioned but excellent insecticide, and may be applied with advantage to the Aphides and other soft small insects. It may be used as a powder, in a liquid form and as a vapour or smoke. Snuff or powder may be dusted over plants that are affected with any of the small "flies" with good effect. Tobacco water, made by steeping the leaves or stems in water for 48 hours, is a very effectual application when sprayed or syringed. The vapour or smoke, as a matter of course, can only be used effectively in an enclosed space, and is scarcely practicable by fruit-growers. Tobacco may also be used to advantage in combination with sulphur and soap.

Walnut-leaf Water.—Though it is not generally known, the leaves of the Walnut yield an excellent insecticide that is very effective in keeping down Aphides, Red Spider, Thrips and other of the smaller pests. Take fresh leaves and pour over them about twice their bulk of boiling water; let them soak for 48 hours, pour off the liquor and apply as a fine spray.

There are also many excellent proprietary insecticides and fungicides which may be used with advantage by fruit-growers.

FRUITS—SPECIES AND VARIETIES.

ABOH.

History.

This fruit is obtained from two species of *Vahea*, *florida* and *Owariensis* (formerly known as *Landolphia*), a genus belonging to the natural order Apocynaceæ or Dogbane family. They are strong-growing, climbing plants, indigenous to Western Africa, and adapt themselves to rather a wide range of elevation, being found on the high lands up to 2500 feet above the sea. The fruits are the size of small oranges or less, and have a sweet but slightly acid pulp, which is greatly relished by the natives. They are valuable as ornamental plants, as they produce abundantly, and in succession, large white jessamine-scented flowers. The species named, and others, also yield caoutchouc in great abundance, and are an important source of supply for this valuable material. Aboh is the native African name.

The order Apocynaceæ, like Solanaceæ, is remarkable for embracing a number of highly poisonous plants and others possessing wholesome properties. It includes the Oleander (*Nerium*), which is a deadly poison. The Periwinkle (*Vinca*) is astringent and acrid, and others have similar properties. One of the most deadly plants of the order is *Tanghinia venenata* (*Cerbera Tanghin*), the famous Ordeal Tree of Madagascar, formerly used as a supposed test of the guilt or otherwise of those charged with certain crimes. On the other hand, another plant belonging to the family, *Tabernæmontana utilis*, the Cow or Milk Tree of the West Indies, yields a wholesome juice, which is largely used as milk in Demerara and other places.

Cultivation and Propagation.

Being natives of Western Africa, the plants that yield the Aboh fruit will only thrive in the warmer regions of Australia. The fruit is almost unknown in this part of the world, but might probably be found worth cultivating in a congenial climate. As the plants are strong feeders a rich deep soil is essential. When not naturally rich manure should be used freely in preparing the land. Being climbers the plants will require trellises or other suitable supports, and they are admirably adapted for covering fences and outbuildings in tropical or semi-tropical regions. Propagation is readily effected by seeds, which should be sown while fresh, covering them to the depth of half-an-inch. When the

young plants are a few inches high they may be planted out where required. Cuttings of the half ripened young shoots will strike freely in sand or light soil, under a hand glass, inserting them about an inch deep. Perhaps the easiest and surest means of raising plants is by layers, as the branches will root freely and quickly if simply covered with soil at the parts where they are wanted to strike.

AFRICAN ALMOND.

History.

The plant called the African Almond is known botanically as *Brabejum stellatifolium (stellatum)*, and it belongs to the natural order Proteaceæ or the Protea family. It is an evergreen shrub, or small tree, with long lanceolate leaves, and produces racemes of white, sweetly-scented flowers. There is some similarity between this plant and the Queensland Nut (*Macadamia*), to which it is closely allied. The fruit or nuts have a hard outer shell, with a single kernel, which, when roasted, has a somewhat similar taste to the Chestnut. When eaten raw the nuts possess poisonous properties, but are considered wholesome after being roasted. The plant is indigenous to a wide area in South Africa, where it thrives in sandy and peaty soils.

Cultivation and Propagation.

The African Almond can be utilised as an ornamental plant, as its foliage is very effective among other shrubs. It is a moderately hardy plant, and will adapt itself to various soils and climates. But it thrives best in a sandy or peaty soil. As, like most other plants belonging to the same order, it is capable of resisting the effects of drought, it might be turned to account in the dry interior districts of Australia. Though the fruit is inferior in quality to many other nuts, yet the hardiness of the plant under certain conditions will cause it to be serviceable. Propagation may be effected by seeds, layers and cuttings. Seeds may be sown at any time, and should be covered to the depth of an inch. Notched layers will root freely if put down early in the spring or autumn. Cuttings of the ripened wood of the past season's growth, with the leaves left on, will strike freely in a frame or under a hand glass. They should be inserted about two inches deep in sand or light soil.

AKEE.

History.

This is the fruit of *Blighia sapida* (*Cupania sapida*), an evergreen tree belonging to the natural order Sapindaceæ, or the Soapwort family, so called because the berries of a plant included in it (*Sapindus saponaria*) are used as soap in the West Indies. The same family embraces the Chinese fruits known as Longan and Litchi, and the well-known European Horse Chestnut. The Akee is a native of Western Africa, and was taken to the West Indies by Captain Bligh, who also introduced the Bread Fruit to that part of the world, and became still

more famous by the mutiny of the *Bounty* in the South Seas. The botanic name was given in honour of Captain Bligh. Akee is the native African name. It forms a handsome tree, with large, broad, shining leaves, and attains a height of thirty feet or more. The flowers are white, produced in racemes from the axils of the leaves, and as they are very fragrant, can be utilised for perfumery. The fruit is as large as a goose egg, and of a reddish orange colour. It contains a yellowish pulpy flesh, in which are embedded three black seeds. The edible portion of the fruit has a pleasant sub-acid flavour, and in the West Indies it is very popular. It is, however, considered to be most desirable when cooked.

Akee.

Cultivation and Propagation.

As the Akee is a tropical fruit it can only be successfully cultivated in the warmer parts of Australia. It is, however, said to be more hardy than many other tropical fruits, and to be even able to withstand slight frosts. In sheltered places on the eastern coast of Australia north of the Clarence River, this tree should thrive well, and it ought to be at home in the Northern Territory and any of the sub-tropic regions. It will thrive in any ordinary good soil, but does best in a rich open sandy loam. Whenever the climate is congenial the tree is worthy of attention, owing to its handsome foliage and flowers, as an ornamental plant, independent of its value as a fruit. Propagation may be effected by seeds, layers or cuttings. Seeds should be sown soon after the fruit is ripe, covering them an inch in depth. Layering may be done at any time of the year, but the most favourable periods are early in the spring, and at the beginning of autumn. Cuttings of the young shoots, when the wood is about half ripe, with the leaves left on, will strike freely in a frame or under a hand glass. They should be inserted about two inches deep in light rich soil or sand.

ALMOND.

History.

The Almond will thrive in many parts of Australasia, but yields larger and more certain crops in the medium warm districts as a rule. It is, however, very unreliable in localities that are subject to late spring frosts. Botanically the Almond is known as *Prunus Amygdalus* (*Amygdalus communis* of some botanists), and it belongs to the natural order

Rosaceæ, sub-order *Amygdaleæ*. In its natural state it is widely distributed, being found in many parts of Western Asia, Northern Africa and Southern Europe. Some authorities consider that the Almond originally came from the same source as the Peach, both having similar foliage and wood, but upon this point the evidence is not clear enough to allow a definite conclusion. There are two classes of Almonds, known respectively as "sweet" and "bitter," and these by some botanists are set down as separate species—the former being called *Amygdalus dulcis* and the latter *Amygdalus amara*. The bitter Almond is somewhat more robust and hardy than the other kind, and the blossoms are larger and paler, but in other respects there is but little difference in the appearance of the trees. Both classes again embrace "hard" and "soft" shelled varieties, the latter being the sorts mostly cultivated for commercial purposes.

Uses.

Sweet Almonds are largely used by confectioners, and are also commonly eaten with raisins and other dried fruits. Considerable quantities are raised for these purposes in Southern Europe and Syria, where the cultivation of the Almond is an important industry. Both the "bitter" and the "sweet" Almond, by pressure, yield a bland oil in large proportions, which is used extensively for culinary and other purposes. It must be remembered, however, that by distillation the bitter Almond yields a deadly poison, known as "essential oil of almonds," and therefore great care should be taken that the refuse from the press is not placed in the way of children or farm stock. The material that remains after pressing the oil from the "sweet" Almonds makes excellent food for cattle, sheep or poultry, and may also be turned to account for flavouring confectionery and pastry.

The cultivation of the Almond should prove profitable in many places, and more especially in the moderately warm districts. There is a considerable demand in the colonies for "soft" shell Almonds, and if in the future a surplus is produced a good market can be found in Europe. As an oil-yielding plant the Almond should also prove profitable, and for this purpose alone it deserves attention. If properly treated, the kernels will yield as high as 25 per cent. of their weight of excellent oil, which will always find a market, locally or otherwise.

Cultivation.

The trees will grow in any ordinary good soil, though they thrive to the greatest perfection in a rich, sandy loam of fair depth, with a gravelly subsoil. In preparing the land, let it be worked deeply, and more especially if it is heavy, compact soil. Drainage should also be provided for when necessary, as the Almond will not thrive in ground that is soddened for any length of time. The best time for planting is July or early in August, according to the locality, and care must be taken not to put the trees too deep in the ground. If planted in orchard

style, the space between the trees should be from 24 to 30 feet apart, according to the robustness of the variety and the nature of the soil. Almonds, and more especially the robust bitter varieties, make very effective breakwinds for orchards or vineyards when planted round the boundaries. When used for this purpose the trees may be planted about 10 feet apart in the lines. In the case of young trees, some attention in pruning is necessary, so as to get strong and well-formed specimens quickly. Mature trees will require but little pruning, and may be left pretty much to themselves. Let the ground be kept as free from weeds as possible, and mulch the surface soil as far as the roots extend before the warm weather sets in. Propagation is effected as with the Peach, and for details see article upon that fruit.

In making a selection of Almonds, the "sweet" soft-shelled varieties are the more desirable sorts, as their produce is most in demand. They also yield a larger weight of kernels, the proportion to the shells being about one-half. The weight of kernels in the hard-shelled kinds will range from 25 to 35 per cent. On the other hand, however, growers must remember that the soft-shelled sorts are more tender than the other class, and consequently are more liable to injury from frosts. They are also less robust in growth. Almonds should be gathered as soon as the husks or outer coverings have burst open. The best mode is to spread canvas under the trees and shake down the Almonds. They can generally be brought down by jarring the branches if they do not fall readily with an ordinary shaking. Removing the husks by hand is a slow and troublesome process, but there are machines of American manufacture that do the work cheaply and quickly. As a light colour is essential to meet market requirements, the Almonds are usually subjected to a bleaching process with sulphur. This treatment, however, must not be given till the Almonds are perfectly dry, and the process should only last about half-an-hour, or even less in some cases. There are a number of varieties belonging to the "soft" shelled class to be found in nursery catalogues, but the following list embraces all that are most deserving of attention :—

Jordan (*Tender-shelled, Soft-shelled Sweet, Ladies' Thin-shell*).—This is one of the best soft-shell Almonds, and is largely used as a dessert fruit, also by confectioners. The shell is large and very tender; kernel large, white, and sweet. Fruit ripens early. Tree robust, and bears well. Flowers very small, pale-red, and are produced at the same time as the leaves. Brand's Jordan, Large Paper Shell and Nonpareil Paper Shell are sub-varieties, and all excellent kinds.

Large-fruited Sweet (*Sweet Hard-shelled*).—This is the only hard-shelled variety that is worthy of attention, as its kernels are used to some extent in confectionery, being somewhat stronger in flavour than the other sorts. The tree is also somewhat hardier and more vigorous. Seeds large, long and broad; kernels large, sweet and well flavoured. Ripens very late.

Pistache.—An early variety, highly esteemed in France and other parts of Europe, but not well-known in this part of the world. The fruit is smaller than the other kinds, the stone terminating in a sharp point,

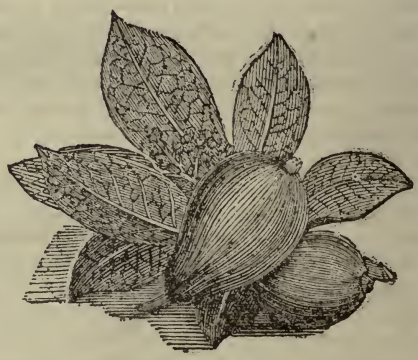
and is about the size and shape of a Pistachia nut *(Pistachia vera)*, hence the name. The shell is tender, but not so soft as the Jordan varieties, the kernel being sweet and well-flavoured.

Sultana.—This is an excellent soft-shell Almond, somewhat similar to the Jordan, but not quite so large, and ripens a week or two later; kernel sweet and well-flavoured, and largely used by confectioners in Europe.

ANCHOVY PEAR.

History and Uses.

The Anchovy Pear is a West Indian fruit, produced by a tall, slender, upright tree, without branches, which attains a height of from 40 to 50 feet. Botanically, it is known as *Grias cauliflora*, and it belongs to the Barringtonia section of the Myrtaceæ or Myrtle family. The trunk of the tree is bare, and terminates with a crown of smooth, glossy, elliptical leaves, which are from two to three feet in length, and proportionately broad. Large white flowers grow out of the stem below the leaves. The fruit is large, oval in shape, brown russet in colour, and has a single kernel. It has a flavour somewhat similar to that of the Mango, and is used in the same way as that fruit, when fully ripe, and in the form of a pickle when gathered green. The fruit is highly prized in the West Indies, but has not received much attention in other parts of the world.



The Anchovy Pear—Grias Cauliflora.

Cultivation and Propagation.

This fruit being a native of a warm region can only be grown successfully in the tropical or semi-tropical parts of Australia. It would thrive in localities where the Banana, Mango and Pine Apple will flourish. In suitable localities it might prove worthy of attention, and the fruit may, when better known, become popular. Like most tropical plants, this tree requires a rich soil, and will thrive to perfection in a sandy loam. It must also be well protected from high winds, and the most suitable locality for this tree is a sheltered valley. Propagation can only be practically effected by seeds, though cuttings of the heads and stems will strike root under a glass or in a frame. Seed may be sown at any time of the year, covering it about two inches deep. Young plants from seed may be planted out the following season.

APPLE.

The Apple is *par excellence* the principal fruit of the cooler regions of the world, being more widely used and generally cultivated than any other kind, and it remains longer in season. This fruit is very popular, and it is utilised in a variety of ways. When eaten raw the fruit is considered to be wholesome and refreshing by most persons, and, therefore, it is in great demand. For culinary purposes the Apple is also consumed in large quantities, and is utilised in various ways. In some parts of the world considerable quantities of the fruit are turned to good account in a dried state, and in the shape of cider it supplies a staple beverage in some parts of England and other European countries, as also in the United States of America. The Apple will thrive to perfection throughout the larger portion of Australasia, and is more especially suited for the more elevated and cooler regions. It is a fruit deserving of greater attention from cultivators, as there is a large and rapidly-expanding home demand, and an outlet in the United Kingdom for any surplus that can be raised for many years to come.

History of the Apple.

The Apple belongs to the natural order *Rosaceæ*, or the Rose family (sub-order, *Pomeæ*), and is known botanically as *Pyrus malus.* The generic name is supposed to be derived from *peren*, the Celtic word for the Pear—a fruit to which the Apple is very closely allied. The common, or English, name is said to have originated from the Celtic *apball* or *abhall*, derived from *ball* in the same language, and signifying a round body. In its wild state the species is indigenous to the United Kingdom and throughout a large portion of Northern Europe. It is also found in a wild state in some parts of Northern Asia. In its wild state the fruit of the Apple is widely different in appearance and quality from the modern cultivated varieties, being small, astringent, acid and unpalatable. The wild fruit in England is commonly known as the "Crab Apple." There is no certainty as to when or where the first improvements originated, but, according to historical records, it must have been at a very early period.

Pyrus coronaria, a robust species, yields the American "Crab Apple," and *Pyrus rivularis*, also an American species, growing in the North-western portion of the continent, furnishes an edible fruit that is eaten by the Indians as food. *Pyrus salicifolia*, or *amygdalæformis*, a European species, also yields edible Apples. Possibly by cultivation these species might be improved, or they may be crossed with varieties of *Pyrus malus.* They might also prove serviceable for stocks if fairly tried.

The Apple appears to have been well known and extensively used by the early Hebrews, Greeks, Romans and other ancient nations, as it is frequently mentioned by their writers. It is frequently referred to in the fables and traditions of these peoples. The allegorical tree of

knowledge, the fruit of which is supposed to have tempted Mother Eve in the Garden of Eden, is said to have borne Apples. Then, again, according to the legends of some of the old writers, the golden fruits in the orchard of Hesperus, which were guarded by a sleepless dragon, eventually slain by Hercules, were also Apples. Other ancient authorities, however, inform us that it is the Orange, and not the Apple, that is referred to in those legends. According to their historians, the Apple appears to have been extensively cultivated by the nations of antiquity. Cultural knowledge to some extent appears also to have advanced considerably among these people, as they practised several of the arts in propagation and otherwise that are now common with modern growers. The art of pruning appears to have been generally practised. Pliny informs us that the art of grafting was well known and largely practised in his time, and he speaks of its value in the most enthusiastic and extravagant terms. This writer also informs us that in the villages around Rome the culture of the Apple was a most profitable industry, and that single trees were often let for one season for a sum equal to about £2 10s. of our money, and gave a better return than could be obtained from an ordinary farm. This appears to be a somewhat highly-coloured statement, yet we must remember that Pliny is generally regarded as one of the most reputable and reliable of the ancient historians.

In Britain the ancient Druids reverenced both Apple and Oak trees, for the reason that the Mistletoe grew upon them only. The Mistletoe being the only parasitical plant known to these people, from its habit of growing upon the trees named, was supposed to have a divine origin, and was consequently highly venerated. It must be understood that the only fruit known to the ancient Britons was the wild or Crab Apple. There is some uncertainty as to when the improved fruit was first known in Britain, but there is good reason for believing that the Romans when they invaded England introduced such varieties as were cultivated in their own country. For several centuries history is mute as to any progress that may have been made, and there are no reliable records till the reign of Henry VIII. We are informed that in the 16th year of that monarch's reign Pippins were first introduced to England "from beyond the seas." They were called pippins on account of the trees being raised from the pips or seeds, instead of being grafted plants. The first-named variety on record is the Nonpareil, which is said to have been taken to England from France in the time of Queen Mary. Gerard, in his "History of Plants," published near the end of Queen Elizabeth's reign, mentioned six desirable kinds, including the "Quoining" (Queening or Queen of Apples), Summer Pearmain, Winter Pearmain, Nonpareil, Costard and a dwarf sweet-fruited sort called Paradisus (Paradise). These names are still to be found in modern catalogues, but, except in the case of the last-mentioned one, it is doubtful whether they are identical with the original varieties. As regards the Paradise, the sort now known as such, and used as a stock for dwarf trees, seems to be identical with the kind mentioned by Gerard. This writer also speaks highly in praise of cider, though that beverage,

said to have been known at the time of the Norman Conquest, was not common in England till the reign of Charles I. This writer also informs us that "there is made an ointment with the pulp of Apples, swine's grease and rose-water which takes away the roughness of the skin, and is called pomatum." In the cider districts of England it was formerly a common practice to salute Apple trees in the hope of obtaining a great crop the following season, and this custom existed quite recently in some places. The ceremony consisted in pouring a portion of the contents of a wassail bowl of cider, with a piece of toast in it, about the roots of the trees. Pieces of toast were also hung in the branches of the most barren trees, and the owner, with his family and servants, would dance around them and sing appropriate songs. A large round Apple called the Costard, from historical records, appears to have been the kind most generally grown in England before the better sorts became numerous. From this the old English term Costard Monger (now Costermonger) came to be applied to dealers who hawk fruit and vegetables for sale.

Uses of the Apple.

As to the various ways of utilising the fruit, and the inducements to the cultivation of Apples as a commercial speculation, I am of opinion that there is a wide and profitable field in Australasia. There is in all the colonies a large and increasing demand for fresh fruit, both for dessert and culinary purposes, which lasts throughout the year. After this demand is supplied, a good market can be found in the United Kingdom for any surplus that we may have to spare for many years to come. It has been already proved that Apples can be profitably shipped to England, and it is only a question of time for a large trade to be developed. In opening up and continuing this trade Australasian growers have the great advantage, owing to our seasons being different from those of Europe and America, of being able to place large quantities of fruit in the British market when the main supplies from other sources are exhausted. In some countries, and more especially the United States, it is a common practice to dry Apples, and in the last-named country the industry has assumed large proportions. American dried Apples are in great demand for home use, and large quantities are exported to various parts of the world. The practice of drying deserves the attention of colonial growers, who may by this means be enabled to utilise unmarketable varieties or avoid sacrificing fruit in glutted markets. There cannot fail to be a good home demand for dried Apples if once brought into general use, and after supplying our wants there is no reason why a large export trade should not be developed. The process of drying is simple, and may readily be carried out by any cultivator. If drying is carried out upon a large scale it will, as a matter of course, be most economically and effectively performed by means of "evaporators" or ovens, through which currents of heated air extract the moisture from the fruit. On a small scale, when the climatic conditions are favourable, the produce may be

prepared by drying it in the sun. In either case the fruit—which must be sound—should be carefully peeled, cored and cut into slices about the eighth of an inch thick. When the fruit is thoroughly dry it should be packed away in air-tight cases, casks or jars, pressing the material firmly. The quantity of Apples required to make 1 lb. of dried fruit will vary to some extent with the density and juiciness of the variety, but it is generally from 4 to 5 lbs. Many kinds of Apples may be utilised in this way, but some sorts are much better adapted for the purpose than others. In the list of varieties at the end of this article particulars will be found as to the varieties especially suitable for drying.

Apple Butter.—An article called "Apple Butter" is much used in some parts of America, where it is very popular. It is prepared by stewing sliced sweet Apples in new cider until they become soft and pulpy, after which the material is packed away in jars or casks till required for use. In France a somewhat similar product is made by stewing the fruit in new wine instead of cider. Possibly Apples might to some extent be utilised in this way in Australia. As to the other uses to which the Apple may be put commercially, the unfermented juice, when evaporated, yields a sort of molasses, which is much used in the United States In perfumery the pulp of the fruit mixed with lard forms a good pomatum, which can be flavoured according to fancy with various extracts. The wood of the Apple tree is very hard and durable, being fine-grained and compact, and is much used by turners in Europe. When stained black it is often used as a substitute for ebony by cabinetmakers and others.

Cider.—Apples are used extensively in some parts of England for making cider, as also in France and Germany. In the United States and Canada they are used to a still larger extent. Whenever cider is made in quantity it appears to have become the popular beverage of the community, and its consumption is extensive. As to whether cider is likely to become a popular beverage in Australia it is hard to say, but there is certainly a strong probability that if growers would turn their attention in this direction, a local market could be found for a not inconsiderable quantity. It is a beverage that would be likely to find much favour during the hot months, were it obtainable at anything near the prices that rule in other countries. The making of cider would be one of the safe-guards against over-production and glutted markets for fresh fruit. As a matter of course, there are kinds of Apples that are specially suited for making cider, and when grown for this particular purpose they should have the preference. The kinds that are specially suitable are those that have a piquant, sharp flavour, abundance of juice, and a fair amount of sweetness. But any kind of Apple may be turned to account for making cider, though the yield may be smaller, and the quality not of the highest standard. It will be far better to turn crops to account in this way than let them go to waste, even if they are not the best for the purpose. There is no particular skill required to turn Apples into cider, and any grower can easily acquire the necessary knowledge. Cider should be made from fully but not over-ripe Apples.

These should be crushed in a mill till they become a uniform mass of pulp. This material is then allowed to stand from twenty-four to forty-eight hours, according to the atmospheric temperature, to engender a slight fermentation. The pulp must then be passed through a press, and the liquor as it flows should be strained through a hair or other cloth. It should then be run into perfectly sweet and clean casks, which must be placed in a cool cellar or other place to ferment, leaving the bungs out. When the strong fermentation ceases, which will generally be the case in two or three weeks if the weather is favourable, the bungs should be fixed in the casks loosely. After a while, when fermentation appears to have altogether ceased, they may be tightened, taking care, previously, to make good any deficiencies in the casks. The cider should be allowed to remain in the casks until it becomes clear and bright, when it must be racked off. The clarifying process may be hastened by the use of isinglass at the rate of 1 oz. to a barrel of cider.

Conditions Necessary For Cultivation.

The Apple may be grown successfully in many parts of Australasia, but the localities specially adapted for it are those which possess a comparatively cool and moist climate. In these cooler districts the trees are likely to be longer lived, to attain a greater size, and to bear better and more regular crops than in less congenial localities. At the same time, the fruit will, as a rule, possess a higher flavour and keep much better. In the medium warm districts, the trees may grow well for a few years, and bear freely, but they will be comparatively short-lived, and the fruit is apt to be deficient in flavour, and does not keep well as a rule. Tropical regions are unsuitable for the Apple, as the heat is too great. Cultivation may be carried on successfully in various soils, but the one above all others is a strong deep calcareous loam with a gravelly or marly subsoil. When such a soil is available it should invariably be chosen, though any good deep cultivation land may give satisfactory results. Some varieties will adapt themselves to particular soils or localities much better than others, thriving and giving good returns where others fail. Horticultural science has not yet shown the reason for these differences, and, as a consequence, no precise rules can be laid down as a guide in making selections. The writer has a theory that these peculiarities are not so much due to the varieties themselves as to the stocks upon which they are worked. More precise knowledge upon this point than growers now possess is much required, but doubtless it will be obtained in time, and then cultivators will know what stocks are best suited to particular varieties, soils and districts.

In preparing land for Apples or any other fruit trees it will be advisable to do the work thoroughly, as a good foundation is as necessary for an orchard as a mansion. As a rule, the ground should be broken up to the depth of 15 inches at the least, and 18 inches or 2 feet will be still better, and more especially in heavy soils. In light or shallow ground, where the subsoil is loose gravel, marl or sand, the

necessity for deep working is not so great. Care should be taken in preparing the land not to turn up a poor subsoil to the surface, it being sufficient to merely move or stir the ground. Many have made the great mistake of trenching up several inches of a bad subsoil to the surface, and the unsatisfactory results have caused them to condemn deep working. Drainage is a matter that should receive due attention, as trees cannot thrive if they are standing in soddened ground for lengthened periods. Whenever the soil is heavy and retentive, ample provision should be made for quickly carrying away any excess of water. The common practice of simply digging holes for fruit trees, and leaving the other portion of the ground, cannot be too strongly condemned, and it is the cause of many failures. These holes after heavy rains simply become so many basins of water, and trees growing in them must necessarily suffer. In very light soils, or where the subsoils are either open gravel, sand or lime-stone, there is often sufficient natural drainage, and therefore no occasion to provide for it. But in stiff, retentive land, artificial drainage should always be provided for as far as is necessary. Deeply-worked and well-drained soils hold moisture during periods of drought longer than shallow or wet land; and, in the winter, through an excess of water being avoided, the temperature is several degrees higher. Then, again, owing to the more perfect aëration of the ground, the plant food that it contains is more readily soluble and available for the trees. The foregoing remarks are applicable to other fruit trees than the Apple, and will not be repeated at length in the following articles.

Selecting Trees and Planting.

In selecting young trees, give a preference to those that have strong clean stems, and are worked upon suitable stocks. Care should be taken not to expose the roots to a drying atmosphere, as is too often done thoughtlessly. For free-growing trees worked upon ordinary stocks the distance apart should not be less than 24 feet, and even 27 or 30 feet will be better. Under ordinary favourable conditions these trees will attain a good age, and must have room for their development. In Europe and America many instances are known of an Apple tree attaining an age of over 100 years. Care must be taken not to plant too deeply, a very common mistake that is the cause of many failures. It is sufficient to place the trees so that the crowns, or upper roots, are merely below the surface. Before the trees are put in the ground all broken or bruised roots should be removed, as when allowed to remain they are of no service to the plants, but are liable to become cankered and cause serious injury. Planting may be done at any time between the fall of the leaf and the spring, and some difference of opinion exists as to the advantages of early planting or otherwise. According to the observations of the writer, the most favourable time is in the latter part of the winter—a week or two before active growth commences. For small gardens, where it is necessary to economise space and a large number of varieties are required, it may be an advantage to grow dwarf

trees, worked upon the Doucin or Paradise stocks. By using these stocks the trees will not be much larger than gooseberry bushes, and may be planted 6 or 7 feet apart. This mode of cultivation is not likely to find much favour with growers for market who have plenty of space at their command, as the trees require greater care, are more troubled with blight, and are comparatively short-lived. As a matter of course, the trees when planted should be securely staked and tied, so that they will not be damaged by heavy winds and rains.

Training and Pruning.

Fruit trees should invariably be trained with low heads in this part of the world. Trees with high heads suffer more from strong winds than others, and also through their stems being insufficiently shaded from the sun. Young trees are more especially liable to injury through the bark being scorched by the sun's power. In order to avoid this contingency, it will be well to cover the stems of young trees during the summer months with strips of bark or some other material that will answer the purpose. Young trees require more attention in pruning

Wood Branch.

Two year-old Branch, showing Fruit Buds.

Fruiting Branch one year-old. All the Buds are Fruit ones.

Branch showing the tendency of some varieties to bear on the points of the shoots.

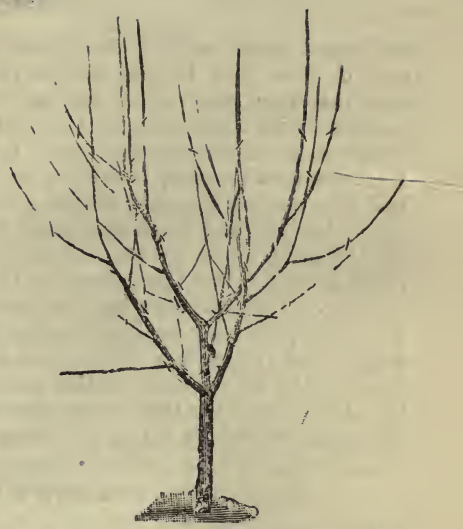
than those that have reached a mature age, as the object of the grower is to assist development as much as possible. His aim is a strong woody growth in particular directions, and well-balanced and symmetrical heads. To attain this object but a few branches are left, and the strength of the plant concentrated in to a limited number of channels. All shoots not likely to serve a useful purpose should be removed. Though as a rule in shortening back the shoots of young trees, it will be advisable to cut the points *outwards*, yet with some kinds this system must be reversed. Upright growing varieties should be invariably cut with *outward* buds. On the other hand, varieties that are inclined to pendular or horizontal growth require to be cut with *inward* buds, so as to encourage the branches to rise. By assisting to throw the new growth upward for a year or two better formed trees can be obtained than by allowing the branches to spread too much. Summer pruning is very useful with

Upright Tree cut back to outside Buds.

Spreading Tree cut back to inside Buds.

young trees, as by rubbing off unnecessary shoots a waste of energy is prevented to a great extent. Care must, however, be taken not to thin out the shoots too much, as a fair proportion of foliage is required for shade and to promote healthy root action. The ends of the shoots must also be pinched back when necessary to prevent a straggling growth and keep the trees compact and well furnished. Mature trees, if they have been well managed when young, will in most cases require but comparatively little in the way of pruning. As a rule, all that is necessary is

to keep the heads moderately open, to remove misplaced shoots or rank ones growing from the stems, and to shorten back those that are running away from their fellows. Then again, some varieties have too great a tendency to produce their fruit towards the ends of the branches, and these should be kept shorter than others. Care must also be taken not to let the trees make a weakly extended growth, which is a too common thing in this part of the world, and to prune so that the heads will be compact and well furnished. The ordinary pruning may be done at any time while the trees are at rest, but growers must bear in mind that if the operation is



Tree the second year after it is planted. Cross lines, showing where the branches should be cut.

A good form for an Apple Tree.

performed very early it is favourable to the production of wood, and if done late in the season it is more conducive to fertility and therefore best suited for mature trees. Root-pruning may be practised with advantage in the case of over-luxuriant mature trees which make an abundance of wood but produce little or no fruit. It is a too common practice, in dealing with trees of this class, to top prune and thin out the branches severely, but this is just the thing that ought not to be done, and cultivators must understand that the more trees are cut the more woody growth will they make. The proper treatment is to check growth rather than stimulate it, and this may be effected by root-pruning. This operation can be performed at any time while the trees are at rest, and may readily be effected by digging a semi-circular trench a spade wide at such a distance as will depend upon the size of the trunk. Cut all the roots in this trench, and the following season treat the other side of the tree in the same way. By adopting this plan trees will often be brought into good bearing condition.

Keeping Clean.

Clean cultivation is essential to the successful culture of the Apple and other fruit trees in this part of the world. An undergrowth of grass and other vegetation absorbs a deal of nutriment and moisture in the summer that otherwise would be available for the trees. Though orchards in grass may do very well in the United Kingdom and other parts of the world, yet experience has taught us that a different system must be adopted here. The cleaner the surface can be kept the better, and weeds should never be allowed to make much headway if it is possible to prevent them. But, though cleanliness is desirable, the too common practice of roughly ploughing or digging between the roots of mature trees cannot be too strongly condemned. When these operations are performed roughly a large proportion of the upper rootlets are destroyed or injured. These rootlets are the mouths or feeders of the trees, provided by nature to supply plant food; and it stands to reason, if a large percentage are destroyed, growth must suffer more or less. It would be wiser to preserve these feeders as much as possible, unless root-pruning is required, and the work can be better done with the scarifier or hoe than the plough or spade. The work can also be more economically done, as four or five scarifyings or hoeings will not entail more labour than one ploughing or digging. The frequent stirring of the surface soil is also exceedingly beneficial to the trees. The practice of mulching is deserving of general adoption, as in this part of the world it is of great assistance to the cultivator during the summer months. Long stable manure, straw, grass, seaweed, or any other material that will answer the purpose should be spread as far as the roots extend before the hot weather sets in, taking care to keep the stems of the trees free. When the surface soil is protected by this means from the direct action of a burning sun and drying winds, the moisture that is in the ground is conserved to a large extent, and will last much longer than otherwise.

Manuring.

In the cultivation of the Apple and other fruits care must be taken that the trees are not allowed to suffer through lack of proper nourishment. Their wants must be supplied, or otherwise they will fail more or less. Many people seem to be under the impression that if the trees are cared for till they reach maturity they ought then to yield crops for all time without receiving anything in return. This is unreasonable, as if the soil is not compensated for what it yields in the shape of plant food the supply of the latter must become exhausted sooner or later. Lack of attention in this respect is the cause of so many fruit trees dying off prematurely, to the disgust and disappointment of their owners. Many trees that go off from supposed diseases or insect and fungoid attacks simply die from sheer starvation through neglect. Cultivators should never allow their trees to suffer through the lack of proper food. Though sometimes soils naturally contain a large amount of plant food, yet this cannot be expected to last for all time. Every crop removes materials in certain proportions, and these should be returned in the shape of manures, in order that the supply may be kept up. An occasional dressing of manure will be of great assistance to old fruit trees, and materially aid in keeping them in a thrifty condition. Special manures are also serviceable to make good the deficiencies in the soil caused by the exhaustion of lime, potash, and other essential materials.

Watering.

When a supply of water, by irrigation or otherwise, is at the command of the cultivator it gives him a very great advantage, as he is able to stimulate the growth of his trees when otherwise they would languish from the effects of drought. But with the Apple and other deciduous fruit trees water must be used with judgment—it should be used only when it is wanted and in proper quantities. The number of waterings required must, as a matter of course, depend to some extent upon the season and the character of the soil. Three or four waterings will usually be quite sufficient for all practical purposes in the driest season. If the winter has been dry a good soaking may be given in the spring, just as growth is commencing; another may be given as soon as the fruit is fairly formed; the third (and fourth, if necessary) may be given when the fruit is from two to three parts grown. Water after the fruit attains its full size does more harm than good, and causes deterioration in quality. The fruit, also, becomes more tender, and will not keep or carry so well as it would if grown with less water.

Propagation.

Propagation may be effected in a variety of ways, but for the perpetuation of established varieties the usual methods are budding and grafting. Grafting is most generally practised with the Apple, the best

time for performing the operation being immediately before the sap commences to rise in the spring. The stocks now generally used in this part of the world for the Apple are the Northern Spy for the stronger kinds and the Winter Majetin for those that are less robust. Both these kinds are absolutely proof against the American Blight or Woolly Aphis, and have given satisfaction. The Irish Peach, New England Pigeon, Isle of Wight Pippin and Devonshire Stubbard are also more or less blight-resisting. The same quality is also claimed for several colonial-raised seedlings, but further experience is required before they can be ranked as absolutely blight-proof varieties. An addition to the list of non-blighting kinds will be an advantage, as it will allow a wider selection of stocks. We may in this way get stocks better adapted for particular climates, soils and varieties than those now generally used For dwarf trees the Doucin or Broad-leaved Paradise and the English Paradise stocks must be used. European cultivators use the ordinary Crab Apple to a large extent as a stock when large trees are required. For trees of smaller size the Siberian Crab finds favour with many. Stocks are obtained from cuttings, which usually strike freely, but their growth may be accelerated by grafting small pieces of root upon them before putting them in. Budding, though not nearly so generally practised as grafting, is preferred by some growers, and may be successfully performed during the growing season when the bark will separate freely from the wood. Usually the best time for budding is a little past midsummer. For the propagation of new or rare varieties budding is a useful method, as it allows every bud to be utilised. Layering is a method practised for the raising of dwarf stocks, but not to any great extent. It should be done during the winter. New varieties, as a matter of course, can only be obtained from seed; and if a quantity of pips are sown they will for a certainty produce in time a number of kinds. Some of these may possibly be useful kinds, but the number of Apples under cultivation at the present time is so large that it is not desirable to add to the list, except in the case of varieties having qualities that specially recommend them. If we can get a new variety that is earlier, later, more highly-flavoured, or will keep better than others of its class, then it may be regarded as an acquisition. Then, again, if cultivators, by cross fertilisation, can manage to raise varieties which combine in the one fruit the distinctively good qualities of two older sorts, the horticultural world will gain—for instance, a combination of the rich flavour of the Ribston Pippin with the keeping quality of the French Crab or Stone Pippin would be an undoubted acquisition.

Insects.

Various insect pests are troublesome to the Apple, and several to a considerable extent. The following is a descriptive list of the more prominent insects that specially affect this fruit:—

American Blight.—This troublesome pest, known also as the Woolly Aphis (*Schizoneura lanigera*), is widely spread through the Australasian colonies. Its peculiar white woolly appearance, which is too familiar

American or Woolly Blights.

Branches of Affected Tree.

Larvæ (highly magnified).

Perfect insect (highly magnified).

to fruit-growers, renders a description unnecessary. Various remedies are in use, and each one finds numerous advocates. Painting the affected parts with a mixture of kerosene and soft-soap, in about equal proportions, is an old and fairly effective remedy. Resin compound is a good remedy that has been used with great success in America. This should be applied with a fine syringe or spray pump during the time the trees are at rest. When the disease is upon the roots of the trees, one of the best remedies is, in the winter, to bare the main ones as much as possible, and apply a thick dressing of slaked lime.

Apple Beetle.—This insect is known scientifically as *Doticus pestilens*, and is likely to prove a troublesome pest to Apple trees. It is a very small brownish beetle, with comparatively long legs, and is as yet but little known. The grub of this beetle perforates Apples, which in about a month begin to shrivel, and it remains and develops in the withered fruit till it is ready to deposit its eggs for the following season. Remedies :—Kerosene emulsion and resin compound.

Apple Moth (*Curve-winged*) (*Erechthias mystacinella*).—This is a very small moth, but is a very destructive insect. It is destructive to Apples and other trees, through the larvæ boring into the branches, interrupting the flow of sap, causing them to break off, and also the formation of knots on excrescences. Kerosene emulsion is said to prove an effective remedy.

Apple Moth (*Light-brown*) (*Cacœcia responsana*).—A troublesome and widely-distributed insect, commonly known as the Australian Apple Moth. The perfect insect is light-brown, with lightly-bronzed wings, which are about three-quarters of an inch across. Its action is similar to that of the Codlin Moth, and it destroys fruit in the same way. Remedies :—The same as for the Codlin Moth.

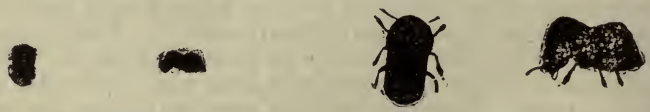
Apple Root Borer (*Leptops Hopei*).—A very destructive indigenous beetle, belonging to the Weevil family. In colour it is a light greyish-brown, and its body is more than half-an-inch in length. Its mode of action is to bore into the roots of the trees, and it destroys their vitality. Remedies :—Let holes, about half-a-dozen in number, be made with a crowbar round the stem of an affected tree. The holes should be from 6 to 12 inches deep; pour in about a wine-glassful of bi-sulphide of carbon, then cover as tightly as possible. Painting the larger roots with corrosive sublimate is also likely to be effective.

Apple Root Borer.

Perfect insect (natural size).

Apple Borer Beetle.—This is a very small but destructive beetle, known scientifically as *Rhizorpertha collaris.* It is widely distributed in all the colonies, and its depredations among Apple trees are great, though it attacks many other kinds, including indigenous timbers. Its mode of attack is to bore holes into the wood, in which the eggs are deposited and hatched. Remedy :—Scraping off of loose bark, and syringing with a strong solution of kerosene emulsion.

Apple Borer Beetle.

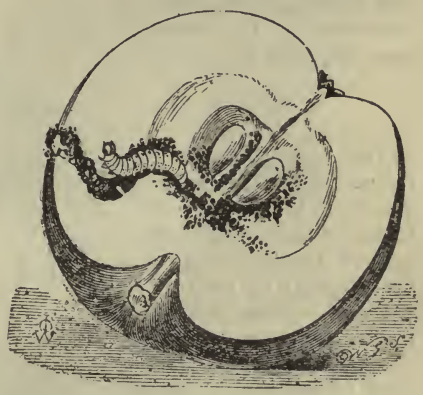


Perfect insects (natural size). Perfect insects (magnified).

Codlin Moth (*Carpocapsa pomonella*).—A well-known and terribly destructive insect, which causes great losses to growers of Apples, and to some extent attacks Pears. It is very widely spread, and cultivators in many parts of the colony are seriously troubled with the pest. The moth in colour is light-brown and bronze, and measures with wings extended about half-an-inch across. The larvæ or grub is yellowish-white, with a very dark-brown head. Remedies :—Bandaging the tree

with strips of cloth or other material to trap the larvæ, large numbers of which can be caught in this manner and destroyed. Hanging lanterns in the trees, with dishes of water and kerosene under them, when the moths are about. All the nocturnal moths readily approach light, and many of this and other kinds may be trapped and destroyed by adopting this plan. Spraying with solutions of kerosene emulsion and the arsenical compounds known as London Purple and Paris Green are also effective. One spraying should be given as soon as the fruit has formed, and a second one two or three weeks later. Possibly something may be done towards mitigating this pest by the introduction and cultivation of natural enemies. Several of these are known, and probably more will be discovered. An Australian beetle (*Telephorus pulchellus*) is known to be an active enemy, as is also an American species (*Chauliognathus pennsylvanicus*). Various American flies are also known to be parasites of the Codlin Moth.

CODLIN MOTH.



Apple showing Caterpillar of Codlin Moth at work.

Perfect insect on wing (natural size).

Perfect insect in repose (natural size).

Caterpillar (enlarged).

Showing how the Caterpillar eats into the Fruit.

An American enemy of the Codlin Moth (*Chauliognathus pennsylvanicus*).

An Australian enemy of the Codlin Moth (*Telephorus pulchellus*).

Scale.—Several of the insects known under this name are more or less injurious to Apple trees, but the one most to be dreaded is the Apple Mussel Scale (*Aspidiotis*), which is unfortunately very widely distributed throughout Australasia. For treatment see page 85.

Fungi.

The Apple, like other fruits, suffers a good deal from the attacks of fungi, which embrace several species, though the majority of cultivators are unconscious of many of these enemies.

Apple Scab or Black Spot (*Fusicladium dendriticum*).—This is the most widely-spread and best-known of fungi that attacks the Apple, and a troublesome one to deal with. It causes great damage to the fruit, which is marked with unsightly scabs and cracks that materially injure its appearance, if it is not absolutely destroyed. When attacked while small the young Apples either drop off the trees, or they crack and shrivel up so as to be useless. If attacked at a more advanced stage of growth the Apples may reach maturity, but they will carry unsightly scars. Sometimes the scabs will cause one side

American Enemies of the Codlin Moth.

Pimpla annulipes (greatly magnified).

Macrocentrus delicatus (greatly magnified).

APPLE SCAB OR BLACK SPOT.

of a fruit to be drawn and prevent it from assuming its proper shape. The leaves are also seriously affected by this fungus, which appears at first in dark green spots. Afterwards the spots assume a brownish colour and the tissue cracks and dries up, leaving holes in the leaves. Sometimes the spots are so numerous that the leaves are reduced to fragments. The spores of this fungus are produced in enormous numbers, and each one under favourable conditions may develop into a "scab." Remedies:—The affected leaves and fruit, when practicable, should be destroyed by fire—that is,

such fruit and leaves as may fall or can readily be gathered. Spraying with Bordeaux Mixture, Eau Celeste, or Ammonia Carbonate of Copper. One spraying should be given just as growth is starting in the spring, but *before the flowers appear.* A second spraying should be given when the leaves are half-grown, and further ones at intervals of two or three weeks till the fruit has attained about two-thirds of its growth.

Bitter Rot or *Ripe Rot.*—This disease is caused by a fungus known scientifically as *Glœosporium versicolor.* It is widely spread, but does not affect all Apples to the same extent, and some varieties are comparatively free from its attacks. Others, again, are specially liable to it, and many losses occur from it, though the true cause is not suspected by cultivators. The disease first makes its appearance when the Apples are beginning to ripen, and, hence the name "Ripe Rot." The fungus first makes its appearance in the form of small circular brown spots on the surface of the fruit. These spots rapidly increase in size till they measure a quarter-of-an-inch across, or more. At this stage of growth the spores are developed and scattered, and the old spots continue to increase in size till they, more or less, cover the fruit. The effect upon the fruit is that it becomes brown and rotten, and has an intensely bitter flavour; consequently, the disease has obtained the name of "Bitter Rot." This fungus propagates with great rapidity, and if not kept in check will cause serious damage in an orchard. Though generally regarded as an Apple pest, this fungus is said to also affect several other fruits. Remedies:—All affected fruit should be destroyed as far as may be practicable, as each spot contains some thousands of germ spores. Spraying with (1) Ammonia Carbonate of Copper, (2) Bluestone and Sodium Carbonate, (3) Bordeaux Mixture. Use as recommended for Apple Scab.

Bitter Rot

Mouldy Core.—This is a somewhat obscure disease, though it is supposed to be caused by some mould fungus that first appears upon the core, hence the name. The fungus germs are supposed to enter the fruit through the eye, from which there is a passage to the core. The spores germinate in the eye, and then force their fine threads to the interior of the fruit. From the core they again fructify, and the threads gradually force their way into the pulp. This is a very troublesome disease, and not easy to detect or deal with. Apples that are affected often appear to be sound, but on cutting them in halves the cores, and sometimes a considerable portion of the flesh, are found to be

Mouldy Core.

mouldy, and more or less rotten. In the more advanced stages of this disease the fruit becomes thoroughly rotten. As the disease works from the centre of the fruit, fungicides cannot be applied, and there are no known remedies. It might be eradicated by destroying affected fruit for a season or two, and, consequently, getting rid of the germs. But as it does not affect all varieties of Apples, perhaps the safest plan will be to discard those sorts that are specially liable to its attacks. The varieties most liable to this disease are those having the more open passages between the eyes and the core chambers.

Powdery Mildew.—This disease is somewhat prevalent, and, strange to say, affects young trees to a greater extent than old ones. It is caused by a fungus known as *Podosphæra Kunzei*, which appears upon the young leaves and branches in the form of a white felt, and hence the name, Powdery Mildew. The leaves when attacked turn brown, become brittle and dry, and fall off. As a rule, the foliage near the points of the shoots suffers most, and affected trees sometimes have the appearance of being scorched. The disease spreads rapidly, and should be dealt with promptly as soon as it is detected. Remedies :—Ammonia Carbonate of Copper, or Eau Celeste, applied as a spray as recommended for the Apple Scab.

Disease.

Water Core.—This is a term applied to the supposed cause of the transparent, or waxy, appearance that may sometimes be noticed in Apples. Sometimes the fruit is only partially transparent, but in other cases the whole of the flesh has this appearance. The cause is an excess of water in the tissues of the fruit, to the exclusion of air. The name has originated from the fact that the disease (if it is really one) generally originates from the core. This, however, is not invariably the case, as frequently it starts from the outside of the fruit. There is no accounting for the appearance of this complaint, though it is supposed to be through the absorption of an excess of water from the stalk cavity. As a rule it is most prevalent after heavy rains, and generally makes its appearance just as the fruit is beginning to ripen. Some varieties are very liable to it, while others are rarely or never affected by this disease. Possibly the reason why some kinds are affected to a greater extent than others is that their flesh tissues are more open. There are no remedies for Water Core, and in order to avoid it, the only thing in the power of cultivators is to reject such varieties as appear to be most liable to it.

Types of Apples.

There are several types of Apples, but their classification according to well-defined characteristics that could be easily recognised is a work of the future. Though some pomological writers of repute have made efforts in this direction, yet no one has succeeded in producing a satisfactory scheme. Apples are mainly classed as Codlins (or Codlings),

Nonpareils, Pearmains, Pippins, and Reinettes, indiscriminately. Though formerly the meaning of these terms may have been well understood, this is not the case at the present time, and people do not know how to distinguish one class from the other. The Codlin section seems to have been kept more true than any other to a distinctive type. The word was originally written *codling*, from *coddle*, to stew or boil, in allusion to the value of this section for culinary purposes. Nonpareil is a French word, meaning incomparable, but varieties to which this term is applied have nothing to distinguish them from Pippins or other classes. The term Pearmain means pear-shaped, and, though appropriate to some of the kinds classed under the name, it is by no means suitable for others. The term Pippin originally signified a seedling, but now has lost that meaning, and is applied to varieties, grafted or budded, that differ materially in characteristics.

Varieties.

There are an immense number of varieties in cultivation—in fact, far more than are required for practical purposes. In Australasia we have a large number, most of the leading European and American varieties having been imported. Australasian growers have also been active in producing new kinds, and our lists contain several superior colonial varieties. As a matter of course, a great many varieties that have been introduced are comparatively worthless, because other kinds have proved to be superior to them. Many kinds alter materially from their characteristics in Europe or America, some improving and others falling off. Consequently, a correct estimate of the value of any variety cannot be obtained from the description given by European or American writers. Many of the British varieties have considerably more colour than when grown in the United Kingdom, and to such an extent sometimes that they are difficult to recognise under their original names. Though many popular kinds have been originated within the last few years, yet there are some sterling old sorts that can still hold their own. For instance, the celebrated Ribston Pippin was raised in Yorkshire considerably more than 100 years ago, and the equally famous Golden Pippin, which was originated in Sussex, can claim to be older still. As regards the last-named Apple, it is said that the Empress Catharine of Russia was so passionately fond of this variety that she employed special messengers to bring her supplies from England.

Qualities Required in Apples.

The qualities required in Apples must depend to some extent upon the objects of the grower. Dessert Apples should not be above medium-size, regular in form, well coloured, and the fruit must be firm, crisp, juicy and pleasantly flavoured. Culinary or kitchen Apples should possess the property of cooking evenly into a tender pulpy mass, those having an acid flavour being the best. The terms, dessert and culinary Apples, are somewhat arbitrary, as some of the finest flavoured of the

former are excellent for cooking. Then, again, some varieties generally regarded as cooking Apples are also first class for eating. It must also be remembered in using Apples for culinary purposes, that some varieties contain naturally far more sugar than others. Consequently, sugar should be used with more descrimination than it usually is. Cider Apples should be firm and juicy, with a piquant flavour. For drying, most culinary sorts are available, though some, which are particularised in the list that follows, give more satisfactory results than others. In making a selection the grower must also take into consideration local conditions to some extent. If he intends to supply the colonial markets with fresh fruit, he will require early, medium and late varieties. On the other hand, if he grows for exportation the kinds selected should be those that keep and carry well, and early sorts will be useless. The same remark will apply to Apples grown for drying and cider making. But for whatever purpose Apples may be grown it is unwise for growers to have too many varieties. More satisfaction is likely to be obtained from a dozen kinds than from a hundred.

Gathering and Storing.

The earlier varieties show, in various ways, when they are ready for gathering, but the later kinds give fewer signs, and some little judgment is required to secure them in the best possible condition. There are three tests by which the cultivator is supposed to be able to tell when a crop is fit to gather. The first of these is when the Apples begin to fall of their own accord, but this is by no means a reliable test, as fruit will often begin to drop before it is properly ripened. The second test is when the fruit stalks will separate from the branches when lightly raised, and this is a fairly safe guide. The third test is when the pips become plump and brown, and perhaps this may be regarded as the safest criterion. It is not advisable to wait till the pips become thoroughly black, as the fruit will then be rather over-ripe for keeping, though it will be in excellent condition for present use. If Apples are left too long upon the trees they are apt to become mealy when stored. The Apples should always be gathered in dry weather, and they must be handled with the greatest care from the time they are taken from the trees till packed for market, or stored away. If required for export to Europe, or other distant parts of the world, the fruit should be exposed to the air for a day or two, so that it will wilt slightly. When this plan is adapted, a good deal of moisture exudes from the skins, and less is given off during the period of transit. Full directions for packing and storing are given at page 66.

Markings in Apples.

There is some confusion as regards the coloured markings of Apples, and the descriptions often fail to convey to the mind exactly what is meant. The following definitions of the terms used may therefore prove serviceable to many :—

Striped. — When there are alternating broad lines of colour.
Streaked.—When the lines are long and narrow.
Blotched.—When there are broad and abrupt markings.
Splashed.—When the coloured markings are narrow and much broken.
Stained. — When the markings are of a light shade and broken.
Marbled.—When the stripes are wide, irregular, and faint.
Clouded. —When there are broad blotches of colour showing faintly.
Mottled. — When the skin is thickly and irregularly covered with faint dots.
Dotted. — When there are more or less dots upon the skin.
Spotted. — When the dots are large.

Principal Forms of Apples.

Round or Roundish.—When the outline is round, or nearly so, the length being about equal to the breadth.
Flat or Oblate.—When the ends are much compressed, the width being considerably greater than the length.
Conical.—In the form of a cone, tapering from the base to the eye.
Ovate or Egg-shaped.—When the form is somewhat similar to an egg.
Ribbed.—When there are ridges running from the stalk to the eye.

In addition to these main forms there are numerous modifications of each, and sometimes it is difficult to find any single term that will give an exact description of the shape of an Apple. To some extent, however, this difficulty is surmounted by the use of such compound terms as *roundish-conical, roundish-oblong,* and others. Certain peculiarities of form are also described as *angular* and *one-sided.*

Principal Forms of Apples.

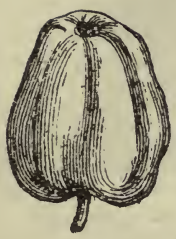
Round.

Ovate.

Conical.

Flattened or Oblate.

Oblong.



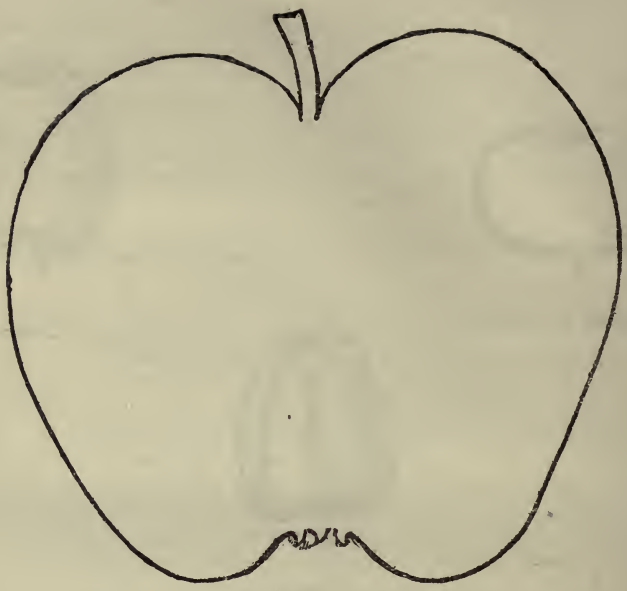
Ribbed.

Varieties.

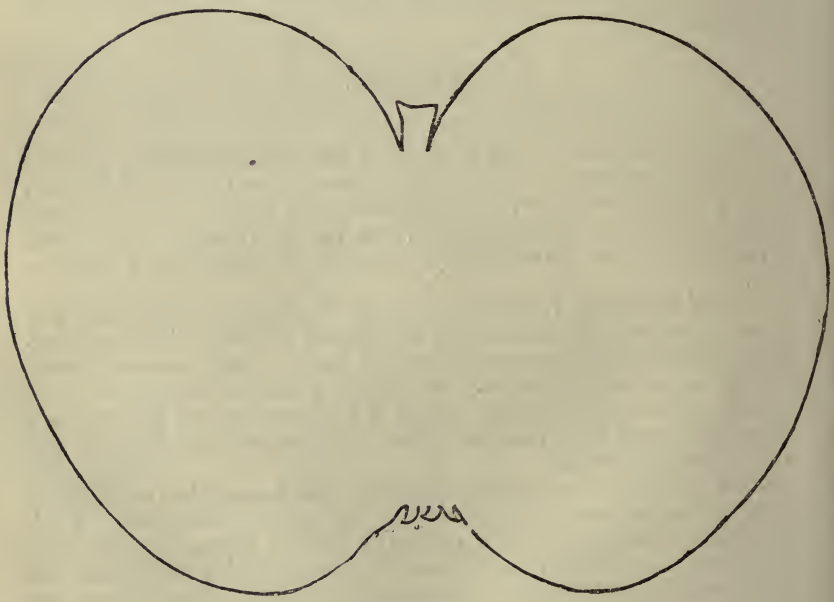
The following list includes most of the principal European, American and colonial varieties. Sectional illustrations show the normal forms of many prominent varieties, but cultivators must bear in mind that some kinds will often differ considerably. In fact, it is not an uncommon thing for two or three distinct forms to be found upon the one tree.

Adams' Pearmain (*Matchless, Norfolk Pippin*).—A first-class and popular variety, supposed to be of English origin. Fruit medium-size, oblong-conical, and very distinct in shape. Skin greenish-yellow, thickly tinged and striped with red. Flesh yellowish, crisp, juicy, with a brisk rich flavour. Ripens late, will keep for several months; is a first-class dessert Apple, and well suited for an export trade. Tree strong, and an excellent bearer.

Ailes.—An excellent American variety, with large oblate or flat fruit. Skin yellowish-green, thickly striped and flushed with red. Flesh yellowish, crisp, juicy, with a rich brisk flavour, ripens late, and will keep a very long while; an excellent Apple for cooking and for dessert when kept for a few months. Suitable for export. Tree vigorous and productive.



Adams' Pearmain.



Alfriston

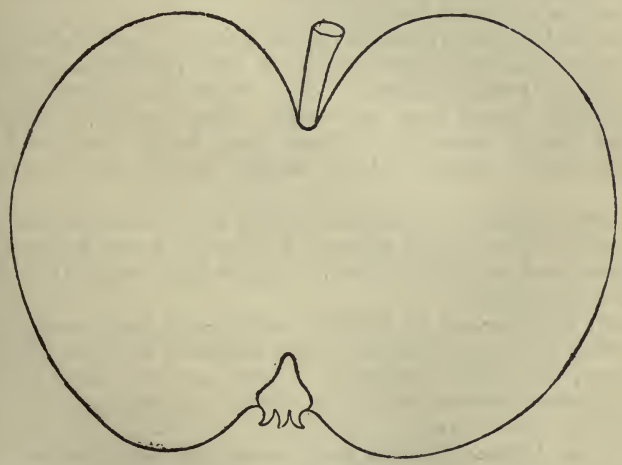
Alfriston (*Lord Gwyder's Newtown Pippin, Oldaker's New, Shepherd's Seedling*).—An old and popular English variety, with large roundish fruit, which is slightly ribbed. Skin greenish-yellow, netted with russet, with a little colour. Flesh, yellowish white, crisp, juicy, with a brisk, acid flavour. Ripens late, keeps well, and is an excellent culinary Apple. A good kind for local markets, and also for export. Tree strong and a good bearer.

Allanbank Seedling.—An excellent and popular culinary variety, with large roundish-conical fruit. Skin greenish-yellow, with faint streaks of red. Flesh firm and juicy. Ripens medium late; and is a first-class cooking Apple.

American Golden Pippin (*Golden Apple, Newtown Greening, New York Greening*).—An American variety with medium-sized oblate fruit. Skin deep-yellow, with a brownish-blush, thickly sprinkled with grey dots, and slightly netted with russet. Flesh yellowish-white, crisp, juicy, sub-acid. Ripens late, keeps well, and is a good dessert Apple. Tree strong, spreading, and prolific.

American Golden Russet (*Bullock's Pippin, Golden Russet*).—A very popular American Apple with roundish-ovate fruit, rather below the medium size. Skin dull-yellow, thickly sprinkled with russet. Flesh yellowish, tender, juicy, with an aromatic flavour. Ripens medium late, and will keep three or four months. A good dessert Apple. Tree moderately robust, but very productive.

American Summer Pearmain.—A very good early American variety, with medium-sized oblong fruit. Skin richly streaked with red and yellow. Flesh yellow, very tender, with a rich pleasant flavour. Ripens about mid-season. Tree moderately vigorous and fairly productive.



Annie Elizabeth.

Annie Elizabeth.—An excellent and popular English variety, with large round showy fruit, prominently ribbed. Skin yellow, richly striped with red. Flesh yellowish white, crisp, juicy, with a sharp flavour. Ripens late, keeps a long time; is an excellent cooking or dessert variety, and suitable for export. Tree vigorous and a free bearer.

Aromatic Russet (Brown Spice, Rook's Nest, Spice Apple).—An old English variety, with medium-sized conical fruit. Skin green, with a brownish cheek, and nearly covered with dark-grey russet. Flesh greenish-yellow, firm, crisp, juicy, and richly aromatic. Ripens late, keeps well, and is a first-class dessert Apple. Tree vigorous, upright, and a great bearer.

Ashmead's Kernel.—A first-class English variety, with roundish-oblate fruit, rather below medium-size. Skin greenish-yellow, with a brown tinge, and marked with russet. Flesh yellowish, firm, crisp, juicy and richly flavoured. Ripens late, keeps well, and is an excellent dessert Apple. Tree hardy and prolific.

Baddow Pippin (*Spring Ribston*).—An excellent English variety, with medium-sized fruit, roundish-oblate, with ribs on the sides, and corresponding ridges at the crown. Skin yellowish-green, with a dull red cheek. Flesh greenish-white, firm, crisp, juicy, with a flavour somewhat similar to the Ribston Pippin. Ripens late, keeps well, and is a good dessert variety.

Baldwin (Butters' Woodpecker).—One of the best and most useful of the American Apples. Fruit large, roundish. Skin yellow and orange, richly striped with red, and slightly streaked and dotted with russet. Flesh yellowish-white, crisp, tender, slightly sub-acid, with a rich pleasant flavour. Makes a good dessert Apple, cooks well, and is suitable for drying. Ripens medium late, and may be kept for some time. Tree strong and an abundant bearer.

Barcelona Pearmain (Speckled Golden Reinette, Speckled Pearmain).—A variety of uncertain origin, popular in some parts of England. Fruit medium-sized, roundish-oblong. Skin nearly covered with red, and speckled with large dots of russet. Flesh yellowish-white, firm, crisp and highly aromatic. Ripens late, keeps well, and is an excellent dessert Apple. Tree strong, hardy, and an excellent bearer.

Bauman's Reinette.—A Belgian variety, with medium-sized roundish-oblate fruit. Skin highly coloured with red. Flesh yellowish-white, firm, juicy and highly flavoured. Ripens late, keeps well, and is a good culinary Apple.

Baxter's Pearmain.—An English variety, with large roundish-conical fruit. Skin pale-green, with shades and streaks of red. Flesh yellowish firm, juicy, and briskly sub-acid. Ripens late, will keep for several months, and excellent either for dessert or cooking. Tree hardy, vigorous and productive.

Beauty of Hants.—This is a comparatively new English variety, with large roundish-conical fruit. Skin deep-yellow, heavily striped with red. Flesh yellowish, juicy, sweet and well flavoured. Ripens medium

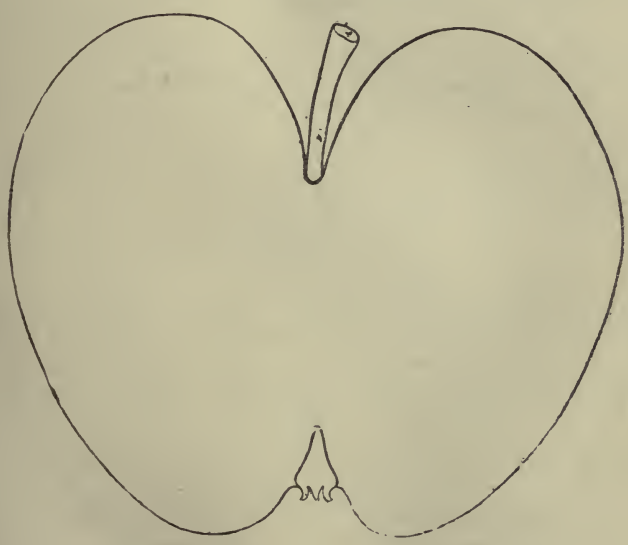
late, keeps for some time, and an excellent cooking Apple. Tree robust and a good bearer.

Beauty of Kent.—A handsome English variety, with large roundish-ovate fruit. Skin greenish-yellow, heavily marked with stripes of dark-red. Flesh juicy, crisp, with a pleasant sub-acid flavour. Ripens medium late, will keep fairly well, and a good culinary Apple. Tree strong, upright, and bears freely.

Bedfordshire Foundling (Cambridge Pippin).—A first-class English culinary variety, with large roundish slightly ribbed fruit. Skin deep-green, with a yellowish tinge on one cheek. Flesh yellowish-white, juicy, and pleasantly sub-acid. Ripens late, keeps well, and is an excellent cooking Apple. Tree strong and prolific.

Ben Davis (Baltimore Red, Carolina Red Streak, Kentucky Pippin, Red Pippin, Victoria Pippin).—A popular and very good American variety, with medium-sized, or larger, roundish-conical fruit. Skin yellow, but nearly overspread with stripes and splashes of two shades of red. Flesh white, tender and sub-acid. Ripens late, keeps well; a good dessert and showy market fruit; also a good Apple for exporting. Tree bears early, is very productive, and as it blooms late is suitable for districts where frosts linger in the spring.

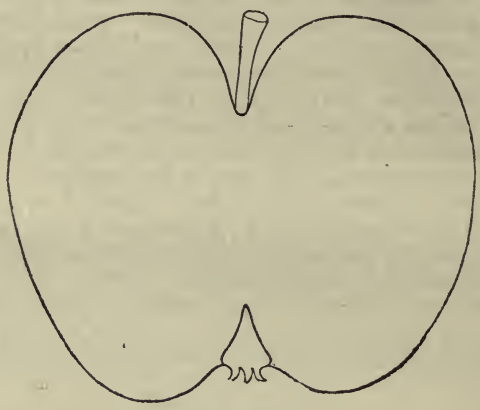
Benoni.—An excellent early American variety, with roundish-conical fruit, rather below medium size. Skin pale-yellow, striped, shaded and marbled with dark-crimson. Flesh yellowish, juicy and pleasantly sub-



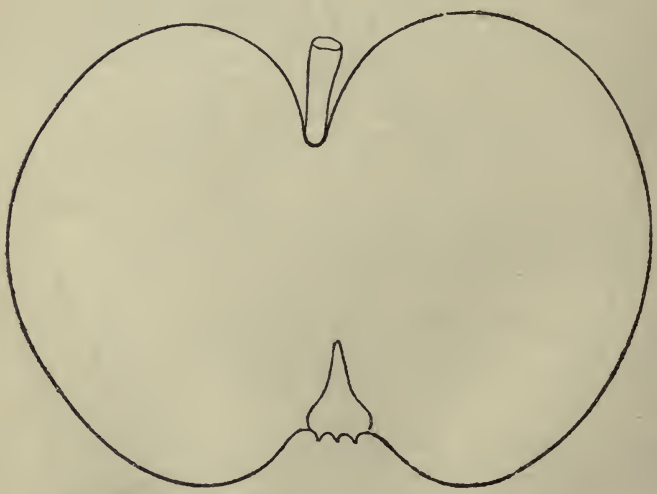
Ben Davis.

acid. Ripens second early, and is a nice dessert Apple. Tree vigorous, hardy, upright, and a prolific bearer.

Bess Pool.—An old and excellent English variety, with showy conical fruit, above medium-size. Skin yellow, washed and striped with red. Flesh white, juicy, with a rich vinous flavour. Ripens late, keeps well, and a good Apple for dessert or cooking.



Benoni.



Blenheim Pippin.

Betty Geeson.—An excellent old English culinary variety, with large roundish fruit. Skin green, with faint stripes. Flesh juicy and briskly flavoured. Ripens late, will keep for several months, and is a first-class cooking Apple. Tree hardy and a good bearer.

Blenheim Pippin (*Blenheim Orange*, *Northwick Pippin*, *Woodstock Pippin*).—An old and very popular English variety, with large roundish-conical fruit. Skin deep orange-yellow, heavily stained and striped with dull-red. Flesh yellowish, juicy, with a sweet pleasant flavour. Ripens medium late, keeps fairly well, and is good both for dessert and cooking. Suitable for export. Tree robust and an abundant and regular bearer.

Blondin.—An American variety, with large oblate, often unequal, fruit. Skin greenish-yellow, splashed and striped with red, and dotted with grey. Flesh greenish-yellow, juicy, and briskly flavoured. Ripens medium late, keeps well, and a good dessert Apple.

Blue Pearmain.—An American variety, with very large regular roundish-conical fruit, Skin dull-green, thickly striped with purplish-red, and covered with bloom that gives a bluish appearance. Flesh yellowish, juicy and aromatic. Ripens well, keeps a long time, and is a good dessert variety. Suitable for export. Tree robust and bears moderately well.

Bonum.—An American variety, with medium-sized oblate fruit. Skin mostly shaded with deep crimson, with splashes and stripes of deep-red. Flesh white, often stained next the skin, firm, juicy, mildly sub-acid, and richly flavoured. Ripens late, will keep several months, and is a good dessert and market Apple. Tree vigorous and an early and abundant bearer.

Borovitsky.—A Russian variety, with medium-sized roundish-angular fruit. Skin yellowish-white, faintly striped with pale-red. Flesh, white, juicy, sweet, briskly flavoured, and a good early dessert Apple.

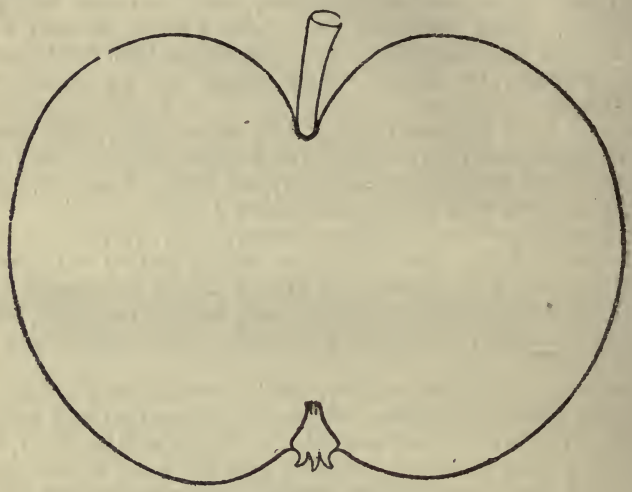
Borsdorffer (*Garnet Pippin*, *Queen's*, *King George*).—An excellent German dessert variety, with small roundish-oblate fruit. Skin pale-yellow, with a full deep-red cheek, and sprinkled slightly with russet. Flesh yellowish-white, firm, crisp, juicy, with a rich vinous flavour. Ripens late and keeps well. Suitable for export.

Boston Russet (*Howe's Russet*, *Putnam Russet*, *Roxbury Russet*, *Warner Russet*, *Sylvan Russet*).—A popular and excellent American variety, with medium-sized roundish fruit, flattened at the ends. Skin thickly covered with brownish-russet. Flesh greenish-white, juicy, sub-acid, and richly-flavoured. Ripens late, keeps a long time, and is an excellent dessert Apple; also suitable for drying and export. Tree vigorous, bears early, and is very prolific.

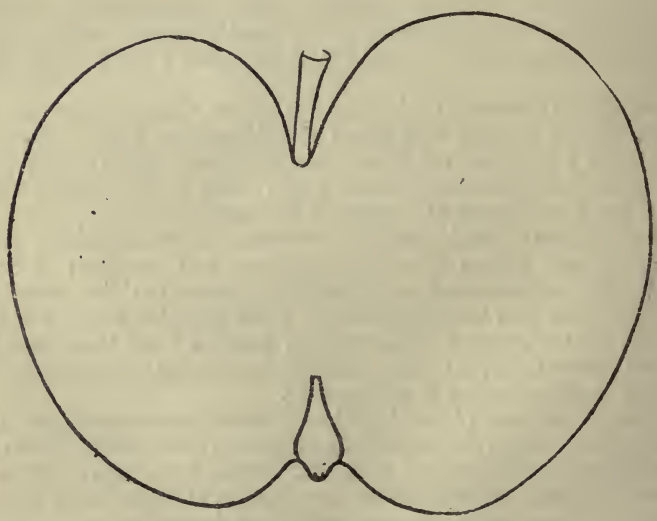
Brabant Bellefleur (*Iron Apple*).—A first-class variety, of Dutch origin, with large roundish-oblong slightly-ribbed fruit. Skin pale yellow, rather heavily striped with red. Flesh firm, juicy, with a rich sub-acid flavour. Ripens rather late, and will keep some time. A first-rate cooking Apple, and also useful as a dessert fruit.

Braddick's Nonpareil (*Ditton Nonpareil*).—An excellent English

variety, with roundish-ovate medium-sized fruit, compressed at the ends. Skin green, tinged with yellowish-brown, and a brownish-red cheek. Flesh yellowish, juicy, sweet, and aromatic. Ripens late, keeps well, and an excellent dessert Apple. Tree strong and usually a very free bearer.



Boston Russet.



Brownlee's Russet.

Bramley's Seedling.—An English variety, with large roundish-conical fruit. Skin yellow, heavily tinged with red, and striped with a deeper shade. Flesh yellowish-white, tender, brisk, and pleasantly sub-acid. Ripens late, may be kept for a long time; is an excellent culinary Apple, and good also for dessert. Tree hardy, vigorous, and a good bearer.

Brownlee's Russet.—A popular English variety, with large roundish-ovate fruit, rather flattened. Skin thickly covered with russet, and a brownish-red cheek. Flesh greenish-white, juicy, sweet, aromatic, and briskly flavoured. Ripens late, keeps well, an excellent dessert Apple, and also good for cooking. Tree vigorous and prolific.

Buckingham (*Bachelor, King, Queen*).—A good American variety, with medium-sized to large roundish-oblate fruit. Skin thickly shaded, striped, and splashed with two shades of red. Flesh yellowish, tender, juicy, and sprightly sub-acid. Ripens very late, will keep for some time, and is an excellent dessert and market Apple. Tree moderately vigorous and productive.

Buff.—An American variety with large roundish irregular fruit. Skin pale yellow overspread with broad broken stripes and splashes of dark-crimson. Flesh white, juicy, breaking, sub-acid. Ripens late, keeps well, and a good dessert Apple. Tree vigorous and productive, but rather liable to blight.

Buncombe (*Red Winter Pearmain*).—A variety of American origin, with medium-sized roundish-oblong fruit. Skin pale yellow, mostly shaded with maroon, and thickly sprinkled with large light dots. Flesh yellowish-white, tender, juicy, mildly sub-acid, and slightly aromatic. Ripens late, keeps a long time, and an excellent dessert Apple. Suitable for export. Tree moderately vigorous, of upright growth, and a good and regular bearer.

Cannon Pearmain.—An American variety, with medium-sized roundish-conical fruit. Skin yellow, striped and marbled with red and dark-crimson with large grey dots. Flesh yellowish, firm, juicy, with a brisk sub-acid flavour. Ripens late, keeps a long time, and is a good dessert and market Apple. Suitable for export. Tree vigorous and very productive.

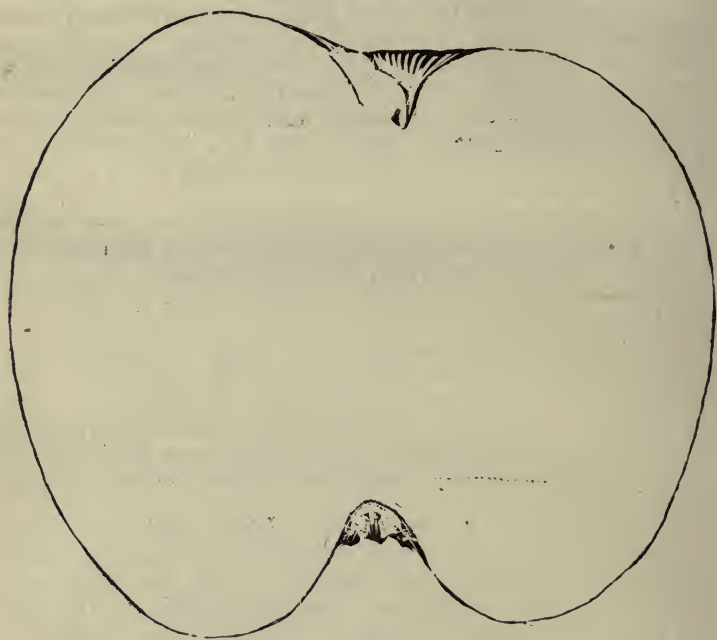
Carlisle Codlin.—An old English variety, with ovate and angular fruit above medium-size. Skin pale yellow, speckled with russet. Flesh white, crisp, and juicy. Ripens rather late, will keep for some time, and an excellent culinary Apple. Tree hardy and an abundant bearer.

Carolina Red June.—An American early variety, with oval irregular fruit, medium-sized or under. Skin nearly wholly covered with deep purple-red. Flesh white, tender, juicy, with a brisk sub-acid flavour. Ripens very early; and a good dessert fruit. Tree vigorous, bears early and abundantly.

Carter's Blue (*Lady Fitzpatrick*).—An American variety of excellent quality, with roundish-oblate fruit, above medium size. Skin yellowish-green, washed and striped with dull-red, and covered with a blue bloom. Flesh yellowish-white, crisp, juicy, sugary, and aromatic. Ripens late,

will keep a long time, and is a first-class Apple for the dessert or cooking. Tree vigorous, productive, and an early bearer, but very subject to blight.

Cellini.—An old and popular English variety, with above medium-sized roundish fruit. Skin deep-yellow, thickly streaked and mottled with dark-crimson. Flesh white, juicy, with a brisk aromatic flavour. Ripens medium late, will keep fairly well; is an excellent culinary Apple, and may be used as a dessert fruit. Tree moderately vigorous and bears freely.



Cellini.

Chamberlain's Late Scarlet.—An excellent late dessert Apple, with showy medium-sized fruit. Skin deep-yellow, richly streaked with red. Flesh firm, juicy, and well flavoured. Ripens late, keeps well, and suitable for export.

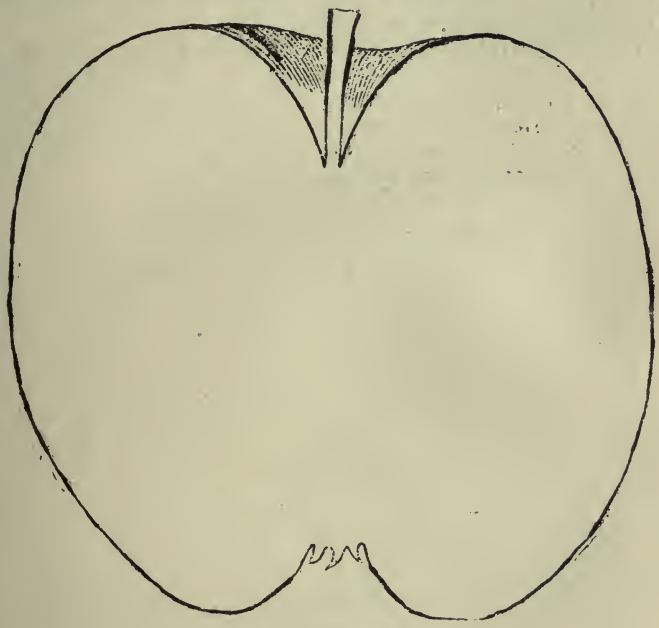
Christie's Pippin.—An excellent English dessert Apple, with roundish fruit below medium-size. Skin deep-yellow, mottled with red, and dotted with russet. Flesh, yellowish-white, juicy, with a brisk sub-acid flavour. Ripens late, will keep for a long time, and a good market, kind. Tree moderate in growth, but a very good bearer.

Chronical (*Cotton Apple*).—An American variety, with medium-sized slightly-conical fruit. Skin greenish-yellow, with splashes and stripes of dull-red and light dots. Flesh, yellowish-white, compact, juicy and mildly sub-acid. Ripens later, will keep for many months, and an

excellent dessert and market Apple. Tree hardy, thrifty, and a moderate and regular bearer.

Claygate Pearmain.—A well-known and popular English variety, with medium-sized roundish-conical fruit. Skin greenish, yellow with a brownish-red cheek, and dull-red dashes and stripes. Flesh yellowish, juicy, with a rich aromatic flavour, somewhat similar to the Ribston Pippin. Ripens late, keeps well, and a first-class dessert variety. Suitable for export. Tree robust, and an abundant bearer.

Cleopatra (New York Pippin, Ortley Pippin, Yellow Pippin, White Pippin, White Bellflower).—A well-known and excellent American variety that is very popular in Australia. Fruit medium to large, and in shape oblong-conical. Skin a rich deep yellow, with sometimes a sunny cheek. Flesh white, fine grained, juicy, sub-acid, and pleasantly flavoured. Ripens late, keeps a long time; an excellent culinary Apple, useful as a dessert fruit, and one of the best sorts for an export trade. Tree strong, hardy, and generally bears very freely.



Cleopatra.

Cockle Pippin (Nutmeg Pippin).—A first-class English dessert variety, with medium-sized conical and slightly-ribbed fruit. Skin yellow, thickly covered and dotted with brown russet. Flesh, yellowish, firm, juicy, with a rich aromatic flavour. Ripens late, and will keep for several months. Tree hardy and prolific.

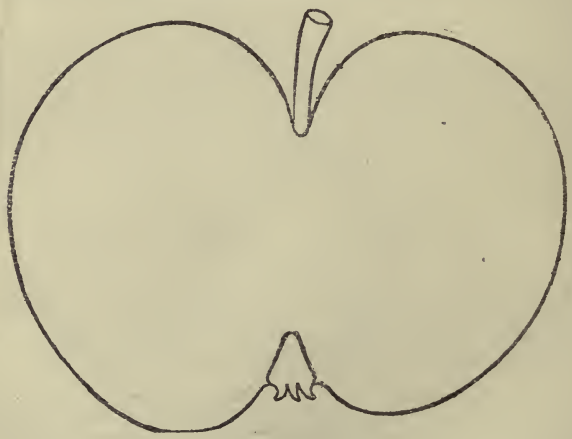
Cooper's Market.—A showy American variety, with medium-sized roundish-conical fruit, somewhat similar to Cox's Orange Pippin. Skin

greenish-yellow, flushed and striped with two shades of red. Flesh, white, tender, with a brisk acid flavour. Ripens late, keeps a long time; an excellent dessert Apple, and suitable for export. Tree hardy, vigorous and very productive.

Cornish Aromatic.—A well-known and popular English variety, with roundish-angular fruit, rather above medium size. Skin deep yellow, with a full deep-red cheek, and thickly marked with russet on the other side. Flesh yellowish, firm, crisp, juicy and briskly aromatic. Ripens late, will keep three or four months, and a first-class dessert Apple. Tree moderately vigorous and prolific.

Cornish Gilliflower (Cornish July-flower).—Another old and popular English variety, with roundish-conical slightly-ribbed fruit, rather above medium-size. Skin dull dark yellowish-green, thickly tinged and striped with brownish-red. Flesh, yellowish, firm, very juicy, with a rich aromatic flavour. Ripens late, keeps a long time, and is a good dessert Apple. Tree strong and fairly prolific, though in England it has the reputation of being a shy bearer.

Court Pendu Plat (Garnon's Pippin, Russian, Wollaton Pippin).—A popular French variety, with medium-sized roundish-flat fruit. Skin nearly covered with rich deep crimson, with a little greenish-yellow on the shaded side. Flesh yellow, crisp, juicy, with a brisk acid flavour. Ripens medium late, keeps for some time, and a good dessert or cooking Apple. Tree vigorons and a good bearer.



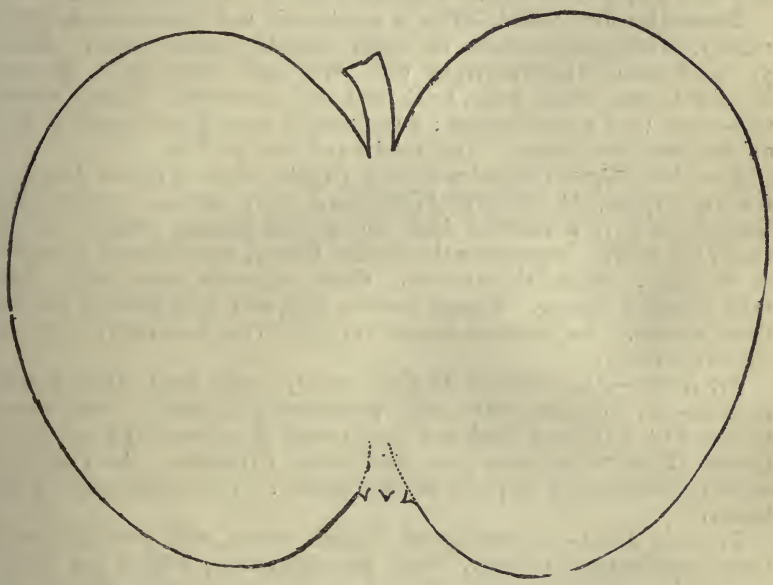
Court Pendu Plat.

Court of Wick (Golden Drop, Fry's Pippin, Knightwick Pippin, Week's Pippin, Yellow Pippin).—A popular old English variety of the Golden Pippin class, with small roundish.oblate fruit, somewhat flattened. Skin yellow, with an orange cheek slightly flushed with red. Flesh yellow, crisp, juicy, with a rich pleasant flavour. Ripens late,

will keep for a long time, and is a first-class dessert Apple. Tree hardy, vigorous and very prolific.

Cox's Orange Pippin.—A well-known and highly-esteemed English variety, with medium-sized roundish-conical fruit. Skin greenish-yellow, shaded, splashed and mottled over most of the surface with bright-red. Flesh yellowish, crisp, juicy and briskly flavoured. Ripens late, will keep for some time, and is a favourite dessert and market Apple. Suitable for export. Tree strong and a good bearer.

Cox's Pomona.—This is another well-known and popular English variety, with ovate fruit, medium-sized or larger. Skin deep-yellow, streaked and shaded with bright crimson. Flesh white, tender, juicy, with a brisk sub-acid flavour. Ripens medium late, will keep for some time, an excellent culinary Apple, and useful as a dessert fruit. Tree vigorous and fairly productive.



Cox's Pomona.

Cox's Red Leaf Russet.—An excellent English dessert variety, with medium-sized roundish-oblate fruit. Skin thickly covered with brown russet. Flesh greenish-white, juicy, with a brisk rich flavour. Ripens late, keeps a long time, and one of the best dessert Apples of the russet class. Tree strong and productive.

Craike's Seedling.—A very good Victorian Apple, raised in the Sandhurst district, after the style of the Stone Pippin, from which it has evidently originated. Fruit similar to the Stone Pippin, though not

quite so large, but with rather more colour. Flesh very juicy, crisp and briskly flavoured. Ripens late, keeps a long time, and an excellent market Apple.

Cullasaga.—An American variety, with a large roundish fruit, inclining to conical. Skin yellowish, to a large extent shaded and striped with crimson, and sprinkled with large dots. Fruit, yellowish, firm, moderately juicy, and mildly sub-acid. Ripens late, keeps well, and is an excellent dessert and cooking variety. Tree strong and very prolific.

Devonshire Quarrenden (*Red Quarrenden, Sack Apple*).—An old and popular English variety, with medium-sized roundish fruit, somewhat compressed at the ends. Skin covered with very deep dark crimson. Flesh greenish-white, crisp, juicy, with a pleasant sub-acid flavour. Ripens medium early, and is a good dessert and cooking Apple, but will only keep a short time. Tree hardy and an excellent bearer.

Devonshire Red Streak.—This is another old and well-known English variety, with medium-sized, or under, roundish-conical fruit. Skin yellowish-green, thickly-striped with red and dotted with brown. Flesh yellowish white, juicy, brisk and well flavoured. Ripens about mid-season ; not a good keeper ; a moderately good dessert variety, but an excellent cider Apple. Tree robust and very prolific.

Downton Pippin (*Downton Golden Pippin, Elton Pippin, Knight's Golden Pippin, St. Mary's Pippin*).—A very old and well-known English variety, a seedling from the famous Golden Pippin. Fruit small, but a little larger than the Golden Pippin, roundish and flattened at the ends. Skin bright-yellow. Flesh yellowish, crisp, with a rich brisk sub-acid flavour. Ripens medium late, and will keep for two or three months. An excellent dessert variety. Tree moderately vigorous and bears freely.

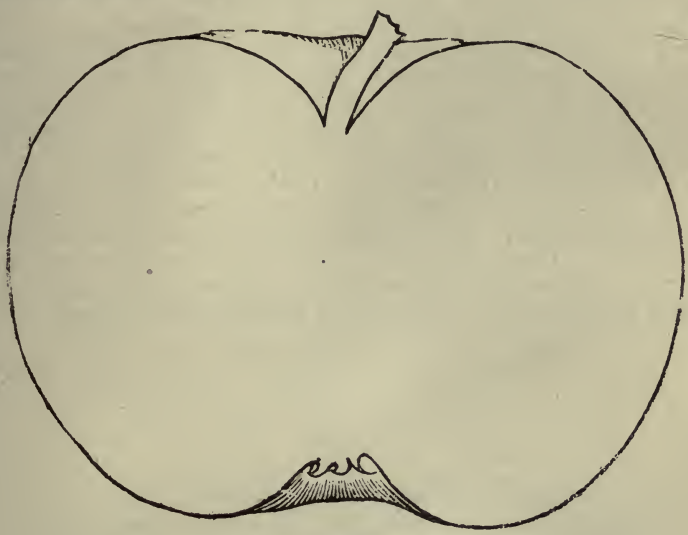
Dr. Hogg.—An excellent English variety, with fruit rather above medium-size, roundish-ovate, and prominently ribbed. Skin deep-yellow, with a full red cheek and faint stripes of crimson with traces of russet. Flesh white, crisp, juicy, and briskly flavoured. An excellent culinary variety, and keeps for several months. Tree robust and a good bearer.

Dredge's Fame.—A very useful English variety, with roundish-ovate fruit, medium-sized or over. Skin greenish-yellow, with a red cheek and patches of thin russet. Flesh greenish-yellow, firm, crisp, juicy, sweet, and briskly-flavoured. Ripens medium late, keeps well, and suitable for dessert or cooking. Tree vigorous and bears freely.

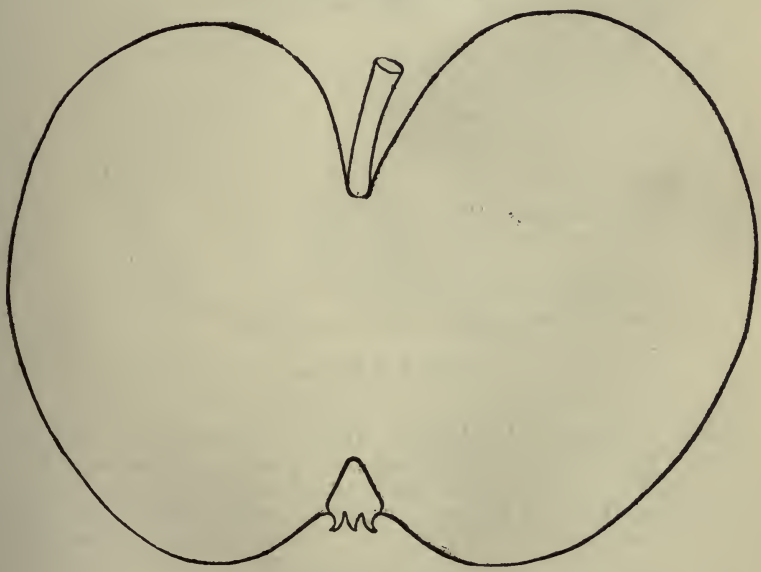
D. T. Fish.—A recently introduced English variety, with large roundish obtusely-angular fruit. Skin bright yellow, with a slight flush red cheek and dotted with small specks of russet. Flesh tender, juicy, with a pleasant sub-acid flavour. Ripens late, will keep two or three months, and is an excellent dessert, cooking and sauce Apple. Tree said to be vigorous and prolific.

Duchess of Oldenberg (*Beauty of Newark*).—A first-class and popular Russian variety, with medium-sized, or over, roundish-oblate regularly formed fruit. Skin deep-yellow, heavily flushed and streaked with

crimson. Flesh yellowish-white, juicy, with a sprightly sub-acid flavour. Ripens early in the autumn; is an excellent dessert or culinary Apple, but does not keep long. Tree very hardy, vigorous, bears freely, and is nearly blight proof



Duchess of Oldenberg.

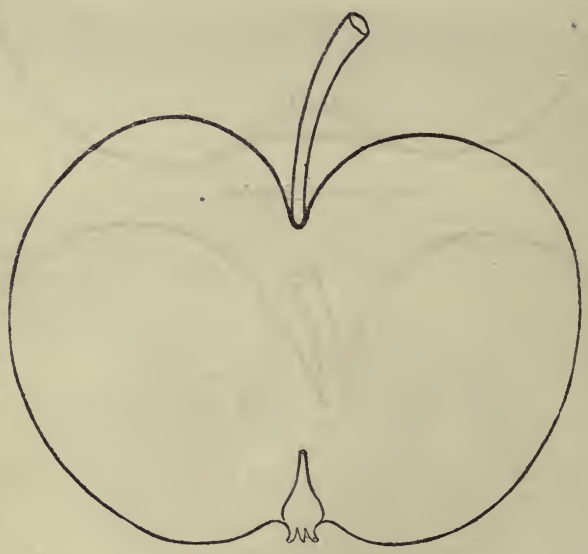


Dumelow's Seedling.

Duke of Devonshire.—An English variety, with medium-sized roundish-ovate fruit. Skin lemon-yellow, with a dull-red cheek and veined with russet. Flesh yellowish, crisp, juicy, with a rich aromatic flavour. Ripens late, will keep a long time, and is an excellent dessert Apple. Tree moderately vigorous and productive.

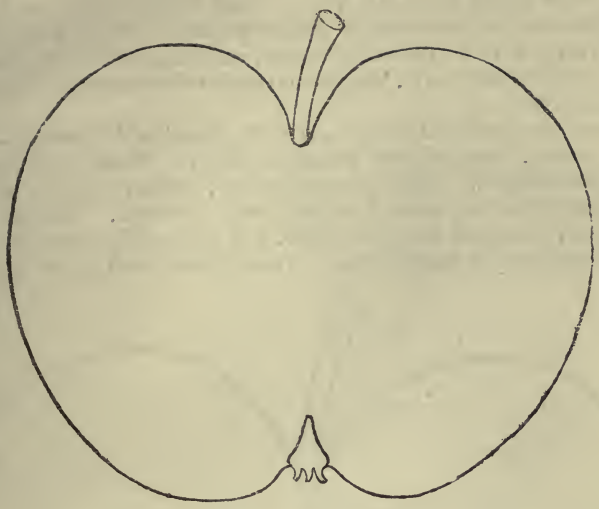
Dumelow's Seedling (*Normanton Wonder*, *Wellington*).—A well-known first-class English variety, with large roundish fruit, compressed at the ends. Skin yellow, with a blush check and marked with russet. Flesh yellow, crisp, juicy, with a pleasant acid flavour. Ripens late, is a very long keeper and one of the best culinary Apples. Suitable also for drying and exporting. Tree robust and an excellent bearer.

Dutch Mignonne (*Copmanthorpe Crab*, *Stettin Pippin*).—A well-known and popular old variety, raised in Holland, with medium-sized roundish-oblate fruit. Skin dull-yellow, with a blush cheek and mottled with russet. Flesh yellowish, juicy, slightly sub-acid, and highly flavoured. Ripens late, keeps a long time, a good dessert Apple, and a suitable kind for export. Tree strong and an excellent bearer.



Dutch Mignonne.

Early Harvest (*July Pippin*, *Yellow Harvest*).—An excellent American variety with medium-sized roundish fruit. Skin bright pale-yellow, with a few faint white dots. Flesh white, crisp, juicy, with a rich sprightly sub-acid flavour. Ripens in early summer, and is an excellent dessert and cooking Apple. Tree hardy, vigorous, and very prolific.



Early Harvest.

Early Joe.—This is an American variety, with small oblate fruit. Skin yellowish, shaded and striped with red, and dotted with green. Flesh whitish, tender, juicy, with a piquant vinous flavour. Ripens at mid-summer; and is a popular dessert Apple. Tree moderately vigorous and a fairly good bearer.

Early Julien.—An old Scotch variety, with medium-sized roundish slightly-flattened fruit. Skin pale-yellow, with an orange cheek. Flesh yellowish-white, very juicy, with a brisk aromatic flavour. Ripens at mid-summer; and suitable for either dessert or cooking. Tree strong, hardy, and a great bearer.

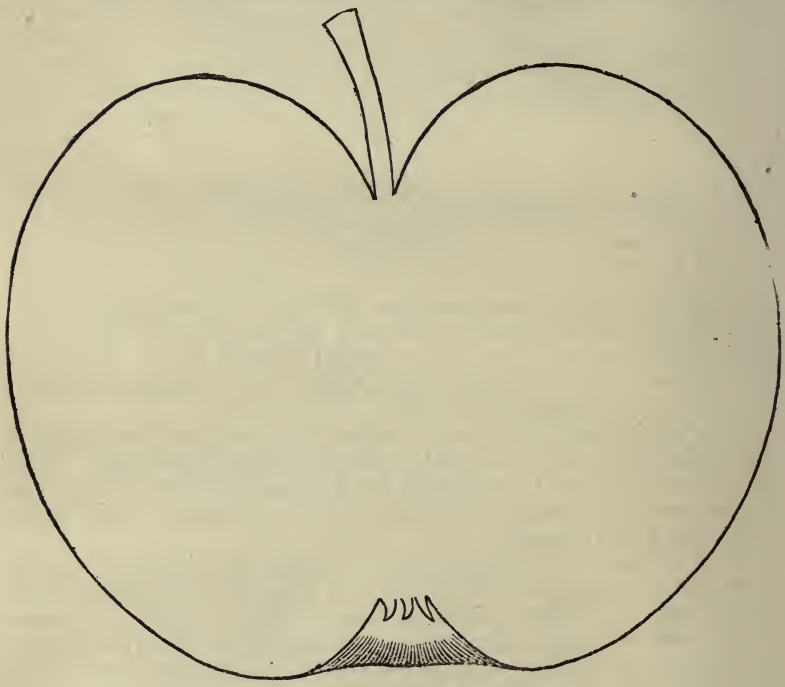
Early Nonpareil (*Summer Nonpareil*).—A very old English variety, at one time popular, and still worthy of a place in an orchard. Fruit medium-size, or under, roundish-oblate. Skin dull-yellow, spotted with russet and grey dots. Flesh yellowish-white, juicy, brisk, with a rich aromatic flavour. Ripens soon after mid-summer; and a suitable Apple for either dessert or cooking. Tree hardy, robust, and very prolific.

Early Red Margaret (*Eve Apple, Red Juneating, Striped Juneating, Striped Quarrenden*).—An English Apple, which is popular on account of its earliness. Fruit medium-sized, roundish-ovate, and tapering towards the eye. Skin heavily covered with stripes and shades of dark-red. Flesh white, juicy, with a brisk vinous flavour. Ripens very early, and therefore greatly in demand, and is a good dessert fruit, but soon gets mealy. Tree robust, a good bearer, and not usually much affected by blight.

Early Strawberry (*American Red Juneating*).—A very early American

variety, with small roundish fruit. Skin finely striped, and stained with two shades of red upon a yellow ground. Flesh white, slightly tinged with red next the skin, tender, sub-acid, with a pleasant brisk aroma. Ripens very early, and is a favourite dessert fruit. Tree strong and productive.

Emperor Alexander (*Alexander, Aporta, Russian Emperor*).—A well-known, showy, and popular Russian variety. Fruit very large and nearly heart-shaped. Skin greenish-yellow, thickly striped with red. Flesh yellowish-white, crisp, juicy, and well flavoured. Ripens late in the summer, is a good culinary Apple, and may also be used for dessert, but will only keep a limited time. Tree vigorous and a free bearer.

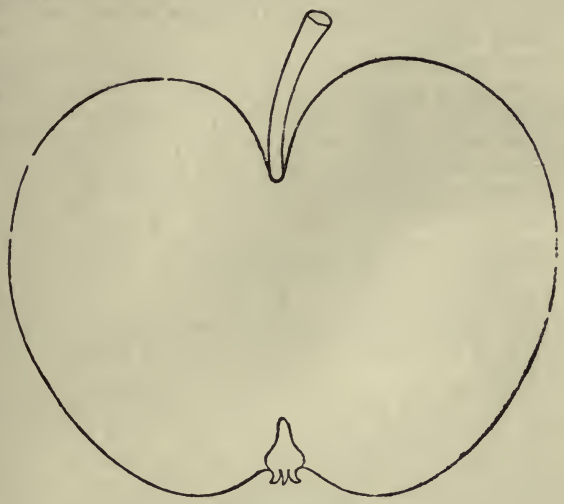


Emperor Alexander.

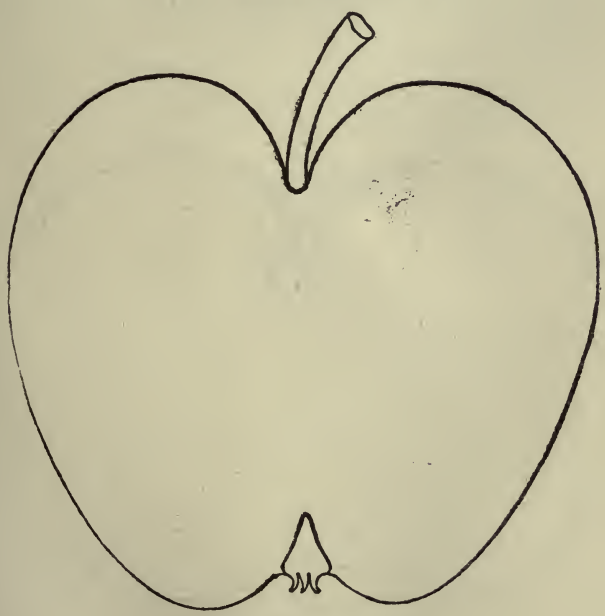
English Russet.—A variety of uncertain origin, with medium-sized, roundish fruit, somewhat flattened. Skin thickly covered with light-brown russet. Flesh yellowish-white, crisp, juicy, with a brisk pleasant flavour. Ripens late, will keep a long time, and is a useful dessert Apple. Tree strong and prolific.

Esopus Spitzenburg.—An excellent American variety, with large oblong fruit, tapering towards the eye. Skin nearly covered with lively-red, and dotted with pale-russet. Flesh yellowish, firm, juicy with a rich brisk flavour. Ripens late, will keep a long time, and is a first-

class dessert Apple. Suitable also for export. Tree fairly robust and a very good bearer.



English Russet



Esopus Spitzenburg.

Evening Party.—A first-class American Apple, with fruit below medium-size and rather flattened. Skin yellow, with a dark-red cheek and stripes and splashes of crimson. Flesh whitish, juicy, crisp, with a vinous aromatic flavour. Ripens late, keeps a long time, and is an excellent dessert variety.

Fall Pippin (*Round Pippin, York Pippin*).—This is supposed to be an American variety, but its origin is uncertain. Fruit large, roundish, and a little flattened. Skin yellow, with a brownish-bluish cheek and a few scattered dots. Flesh white, tender, juicy, with a rich aromatic flavour. Ripens in the autumn, will keep for some time, and a useful dessert or cooking Apple. Tree strong, hardy and productive.

Fearn's Pippin (*Clifton Nonesuch, Ferris Pippin, Florence Pippin*).—An old and popular English variety, with medium-sized roundish-oblate fruit. Skin greenish-yellow, russety round the stalk, with a flush cheek and streaks of red. Flesh greenish-white, juicy, rich and well flavoured. Ripens late, keeps for a long time, and is a good Apple either for dessert or culinary purposes. Tree hardy, robust and an excellent bearer.

Five-crowned Pippin (*London Pippin, Royal Somerset*).—A very old, excellent and popular English variety. Fruit above medium-size, flattened and angular, with five prominent ridges round the crown. Skin deep-yellow, with a tinge of red. Flesh yellowish-white, firm, with a pleasant sub-acid flavour. Ripens very late, an excellent keeper, a good cooking Apple, and useful as a dessert fruit; also an excellent variety for drying, and for an export trade. Tree robust and a good bearer.

Five-Crowned Pippin.

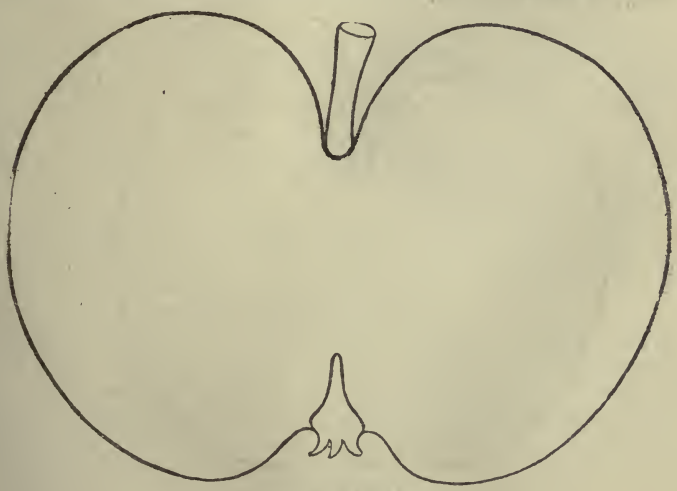
Flower of Kent.—A well known and excellent English variety, with large roundish-conical irregularly-ribbed fruit. Skin dull-yellow, washed and striped with dull and bright red. Flesh greenish-yellow, very juicy, with a pleasant brisk sub-acid flavour. Ripens in the autumn, will keep for two or three months, and is an excellent cooking Apple. Tree strong and bears freely.

Forge.—An old and useful English variety, with medium-sized roundish-oblate obscurely-ribbed fruit. Skin deep-yellow, flushed, striped and mottled with red. Flesh yellowish-white, juicy, sweet, with a fine aromatic flavour. Ripens late, and will keep a long time. A good culinary Apple, and also suitable for making cider. Tree robust and a heavy and regular bearer.

Fox Whelp.—An old English cider Apple, with medium-sized fruit, ribbed at the crown. Skin yellow, flushed and striped with red. Flesh firm, very juicy and sharply sub-acid. Ripens in autumn, and is an excellent Apple for cider, but not worth cultivating for other purposes. Tree hardy, strong and prolific.

French Crab (*Claremont Pippin*, *Easter Pippin*, *Winter Greening*). —An old English variety, held in great esteem for its long-keeping qualities. Fruit globular and above medium-size. Skin dark-green, becoming yellowish as the fruit ripens. Flesh greenish-white, firm, juicy and pleasantly sub-acid. Ripens very late, and may be kept for twelve months or more. An excellent culinary Apple, a good dessert fruit, and suitable for export. Tree vigorous and bears abundantly.

Gladney's Red.—An American variety, with medium-sized roundish fruit. Skin thickly shaded, striped and mottled with light-red. Flesh yellowish, firm, moderately juicy, sub-acid, with a slight aromatic flavour. Ripens in the autumn, will keep two or three months, and is a good dessert Apple. Tree moderately robust and prolific.



Gloria Mundi.

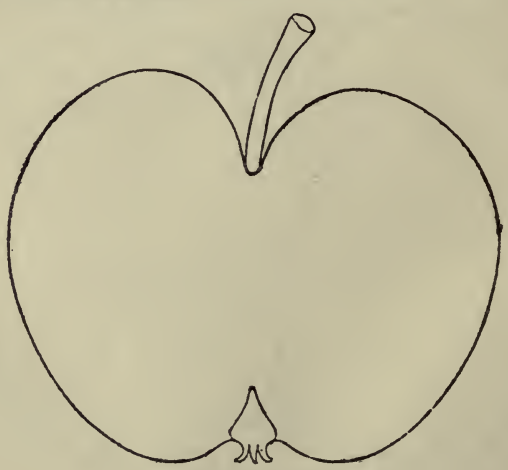
Gloria Mundi (*Baltimore Pippin, Mammoth, Monstrous Pippin, Ox Apple*).—A useful and showy variety of uncertain origin, with fruit very large, roundish and somewhat flattened. Skin greenish-yellow, with a faint blush cheek. Flesh white, juicy, with a pleasant acid flavour. Ripens in the autumn, will keep two or three months, and is an excellent culinary Apple. Tree robust and productive.

Golden Harvey (*Brandy Apple*).—An old English variety, with small nearly round fruit. Skin roughly russety on a yellow ground, with a tinge of red on the cheek. Flesh yellow, juicy, sub-acid, with an aromatic flavour. Ripens late, keeps fairly well; a good dessert, and first-class cider Apple. Tree moderate in growth, but bears freely.

Golden Knob.—An English variety, with small fruit, roundish and a little flattened. Skin yellow, much covered with russet, and a reddish tinge on one side. Flesh greenish-white, juicy and well flavoured. Ripens late, keeps well, and is a good dessert Apple. Tree strong and prolific.

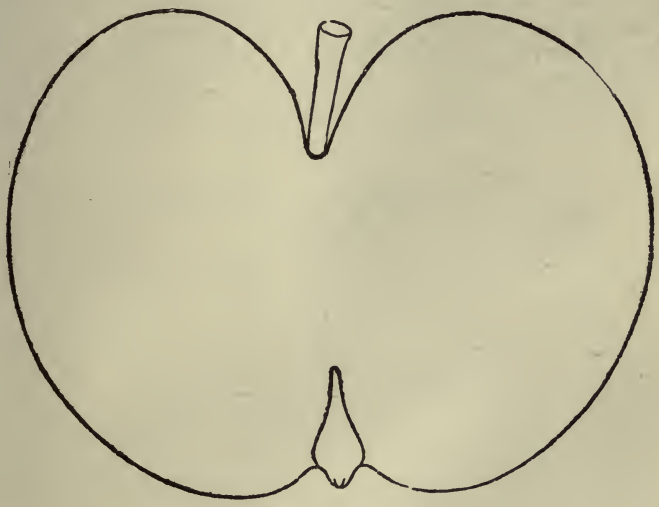
Golden Noble.—A favourite old English variety, with large roundish-conical fruit. Skin clear bright-yellow, with small spots and patches of russet. Flesh yellow, tender and pleasantly sub-acid. Ripens in the autumn, will keep two or three months, and is a good culinary Apple. Tree strong and a free bearer.

Golden Pippin (*Old Golden Pippin*).—A first-class and well-known old English variety, which has been cultivated for nearly 250 years. Fruit round, small and regularly formed. Skin deep golden-yellow, with white specks and dotted with russet. Flesh yellowish, brisk, juicy and highly flavoured. Ripens in the autumn, keeps fairly well, is a good dessert Apple, and suitable for making cider. In England this variety keeps better than here, and is superior in flavour, being generally considered to be the Queen of Apples. Tree strong and a good bearer in cool localities.



Golden Pippin.

Golden Reinette (*English Pippin, Dundee, Elizabeth, Megginch Favourite, Princess Noble, Wyker Pippin*).—A very popular and excellent dessert apple of English origin. Fruit below medium-size, regular, roundish, and a little flattened. Skin smooth, golden-yellow, flushed and streaked with red on one side, and dotted with russet. Flesh yellow, crisp, juicy, and briskly sub-acid. Ripens medium late, will keep two or three months, and is a good dessert apple. Tree moderately vigorous and productive.



Golden Reinette.

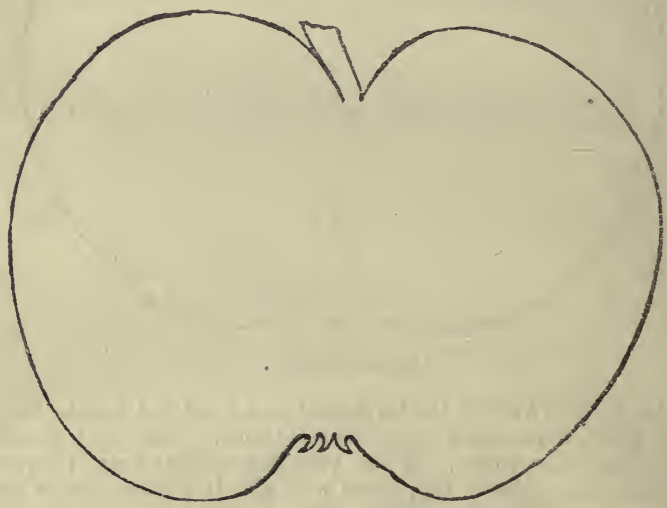
Golden Russet (*English Golden Russet*).—An old and popular English variety, with medium-sized roundish-oblate fruit. Skin thickly covered with bright-yellow russet. Flesh yellowish white, firm, juicy, and mildly sub-acid. Ripens late, keeps well, and is a good dessert apple. Tree strong, prolific, and an early bearer.

Golden Winter Pearmain (*Hampshire Yellow, King of the Pippins, Southampton Pippin*).—An old and favourite English variety, with medium-sized pearmain-shaped fruit. Skin deep yellow, flushed and streaked with red. Flesh yellowish-white, firm, juicy, with a sweet aromatic flavour. Ripens medium late, will keep three or four months, and a good apple either for dessert or cooking and suitable for export. Tree moderately vigorous and a free bearer.

Gooseberry Pippin.—A good and popular old English variety, with rather small roundish fruit, somewhat flattened. Skin greenish-yellow, with splashes and marblings of red. Flesh greenish-white, tender, juicy, and pleasantly sub-acid. Ripens late, will keep for a long period, a good dessert apple, and suitable for an export trade. Tree robust and productive.

Grange's Pearmain (*Grange's Pippin*).—An old English variety of excellent quality, with large roundish-conical fruit. Skin yellow, with broken stripes of red and white specks. Flesh yellowish-white, crisp, juicy, with a brisk, pleasant flavour. Ripens late, will keep for three or four months, and is a first-class culinary apple. Tree vigorous and an excellent bearer.

Gravenstein.—A well-known and popular German variety, with large round flattened fruit, a little one-sided. Skin pale-yellow, heavily striped and marbled with deep-red and orange. Flesh yellowish-white, crisp, vinous, and aromatic. Ripens about mid-season; is an excellent dessert or culinary apple, but will not keep long. Tree hardy, robust, and very prolific.



Gravenstein.

Greenup's Pippin.—An English variety, with roundish fruit, rather above medium-size. Skin yellow, with a bright red cheek. Flesh yellowish-white, juicy, sweet, with a brisk sub-acid flavour. Ripens medium late, will keep three or four months, and is a very good culinary apple. Tree hardy, strong, and a great bearer.

Hambledon Deux Ans.—An old and popular English variety, with large roundish fruit, rather broadest at the base. Skin yellowish-green, with a deep blush cheek, and heavily striped and splashed with red. Flesh greenish-white, firm, crisp, and richly flavoured. Ripens late, keeps for a long period; is a good dessert or culinary apple and suitable for export. Tree vigorous and productive.

Hanwell Souring.—A first-class old English culinary variety, with medium-sized roundish-ovate fruit. Skin greenish-yellow, with a red blush. Flesh firm, crisp, and briskly acid. Ripens late, keeps a long time, cooks well, and is a good cider Apple. Tree strong and productive.

Harvey (Dr. Harvey).—One of the oldest English varieties, with large roundish-ovate fruit. Skin greenish yellow with a red blush and russet tracings. Flesh white, crisp, juicy, and pleasantly sub-acid. Ripens medium late, will keep three or four months, and is a good culinary Apple.

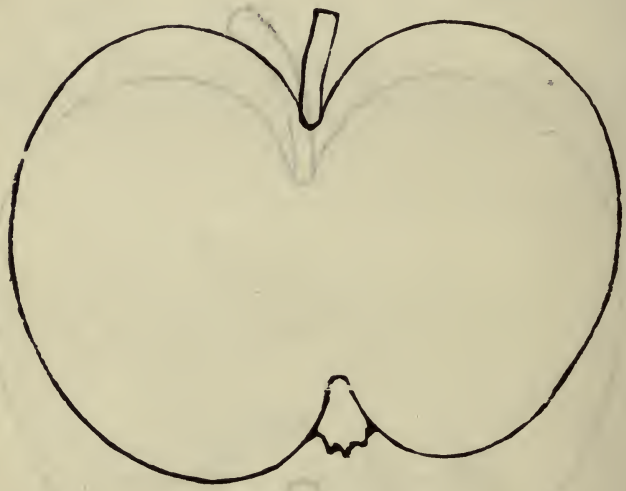
Hawthornden.—An old and favorite Scotch variety, with roundish flattened fruit, rather above medium-size. Skin yellowish green, with a deep blush. Flesh white, juicy, with a pleasant flavour. Ripens medium late, will keep two or three months, is an excellent culinary Apple, and suitable for drying. Tree robust and a great bearer.

Hawthornden.

Herefordshire Beefing.—A recently introduced English variety, that comes to us with a high character. Fruit medium-size or over. Skin nearly covered with dark-red, and dotted with light-brown spots, especially round the base of the fruit. Flesh greenish-white, very firm, and slightly acid. Ripens late, keeps well, and said to be an excellent Apple for cooking and drying. Tree said to be of vigorous growth, and a constant and heavy cropper.

Herefordshire Pearmain (Old Pearmain, Royal Pearmain).—An old, well-known, and popular English variety, with rather large roundish-conical fruit. Skin yellowish-green, flushed, shaded, and marbled with dark-red, and dotted with russet specks. Flesh yellowish, crisp, firm, juicy, with a rich aromatic flavour. Ripens late, will keep a long time, suitable for dessert or cooking, and is a good Apple for export. Tree robust and prolific.

Hoary Morning (Dainty, Downy, Sam Rawlings).—A well-known English variety, with large roundish-conical fruit, somewhat flattened. Skin yellowish, thickly striped and splashed with red, and covered with a thick bloom, like thin hoar frost. Flesh yellowish-white, tinged with red next the skin, crisp, juicy, and slightly acid. Ripens after mid-season, will keep a few weeks, and is an excellent cooking or drying Apple. Tree vigorous and prolific.

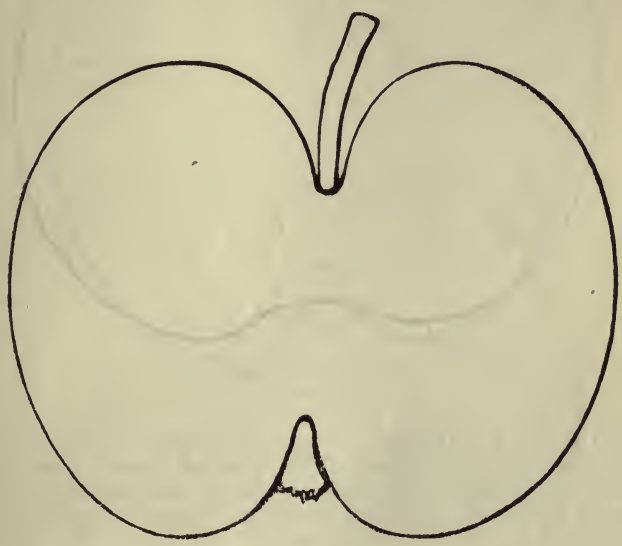


Hoary Morning.

Hollandbury (Hawberry Pippin, Horsley Pippin, Kirke's Admirable).—An old English and popular variety, with large roundish fruit, flattened at the ends, and prominently ribbed. Skin greenish-yellow, but heavily flushed and striped with bright-red. Flesh white, juicy, and briskly sub-acid. Ripens in the autumn, will keep for two or three months, and is a first-class culinary Apple. Tree strong and bears freely.

Holstein's Alpine Seedling.—An excellent Victorian variety, raised in the Bright district. Fruit medium-sized roundish-conical, Skin nearly covered with deep bright-red. Flesh, yellowish, firm, juicy, with a piquant sub-acid flavour, Ripens late, will keep a long time, and an excellent market Apple.

Hoover (Wattaugah).—One of the best and most popular of the American varieties, with roundish fruit, medium sized or over. Skin overspread with red, with darker stripes and light dots, with thin russet near the stalk. Flesh yellowish, firm, juicy, and richly sub-acid. Ripens late, will keep for several months, suitable for dessert or cooking, and a good Apple for market or export. Tree strong and prolific.

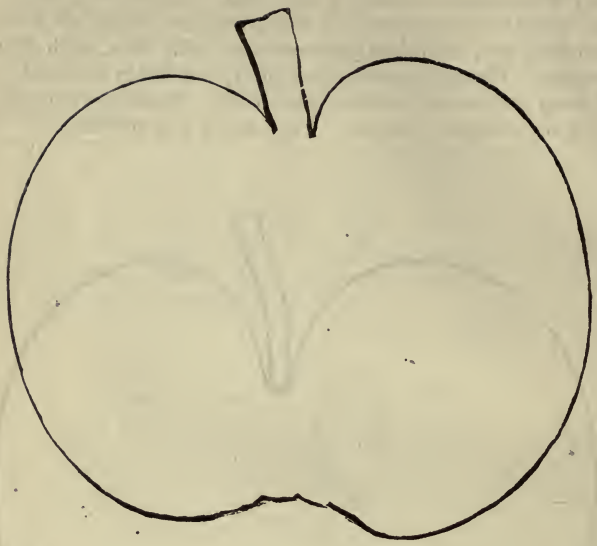


Hoover.

Hubbard's Pearmain.—An excellent old English variety, with small roundish-conical fruit. Skin greenish-yellow, often covered with pale-brown russet. Flesh yellow, firm, juicy, with a rich sugary aromatic flavour. Ripens late, keeps a long time, and is one of the richest dessert Apples. Tree vigorous and a very good bearer.

Irish Peach (Early Crofton).—A well-known old English variety, with roundish flattened fruit, medium-sized or under. Skin nearly covered with brownish-red. Flesh white, tender, juicy, and well flavoured. Ripens before mid-season, is a fairly good dessert fruit, but will only keep a short time. Tree hardy, prolific, and not subject to blight.

Isle of Wight Pippin (Orange Pippin).—A very old English variety, with medium-sized roundish fruit, a little flattened. Skin deep yellow, with an orange-brown cheek and traced with thin russet. Flesh yellow, firm, juicy, with a pleasant aromatic sub-acid flavour. Ripens medium late, will keep for three or four months, and is an excellent dessert Apple. Tree moderately vigorous and fairly productive.



Irish Peach.

Jewett's Best.—An American variety of excellent quality, with large oblate or nearly globular fruit. Skin greenish-yellow, heavily shaded with deep-red. Flesh yellowish-white, juicy, and pleasantly sub-acid. Ripens late, keeps well, and is a good dessert Apple. Tree strong, hardy, and productive.

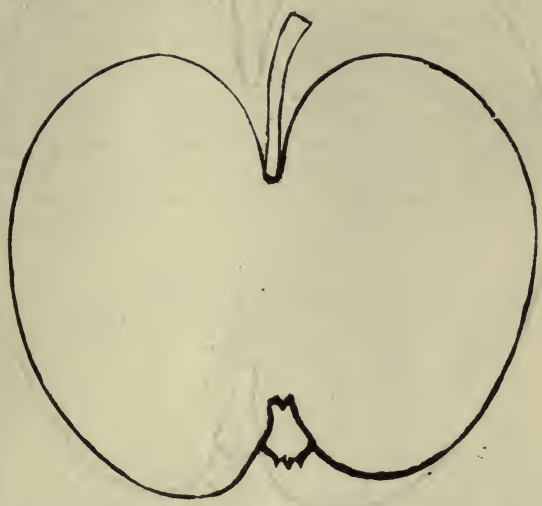
Jolly Beggar.—A favorite old English culinary variety, with large roundish fruit. Skin pale-yellow, with an orange cheek. Flesh white, juicy, and briskly sub-acid. Ripens medium late, and will keep two or three months. Tree hardy, comes into bearing early, and an extraordinary heavy cropper.

Jonathan (King Philip).—This is one of the finest and best of the American varieties. Fruit medium-sized or larger, roundish-conical, and tapering towards the eye. Skin overspread with deep-red, with darker stripes. Flesh white, sometimes tinged with pink, tender, juicy, with a sprightly vinous flavour. Ripens late, will keep a long time, is an excellent dessert Apple, and suitable for export. Tree very hardy, vigorous, and a free bearer.

Joanneting (Golden Beauty, Juneating).—A very old and formerly popular English variety, with small round flattened fruit. Skin light-yellow, with a red blush. Flesh white, crisp, and pleasantly flavoured. Ripens about mid-summer, and is a useful early dessert Apple. Tree vigorous and a fairly good bearer.

Keddleston Pippin.—An English variety, with small regularly formed conical fruit. Skin bright-yellow with veinings and specks of russet.

Flesh yellowish, crisp, juicy, with an aromatic flavour. Ripens late, keeps well, and is a first-rate dessert Apple. Tree moderately vigorous and productive.



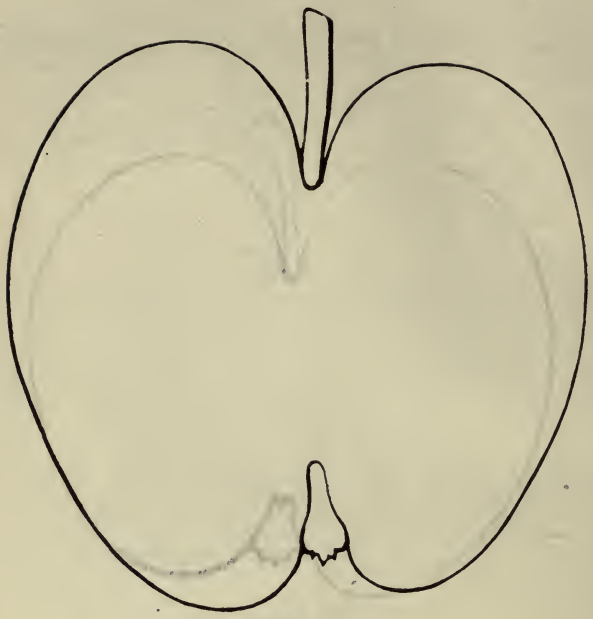
Jonathan.

Kentish Fillbasket.—A well-known and popular English variety, with very large roundish-angular fruit. Skin greenish-yellow, with a brownish-red blush, and streaked with darker-red, Flesh yellowish-white, tender, juicy, and sub-acid. Ripens after mid-season, will keep a few weeks, and is an excellent kitchen Apple. Tree strong, hardy, and prolific.

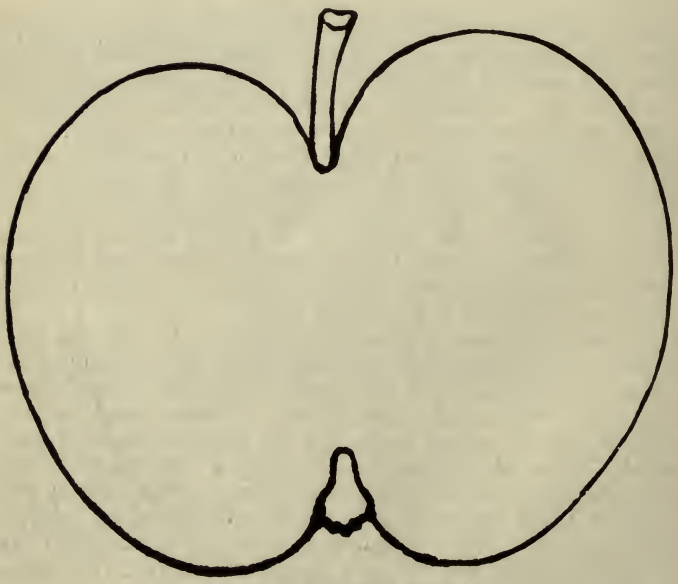
Kentucky Red Streak (Winter Red Streak).—An excellent American variety, with medium-sized roundish-conical fruit. Skin greenish-yellow, heavily shaded with dark purplish-red, and indistinctly striped, also spotted with light dots so thickly as to give a mottled appearance. Flesh white, tender, juicy, and mildly sub-acid. Ripens late, will keep a long time, a good dessert and cooking Apple, and suitable for export. Tree vigorous, productive, and a regular bearer.

Kerry Pippin (Edmonton Aromatic Pippin).—An old and popular Irish variety, with medium-sized oval fruit, flattened and wrinkled at the eye. Skin pale-yellow, tinged and streaked with red. Flesh yellowish, firm, crisp, juicy, with a rich sugary flavour. Ripens towards the end of summer, will keep for several weeks, and is a first-class dessert Apple.

Keswick Codlin.—A well-known and popular old English culinary variety, with large conical irregularly angular fruit. Skin greenish-yellow, with a faint blush on one side. Flesh yellowish-white, juicy, and pleasantly sub-acid. Ripens about mid-season, is an excellent Apple for cooking or drying, but will only keep a few weeks. Tree vigorous, prolific, and an early bearer.



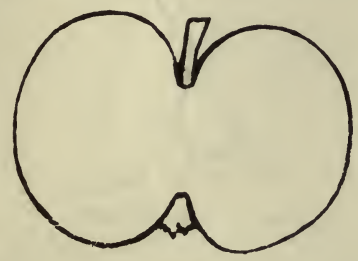
Keswick Codlin.



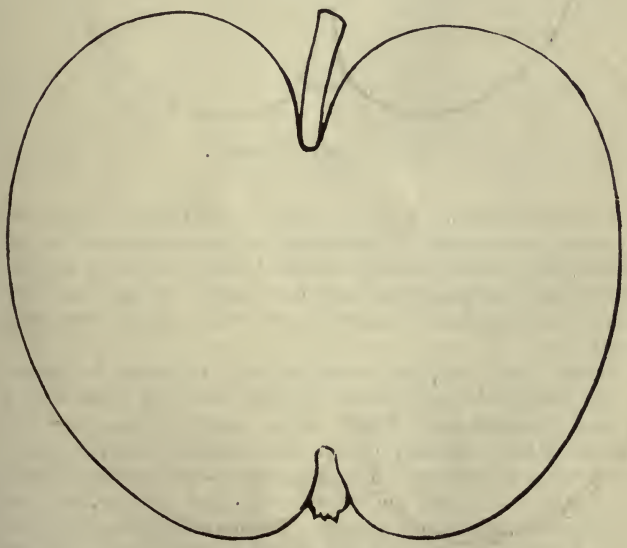
King of Tompkin's County.

King of Tompkin's County (King Apple, Tommy Red).—A showy and good American variety, with very large globular inclining to conical fruit. Skin yellow, deeply shaded, splashed and striped with red. Flesh yellowish, juicy, tender, with a rich aromatic flavour. Ripens late, keeps a long time, and is a good dessert or culinary Apple. Tree vigorous, spreading, a regular bearer, and heavy cropper.

Lady Apple (Api).—A French variety, popular in Europe, with very small round flattened fruit. Skin smooth and glossy, with a brilliant-red cheek upon a deep-yellow ground. Flesh white, crisp, juicy, and pleasantly flavoured. Ripens late, will keep for a long period, and is a handsome little dessert Apple. Tree hardy, vigorous, and bears freely the fruit forming in bunches.



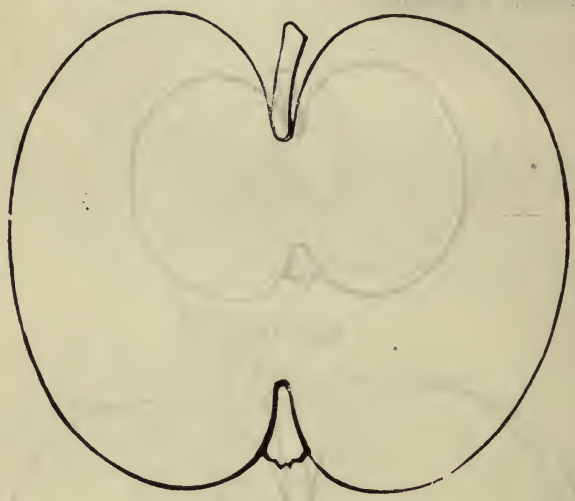
Lady Apple.



Lady Henniker.

Lady Henniker.—A popular and showy English variety, with large roundish-conical fruit. Skin yellow, richly streaked with red. Flesh yellowish-white, juicy and well flavoured. Ripens late, keeps well, and is an excellent dessert and culinary Apple. Tree strong and productive.

Lamb Abbey Pearmain.—One of the finest old English dessert Apples. Fruit medium-sized roundish-conical flattened at the ends. Skin greenish-yellow, splashed and striped with two shades of red. Flesh yellow, crisp, juicy, with a rich sweet aromatic flavour. Ripens late, keeps for a long period, and well suited for an export trade. Tree fairly vigorous and very prolific.

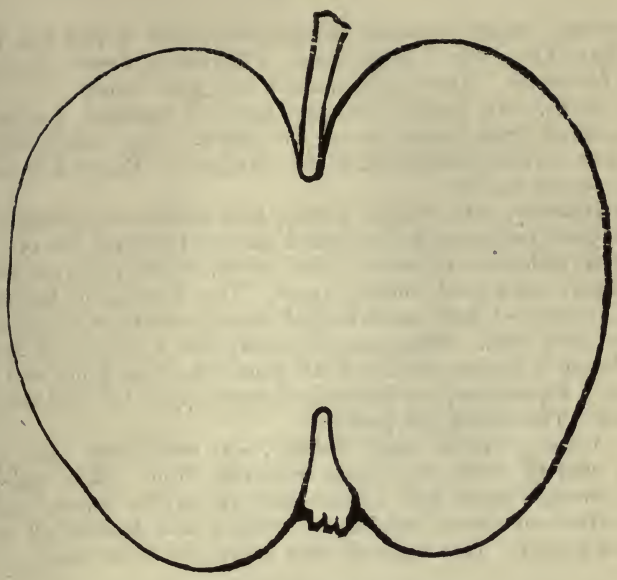


Lamb Abbey Pearmain.

Lane's Prince Albert.—A newly introduced English Apple, which is said to possess great merit. Fruit large, varying in shape from conical to ovate. Skin pale-yellow, heavily streaked and tinted with deep-crimson. Flesh very firm, crisp, juicy, and well flavoured. Ripens late, keeps well, and said to be a high-class culinary Apple. Tree robust, very hardy, and bears freely.

Late Wine.—An excellent American variety, with roundish-conical fruit, rather below the medium size. Skin shading from light to dark crimson and purplish-red. Flesh white, tender, juicy, and sub-acid. Ripens medium late, will keep two or three months, and is a good Apple for either dessert or cooking. Tree vigorous, bears early and freely.

Lemon Pippin.—An old and popular English variety, with medium sized oval fruit. Skin lemon-yellow. Flesh yellowish-white, firm, juicy, with a brisk flavour. Ripens late, will keep well, and is a good Apple for dessert or cooking. Tree moderately vigorous, and bears freely.



Herefordshire Pearmain.

Lewis' Incomparable.—An excellent English variety, with large conical fruit. Skin lively-red, streaked with a darker shade. Flesh yellowish, firm, crisp, juicy, with a slight aromatic flavour. Ripens medium late, will keep for three or four months, and is a good dessert and culinary Apple. Tree hardy, strong, and productive.

Lincolnshire Holland Pippin (Striped Holland Pippin).—An old English variety, with large roundish flattened fruit. Skin yellow, with stripes of red. Flesh white, crisp, and slightly acid. Ripens medium late, will keep for two or three months, and is a fairly good cooking Apple. Tree strong and prolific.

Loddington Seedling (Stone's Apple).—A recently introduced English variety, and said to be a first-class Apple. Fruit large and showy. Skin shining yellowish-green, with a brown-red cheek and broken streaks of crimson. Flesh white, solid, tender, with a pleasant sub-acid flavour. Ripens late, will keep for a long period, and said to be an excellent culinary Apple. Tree vigorous, prolific, and comes into bearing early.

Lodgemore Nonpareil (Clissolds Seedling).—A favourite English variety, with medium-sized roundish fruit. Skin deep-yellow, with a blush of red on one side and dotted with grey. Flesh yellowish, firm, crisp, juicy, with a rich aroma. Ripens late, can be kept for a long time, is a first-class dessert Apple, and suitable for export. Tree strong and productive.

Lord Burghley.—An excellent English variety, with medium-sized roundish fruit, slightly flattened, ribbed at the eye, and somewhat angular. Skin golden-yellow, with a deep crimson cheek and dotted freely with

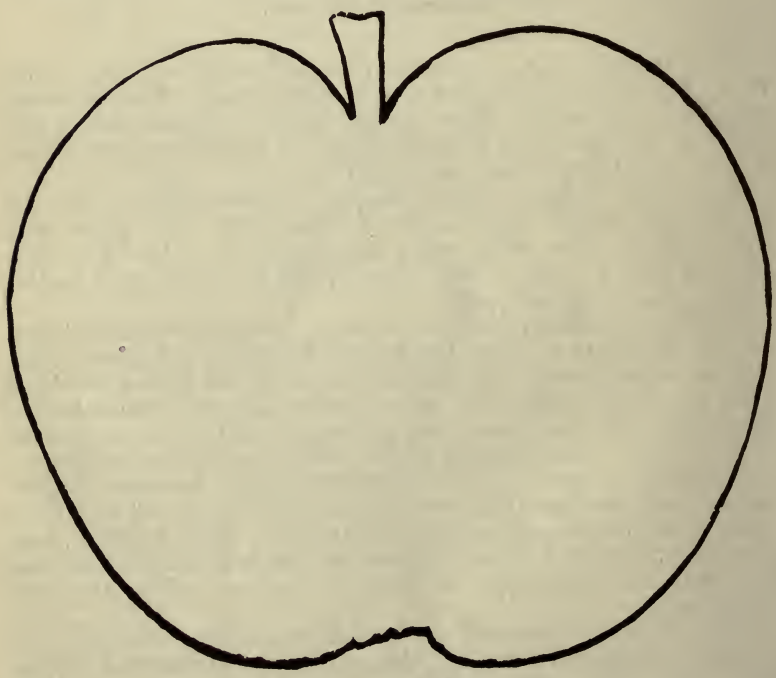
russet specks. Flesh yellowish, tender, juicy, with a rich fine flavour. Ripens late, keeps for a long period, a first-class dessert Apple, and suitable for export. Tree vigorous and a very good bearer.

Lord Derby.—An English culinary Apple of excellent quality, with large roundish fruit having prominent ridges. Skin dark-green, with russet dots. Flesh greenish-white and very juicy. Ripens late and will keep for several months.

Lord Grosvenor.—An English variety, with large roundish-conical fruit, irregularly and prominently ribbed, and puckered towards the eye. Skin pale-yellow, with traces of russet. Flesh white, tender, juicy, and sub-acid. Ripens early, and a good cooking Apple. Tree a very good bearer.

Lord Lennox.—A very useful English dessert variety, with rather small roundish-oblate fruit. Skin greenish-yellow, with a bright-red flush and streaked with a darker shade. Flesh yellowish, crisp, juicy, and highly flavoured. Ripens late, is a first-class dessert Apple, and will keep for a long time. Tree strong and prolific.

Lord Nelson (Kirke's Lord Nelson).—A well-known and popular English variety, with very large roundish fruit. Skin pale-yellow heavily streaked with red. Flesh yellowish-white, sweet, and juicy Ripens after mid-season, suitable for cooking and dessert, but is not a very good keeper. Tree vigorous, very hardy, and bears freely.



Lord Nelson*

Lord Suffield.—A valuable and popular English variety, considered by many to be an improvement upon the Keswick Codlin. Fruit above medium-size, conical. Skin greenish-yellow, with a slight red tinge upon the cheek. Flesh white, firm, juicy, and briskly flavoured. Ripens after mid-season, will keep for several months, is one of our best cooking Apples, and a good kind for cider. Tree hardy, strong, and a great bearer.

Lord Wolseley.—An excellent New Zealand variety that has obtained a high reputation, and is said to be a cross between the Irish Peach and Stone Pippin. Fruit medium-sized roundish-conical. Skin light-green. Flesh firm, juicy, and briskly flavoured. Ripens late, keeps for a long time, and is a good dessert and culinary Apple. Tree robust, a heavy cropper, and said to be quite blight-proof.

Lucombe's Seedling.—An English variety, with large roundish-angular fruit. Skin yellowish-green, with darker spots and streaked with crimson on one side. Flesh white, juicy, and pleasantly flavoured. Ripens late, will keep a long time, and is an excellent cooking Apple.

Maclean's Favorite.—A first-class English variety, with medium-sized roundish fruit. Skin yellow. Flesh crisp, juicy, with a flavour resembling the Newtown Pippin. Ripens medium late, will keep two or three months, and is a good dessert Apple. Tree not very robust, but an excellent bearer.

McAfee's Nonesuch.—An American variety, with large globular fruit, inclining to oblate. Skin yellowish-green, shaded and heavily striped with crimson. Flesh whitish, solid, crisp, and sub-acid. Ripens late, keeps a long time, and is an excellent dessert Apple. Tree strong and very productive.

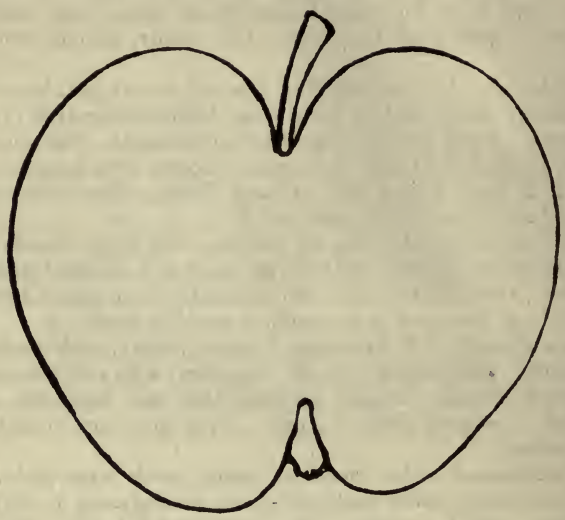
Mank's Codlin (Frith Pitcher, Irish Pitcher, Irish Codlin).—An old English culinary Apple, with medium-sized conical fruit. Skin pale-yellow, with a blush-red cheek. Flesh yellowish-white, crisp, sub-acid, with a slight aroma. Ripens in the autumn, will keep two or three months, and is an excellent cooking Apple. Tree hardy, productive, and comes into bearing early.

Maiden's Blush.—A handsome and useful American variety, with medium-sized, or over, roundish-conical fruit. Skin pale-yellow, with a deep-crimson cheek widely spread. Flesh white, tender, and pleasantly sub-acid. Ripens about mid-season, will keep for several weeks, suitable for both dessert and cooking, and an excellent apple for drying. Tree robust and very prolific.

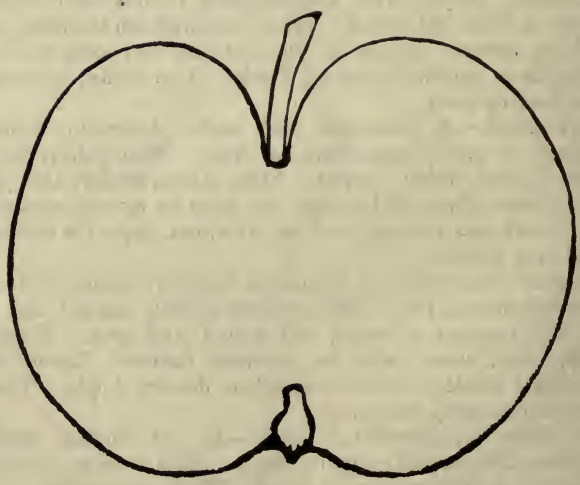
Manningtons Pearmain.—A high-class English variety, with medium-sized roundish-conical fruit. Skin yellow, heavily shaded and splashed with red, with tracings of russet and dotted with grey. Flesh yellow, firm, crisp, juicy, sweet, with an aromatic flavour. Ripens late, will keep for several months, and is an excellent dessert Apple. Tree hardy, productive and an early bearer.

Margil (Neverfail, Murches Pippin).—An old English variety, with small ovate-conical slightly-angular fruit. Skin orange, streaked and mottled with red with tracings of russet. Flesh yellow, firm, juicy, with a rich aromatic flavour. Ripens late, will keep for a long period, and is

one of the richest flavoured dessert Apples. Tree moderately robust and a fairly good bearer.



Mannington's Pearmain.



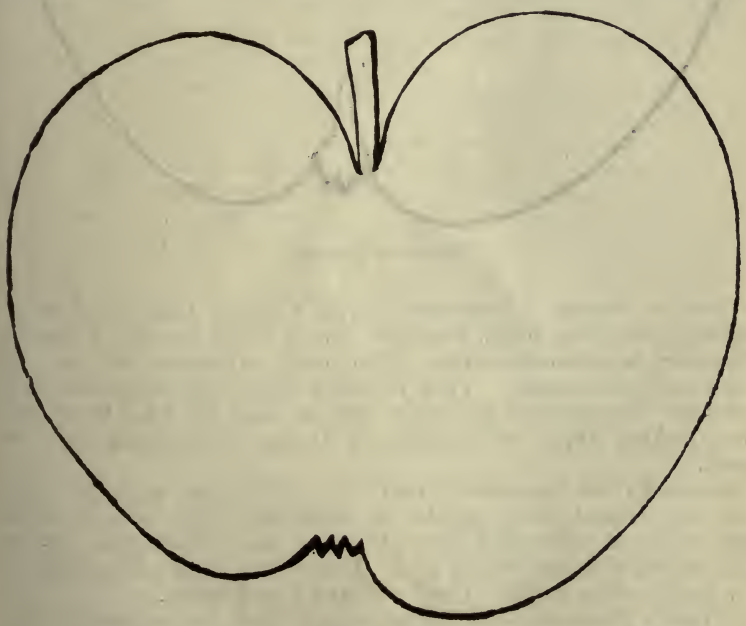
Margil.

Marston's Red Winter.—A useful and excellent American variety, with roundish conical fruit, above the medium-size. Skin ground colour yellow, but very heavily shaded and striped with crimson and sprinkled with minute dots. Flesh yellowish-white, very juicy, and pleasantly sub-acid. Ripens late, will keep for several months, and an excellent dessert or culinary Apple; also suitable for export. Tree hardy, of moderate growth, and a great bearer.

Maverack's Sweet.—A good American variety, with large roundish-oblate fruit. Skin yellow, but mostly shaded with rich deep-red, and sprinkled with grey dots. Flesh yellowish, tender, rich, and sweet. Ripens late, will keep for three or four months, and is a good cooking or dessert Apple. Tree vigorous, productive, and an early bearer.

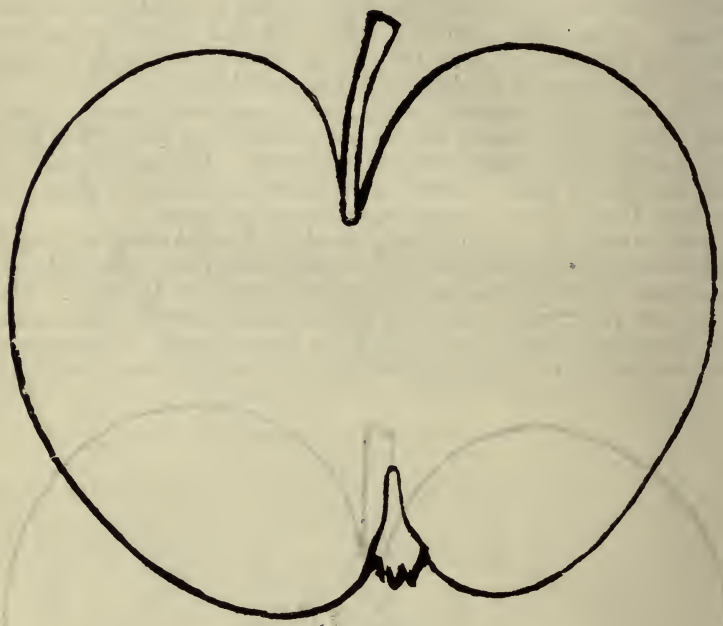
McLellan.—An American variety, with large roundish-oblate fruit. Skin yellow, richly splashed, striped, and marbled with red. Flesh white, very tender, with a rich sweet vinous flavour. Ripens late, will keep for a long period, a good dessert and culinary Apple, and is suitable for drying. Tree vigorous, productive, and a regular bearer.

Mela Carla (*Male Carla, Charles Apple*).—A well-known and popular Italian variety, with medium-sized roundish-ovate fruit. Skin thin, of a clear waxen-yellow on one side and bright-crimson on the other. Flesh white, very juicy, sweet, aromatic, with a vinous flavour. Ripens late, keeps for several months, and is a delicious dessert Apple. Tree somewhat tender in cold districts, but thrives in warmer localities, and bears freely.



Melon Apple.

Melon Apple (*Norton's Melon, Watermelon*).—An excellent American variety, with medium-sized, or larger, roundish-oblate fruit, narrowing a little towards the eye. Skin lemon-yellow, with a light-crimson cheek, and splashed, striped, and mottled with a darker shade. Flesh yellowish-white, tender, crisp, juicy, sweet, and vinous, with a delicate aroma. Ripens medium late, will keep for three or four months, and is a fine dessert Apple. Tree only moderately vigorous but a good bearer.



Mere de Menage.

Mere de Menage (*Combermere Apple, Flanders Pippin*).—A showy variety of uncertain origin, somewhat similiar to the Emperor Alexander. Fruit very large roundish-ovate. Skin nearly overspread with red, with numerous darker streaks. Flesh yellowish-white, crisp, juicy, and briskly sub-acid. Ripens about mid-season may be kept for a few weeks, is a good cooking Apple, and suitable for drying. Tree strong and bears freely.

Minchall Crab (*Lancashire Crab*).—An old English culinary variety, with large round fruit, considerably depressed. Skin greenish-yellow, with traces of russet and one side tinged and striped with dull-red. Flesh white, firm, and briskly acid. Ripens late, keeps a long time, and is a good cooking Apple. Tree hardy and a good bearer.

Minier's Dumpling.—An English variety, with large roundish, somewhat flattened, and slightly angular fruit. Skin dark-green, with a dull-

red cheek. Flesh greenish-white, firm, juicy, and sub-acid. Ripens late, keeps for a long period, and is a first-class cooking and drying Apple. Tree robust and an excellent cropper.

Mobb's Royal.—A large and excellent culinary variety, which is sometimes known as Fillbasket. Fruit very large, round, and somewhat flattened. Skin bright-green, with a yellow tinge and a brownish-red flush. Flesh firm, very juicy, with a brisk sub-acid flavour. Ripens after mid-season, is an excellent cooking Apple, and suitable for drying. Tree robust and a free bearer.

Morgan's Seedling.—An excellent and popular variety, with medium-sized roundish fruit. Skin yellow, with stripes of red. Flesh juicy and well flavoured. Ripens late, keeps well, and a good dessert or culinary Apple. Tree strong and a prolific bearer.

Moss's Incomparable.—An English variety, with medium-sized roundish-oblate fruit. Skin yellow ground, heavily streaked with red. Flesh yellowish, crisp, and juicy. Ripens after mid-season, and is an excellent dessert or cooking Apple.

Mr. Gladstone.—A very popular English variety, with rather small to medium-sized roundish-conical fruit. Skin heavily shaded with dull-red, and thickly striped with crimson, Flesh tender, juicy, with a brisk pleasant flavour, ripens early, and a first-class dessert Apple. Tree vigorous and bears freely.

Munroe's Favourite.—A popular culinary variety, with very large roundish-conical irregular fruit. Skin yellowish-green, with a slight red cheek. Flesh juicy and briskly flavoured. Ripens medium late, is an excellent cooking Apple, and will keep for some time; suitable for export Tree hardy, robust, and very prolific.

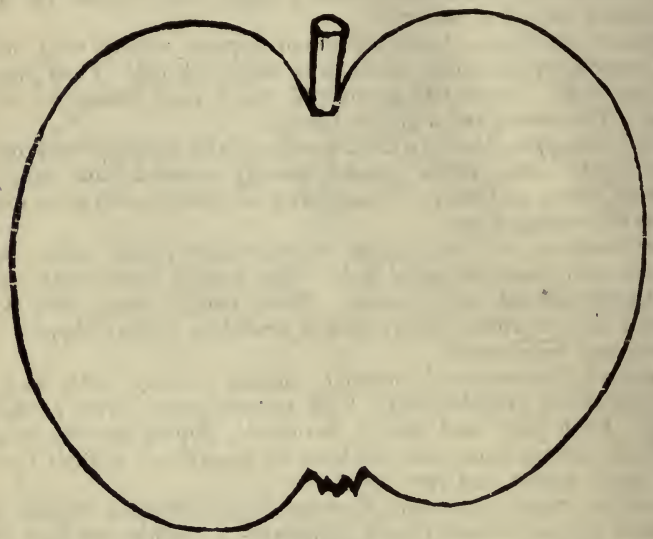
Newtown Pippin (*American Newtown Pippin, Brooke's Pippin, Hunt's Newtown Pippin, Green Winter Pippin*).—A well-known and popular variety of American origin, with medium-sized roundish rather irregular and slightly ribbed fruit. Skin olive-green, with a brownish-red cheek, dotted with grey specks, and tracings of russet near the stalk. Flesh greenish-white, crisp, very juicy, with a rich aromatic flavour. Ripens late, may be kept for a long period, is a first-class dessert Apple, and also suitable for export This Apple is largely shipped from America to the British market. Tree moderately vigorous and a fairly good bearer.

New England Pigeon.—An American variety which is blight-proof. Fruit medium-sized, rather irregular roundish-conical. Skin highly coloured. Flesh juicy and well flavoured.

New Rock Pippin.—An English variety, with medium-sized, roundish, flattened, and somewhat irregular fruit. Skin dull-green, with a brown blush and traced with russet. Flesh yellow, juicy, firm, and well flavoured. Ripens late, will keep three or four months, and is a good dessert variety. Tree vigorous and productive.

Newtown Spitzenburgh (*Burlington, Matchless, Ox Eye*).—A first-class and popular American variety, with medium-sized roundish-oblate fruit. Skin yellow, sprinkled with grey specks, washed with light-red, and heavily striped and splashed with a deeper colour. Flesh yellow, crisp, tender, juicy, with a rich vinous flavour. Ripens late, keeps a long time, and is a fine dessert Apple. Tree moderately vigorous and bears freely.

Nickajack, (*Carolina Spice, Red Pippin, Winter Rose*).—One of the best and most popular of the American varieties. Fruit medium-sized or over, roundish-oblate. Skin nearly covered with red, splashed and striped with a darker shade, and speckled with small yellowish dots. Flesh yellowish, compact, juicy, and pleasantly flavoured. Ripens late, a very long keeper, a good dessert and market Apple, and suitable for export. Tree robust, very hardy, and bears in abundance.



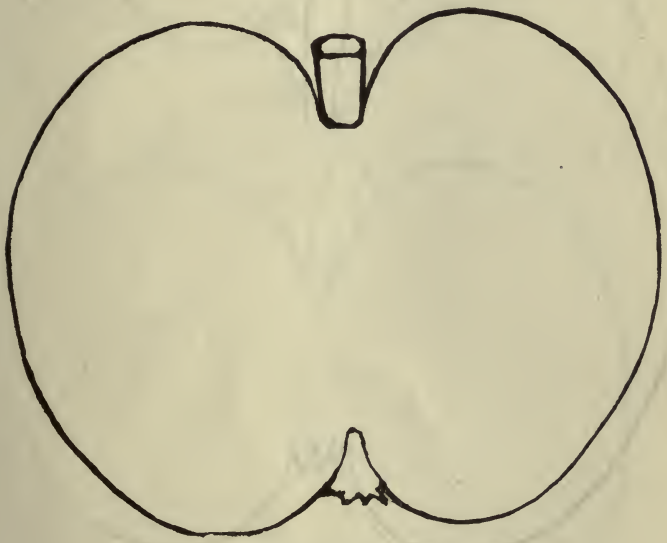
Nickajack.

Nonesuch.—A very old popular and excellent English variety, with medium-sized round flattened fruit. Skin greenish-yellow, striped and spotted with dull-red. Flesh white, tender, juicy, and pleasantly sub-acid. Ripens after mid-season, will keep for several weeks, and is a useful Apple either for dessert or cooking. Tree vigorous and a good bearer.

Nonpareil (*English Nonpareil, Hunt's Nonpareil, Lovedon's Pippin*).—A very old and well-known English variety, with medium-sized roundish-conical fruit. Skin greenish-yellow, with a brownish-red cheek and patches and tracings of russet. Flesh greenish-white, crisp, aromatic, with a sprightly sub-acid flavour. Ripens late, will keep for a long time, and is a first-class dessert Apple. Tree vigorous and very productive.

Norfolk Bearer.—A useful English variety, with medium-sized roundish fruit, somewhat angular round the eye. Skin yellowish-green, with a heavy dark-crimson cheek. Flesh greenish-white, juicy, tender, crisp, with a brisk agreeable flavour. Ripens medium late, will keep three or four months, is an excellent culinary Apple, and suitable for making cider. Tree strong, hardy and a very great bearer, hence the name.

Nonpariel.

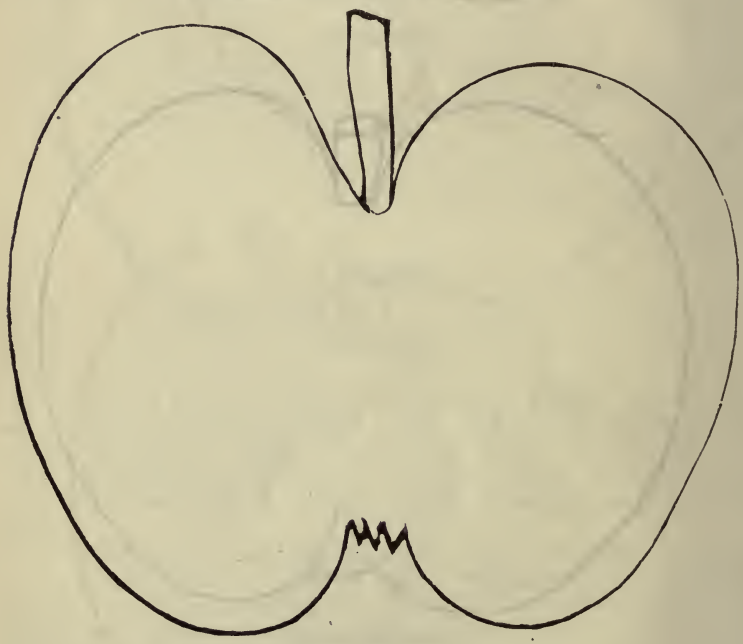


Norfolk Beefing.

Norfolk Beefing (*Norfolk Beaufin*, *Catshead Beefing*, *Read's Baker*).—A very old and well-known English variety, with large round fruit, slightly flattened. Skin dull-green. with a deep brownish-red cheek. Flesh greenish-white, firm, crisp, juicy, with a brisk acid flavour, Ripens late, will keep for a very long time, is a first-rate cooking Apple, and one of the best for drying. Tree robust and prolific.

Northern Greening (*Walmer Court*).—A very good old English culinary variety, with large roundish ovate fruit. Skin dull yellowish-green, strewed with large grey dots, with a brownish-red cheek Flesh greenish-white, juicy, and sub-acid. Ripens late, will keep a long time, and is an excellent cooking Apple. Tree strong and generally bears freely.

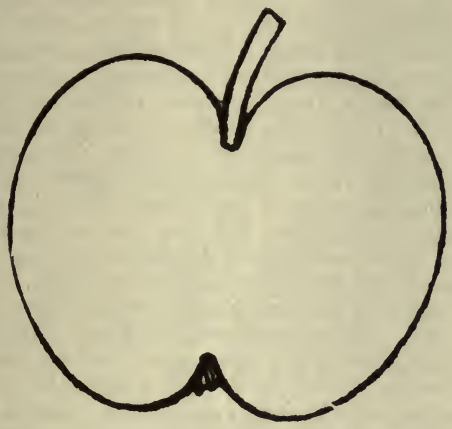
Northern Spy.—A well-known useful American variety, which is highly valued through its being blight-proof. Fruit rather large ovate-conical. Skin yellow, but to a large extent covered with streaks of light and dark red. Flesh yellowish white, tender, juicy, slightly sub-acid, and richly flavoured. Ripens late, will keep for a very long time, is an excellent dessert and market Apple, and suitable for export. Tree robust, upright in growth, is late in coming into bearing; rather shy in fruiting for a few years, but afterwards bears as freely as other kinds This variety, owing to its being blight-proof, is used as a stock for grafting other kinds upon.



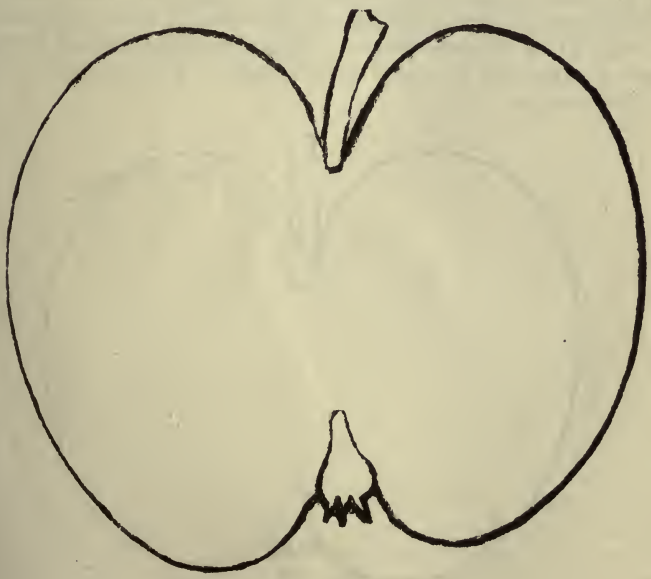
Northern Spy.

Oslin (*Arbroath Pippin, Mother Apple*).—An old Scotch variety, with medium-sized roundish rather flattened fruit. Skin lemon-yellow, sprinkled with a few greyish-green dots. Flesh yellowish, firm, crisp, juicy, with a rich aromatic flavour. Ripens at mid-season, and is an excellent summer dessert Apple, but will only keep a few weeks. Tree vigorous, hardy, and very prolific.

Pearson's Plate.—An old and excellent English variety, with rather small roundish-flattened fruit. Skin greenish-yellow, with a red cheek. Flesh greenish-white, crisp, tender, juicy, with a brisk sub-acid flavour. Ripens late, will keep for several months, and is a first-class dessert Apple. Tree moderately vigorous and bears freely.



Pearson's Plate.



Peasegood's Nonesuch.

Peasegood's Nonesuch.—A popular and useful variety, with large roundish-oblate fruit. Skin yellow, with red stripes. Flesh very juicy and briskly flavoured. Ripens rather late, is an excellent culinary or dessert Apple, and keeps well. Tree strong and an abundant bearer.

Peck's Pleasant (Waltz Apple).—An excellent American variety, belonging to the Newtown Pippin class. Fruit above medium-size, roundish, and slightly ribbed. Skin deep-yellow, with a bright-red blush and dotted slightly with grey. Flesh yellow, crisp, juicy, and well flavoured. Ripens late, an excellent keeper, and a good table Apple.

Perfection (Shepherd's Perfection).—A variety of excellent quality, raised at Somerville, in Victoria, which is to some extent in appearance and quality similar to the well-known Scarlet Nonpareil. Fruit above medium-size, roundish ovate. Skin greenish-yellow, richly striped and dashed with different shades of red. Flesh white, juicy, and highly flavoured. Ripens medium late, will keep for a long time, and is an excellent dessert Apple; also a good Apple for exporting. Tree vigorous, an abundant bearer, and but slightly affected by blight.

Pineapple Russet.—A first-class English russet variety, with medium sized, roundish-ovate, and somewhat angular fruit. Skin greenish-yellow, dotted with white, and thickly covered on one side with light-russet. Flesh yellowish-white, tender, juicy, with a sprightly pineapple flavour. Ripens medium late, may be kept two or three months, and is a good dessert Apple. Tree of moderate growth and a fairly good bearer.

Pitmaston Nonpareil (Russet Coat Nonpareil).—An English variety, with medium-sized roundish-oblate fruit. Skin dull-green, with a faint-red cheek, and covered with thin yellow-russet. Flesh greenish-yellow, firm, with a rich aromatic flavour. Ripens medium-late, may be kept two or three months, and is a good dessert Apple. Tree moderately vigorous and a fair cropper.

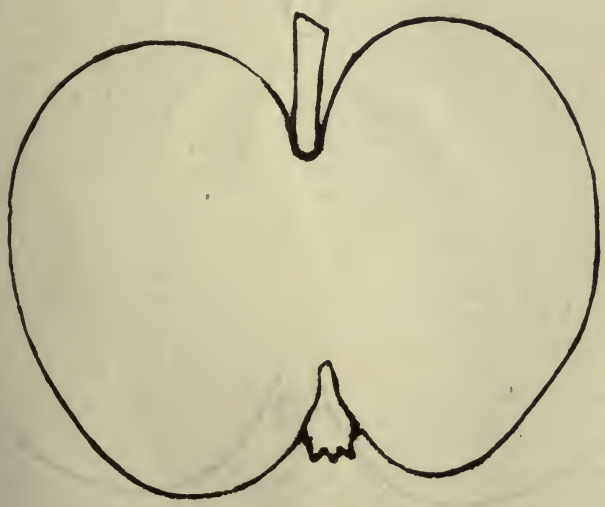
Pomme de Neige.

Pomme de Neige (*Fameuse, Snow Apple*).—An excellent and favorite variety from Canada, and probably of French origin. Fruit medinm-sized or under, roundish, somewhat flattened. Skin with a ground of greenish yellow, but heavily marked with blotches, shades, and stripes of red. Flesh very white, tender, juicy, with a rich and slightly aromatic flavour. Ripens medium late, and will keep two or three months. Tree moderately robust, bears freely, and is but little affected with blight.

Prince Bismark.—A showy, well-known, and popular Victorian variety, said to have been raised at Carisbrook. Fruit very large, roundish-conical, and somewhat similar to Emperor Alexander. Skin yellow, heavily streaked with different shades of red. Flesh creamy-white, crisp, juicy, with a pleasant sub-acid flavour. Ripens about mid-season, will keep for a few weeks, and is a good Apple either for dessert or cooking. Tree robust, hardy, prolific and an early bearer.

Prince of the Pippins.—A very good Victorian variety with medium-sized roundish-conical fruit. Skin heavily flushed and striped with various shades of red. Flesh juicy, firm, and highly flavoured. Ripens after mid-season, is a very good dessert Apple, and keeps moderately well. Tree fairly vigorous and a free bearer,

Queen of the Pippins (*Reine des Reinettes*).—A variety of uncertain origin, with medium-sized roundish-conical fruit. Skin deep bright-yellow, shaded, splashed, and marbled with red, and a few grey dots, Flesh yellowish-white firm, crisp, juicy, and slightly aromatic. Ripens late, will keep three or four months, and is a first-class dessert Apple. Tree moderately vigorous, and a good bearer.



Red Astrachan.

Red Astrachan (*Anglesea Pippin*).—A well-known, popular, aud useful Swedish variety, with roundish-conical fruit, somewhat angular. Skin almost entirely overspread with deep bright-red, and covered with a white bloom. Flesh white, crisp, moderately juicy, sub-acid, and well flavoured. Ripens early, is an excellent dessert Apple, and a serviceable market variety. The fruit however will only keep a short time, and must be gathered before it is dead ripe, or otherwise it becomes too mealy. Tree hardy, vigorous, very prolific, and an early bearer.

Red Ingestrie.—An old and excellent English variety, with rather small roundish-oblong fruit. Skin deep-yellow, with a heavy-red cheek and speckled. Flesh pale-yellow, firm, very juicy, with a rich flavour. Ripens late, will keep three or four months, and is a first class dessert Apple. Tree moderately vigorous and generally bears freely.

Redstreak (*Herefordshire Redstreak, Scuddamore's Crab*).—A first-class old English cider Apple, with medium-sized roundish fruit. Skin deep-yellow, streaked all over with red. Flesh yellowish, firm and sub-acid. Ripens medium late, may be kept for a few weeks; is a good culinary Apple, and one of the best kinds that can be grown for cider. Tree very robust, hardy, and a great bearer.

Reinette du Canada.

Red Warrior.—An American variety, somewhat resembling Nickajack, with large roundish oblate fruit. Skin nearly covered with stripes and marblings of two shades of red. Flesh yellowish, crisp, juicy, and well flavoured. Ripens late, will keep a long time, and is a good dessert or cooking Apple. Tree vigorous and productive.

Reinette du Canada (*Portugal, St. Helena Russet*).—One of the best known and most useful Apples, which, notwithstanding its name, is of doubtful origin,, but supposed to have been raised in France. Fruit very large, roundish-conical, angular, and somewhat flattened. Skin greenish-yellow, marked with brown, and sprinkled with patches and dots of russet. Flesh white, firm, juicy, with a rich sub-acid flavour. Ripens late, will keep a very long time; is a good dessert Apple, and excellent for cooking. It is also one of the best Apples for an export trade. Tree vigorous in habit, hardy, and very productive.

Reinette Rouge Hatif.—A handsome and useful early French variety with medium-size roundish fruit. Skin thickly striped with red and carmine. Flesh firm, juicy, and richly flavoured. Ripens early, and is a very good dessert Apple. Tree moderately robust and generally a good cropper.

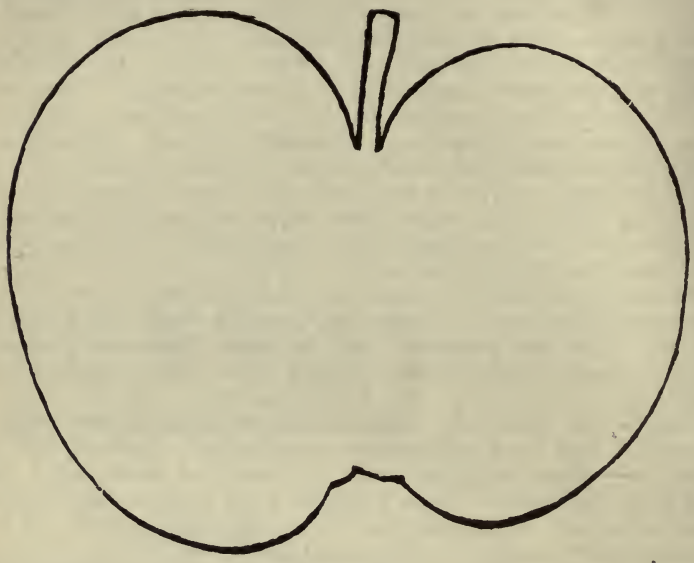
Reinette van Mons.—An excellent dessert Apple, whose origin is uncertain. Fruit below medium-size, roundish-ovate, flattened, with five slight ribs. Skin rich-yellow, with an orange-red cheek and a thin, coating of brown russet. Flesh yellowish, crisp, juicy, sub-acid, with an aromatic flavour. Ripens late, can be kept for a long period, and is a first-class dessert Apple Tree strong and bears freely.

Rhode Island Greening (*Burlington Greening, Jersey Greening*).—An excellent and well known American variety, with large roundish fruit, a little flattened. Skin greenish-yellow, and sometimes a dull blush near the stalk. Flesh yellow, crisp, very juicy, with a rich sub-acid flavour. Ripens late, will keep for a long time, and is a good culinary and dessert Apple. Tree very hardy, robust, and a good bearer.

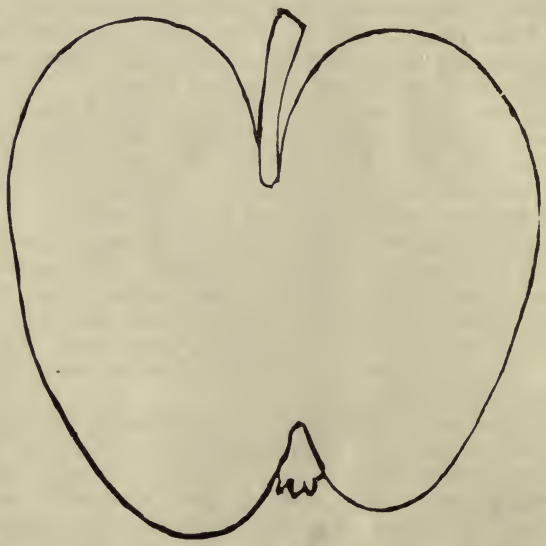
Ribston Pippin (*Formosa Pippin, Glory of York, Traver's Pippin*).—A well-known old English variety, which in the United Kingdom is considered to be the King of Apples, on account of its rich, peculiar, and distinct flavour, and being a good keeper. In this part of the world, however, it does not maintain its high English character, as there is a great falling off in flavour, and the fruit will not keep for any length of time. Fruit medium-sized or larger, roundish. Skin greenish-yellow, clouded and streaked with dull-red. Flesh, yellow, crisp, juicy, with a rich aromatic flavour when perfect. Ripens soon after mid-season, and will keep for three or four months. Tree not very robust, a good bearer, but rather liable to blight. Better adapted for the colder parts of Australasia than other districts.

Rokewood (*Bullock's Seedling*)—A very good variety raised in Victoria, which promises to prove a useful acquisition to the list of cultivated sorts. Fruit roundish-conical and regularly shaped. Skin deep-orange, heavily shaded with crimson and dotted with brown-russet. Flesh yellowish, firm, and juicy, with a rich aromatic flavour. Ripens late, will keep for a very long time, is an excellent dessert Apple,

and a good kind for exporting. The original tree has proved to be a regular and heavy bearer.



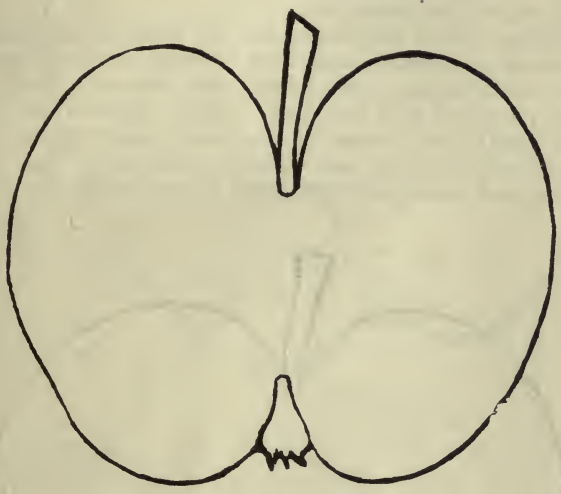
Ribston Pippin.



Romanite.

Romanite.—A first-class American variety, with roundish-conical fruit. Skin yellow ground, but nearly overspread with bright-red and sprinkled with light dots. Flesh yellowish, juicy, mildly sub-acid, and pleasantly flavoured. Ripens late, will keep for a long time, an excellent dessert Apple, and suitable for export. Tree vigorous, hardy, and very productive.

Rome Beauty (*Gillett's Seedling*).—An excellent American variety, with large, roundish, and slightly conical fruit. Skin ground-yellow, but to a large extent shaded and striped with bright-red and sprinkled with light dots. Flesh yellowish, juicy, with a sprightly sub-acid flavour. Ripens late, may be kept for a long period, is a first-class dessert Apple, and an excellent variety for a local market and export. Tree vigorous and a good bearer.



Rome Beauty.

Rosemary Russet.—An old English variety, with medium-sized roundish-conical fruit. Skin greenish-yellow, with a light-red blush and covered with thin pale-russet. Flesh yellowish, firm, juicy, with a rich aromatic flavour. Ripens medium late, will keep for three or four months, and is an excellent dessert Apple. Tree moderately vigorous and a fairly good bearer.

Ross' Nonpareil.—A good old Irish variety, with medium-sized roundish fruit, narrowing a little towards the eye. Skin covered with thin brown-russet, with a faint-red cheek. Flesh greenish-white, with a pleasant aromatic flavour. Ripens late, will keep three or four months, and a very good dessert Apple. Tree strong and bears profusely.

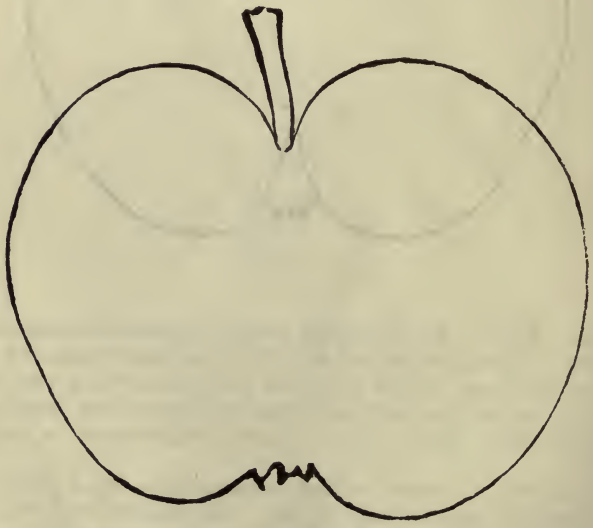
Royal Russet (*Leathercoat Russet*).—An old English variety, with medium-sized roundish-conical fruit. Skin yellowish-green, mostly covered

with light-brown russet. Flesh greenish-white, firm, briskly acid, and slightly aromatic. Ripens late, will keep for a long period, and is an excellent culinary Apple. Tree vigorous, hardy, and productive.

Ryme (*Caldwell*).—A first-class and popular old English variety, with medium-sized, or larger, roundish-oblate regularly-formed fruit. Skin yellow ground, but to a great extent shaded with red. Flesh yellowish, firm, juicy, sub-acid, and well flavoured. Ripens late, will keep for a long time, and an excellent dessert and culinary Apple; also a good variety for exporting. Tree robust and an excellent bearer.

Sam Young (*Irish Russet*).—An old Irish variety, with rather small roundish, slightly flattened, and regularly formed fruit. Skin bright-yellow, nearly covered with grey-russet, with a reddish tinge on the cheek. Flesh greenish-yellow, juicy, and richly flavoured. Ripens late, will keep for three or four months, and is an excellent little dessert Apple. Tree hardy, robust, and productive.

Scarlet Nonpariel.—A well-known and very popular old English variety, with medium-sized, roundish, somewhat flattened, regularly-formed fruit. Skin greenish-yellow, richly striped and shaded with red. Flesh yellowish-white, firm, juicy, and rich flavoured. Ripens medium late, will keep for several months, and is one of the finest dessert Apples. Is also a very popular market variety, and suitable for export. Tree moderately robust and a good bearer, but often badly affected by blight.



Scarlet Nonpariel

Scarlet Pearmain (*Bell's Scarlet, Hood's Seedling, Oxford Peach*).—A first-class old English variety, with medium-sized conical fruit. Skin

yellow ground, but to a large extent covered with various shades of red. Flesh white, slightly tinged with pink, crisp, juicy, sub-acid, and pleasantly flavoured. Ripens late, will keep for several months, and is an excellent dessert Apple. Tree robust and very prolific.

Scarlet Pearmain.

Shepherd's Fame.—An old English variety, with large roundish-oblate slightly-ribbed fruit. Skin deep-yellow, richly streaked with various shades of red. Flesh yellowish, tender, juicy, and well flavoured. Ripens late, will keep three or four months, and is a good dessert or culinary Apple.

Shockley.—A first-class American variety, with roundish-conical fruit, rather below the medium size. Skin pale-yellow ground, but overspread with red and with conspicuous minute dots. Flesh yellowish-white, crisp, juicy, with a rich vinous flavour. Ripens late, will keep for a very long period, and is an excellent dessert Apple, a profitable market variety, and suitable for export. Tree moderately vigorous, very productive, a regular cropper, commences to bear early, and does not suffer much from blight.

Shorland Queen.—An excellent Victorian variety, with medium-sized conical fruit. Skin richly flushed and streaked with red. Flesh juicy and pleasant.

Small's Admirable.—A good English variety, with roundish-ovate and somewhat flattened fruit, above medium-size. Skin of a uniform

lemon colour. Flesh yellowish, firm, crisp, sub-acid, with a rich delicate flavour. Ripens medium late, will keep three or four months, and is a good dessert or culinary Apple. Tree a very prolific bearer, and well suited for dwarf culture.

Shockley.

Smith's Cider.—An American variety, with medium-sized to large roundish-conical fruit. Skin yellow, shaded and striped with red, and thinly sprinkled with grey dots. Flesh whitish, juicy, crisp, and mildly sub-acid. Ripens late, will keep several months, and is an excellent culinary and cider Apple. Tree very vigorous, hardy, and a heavy cropper.

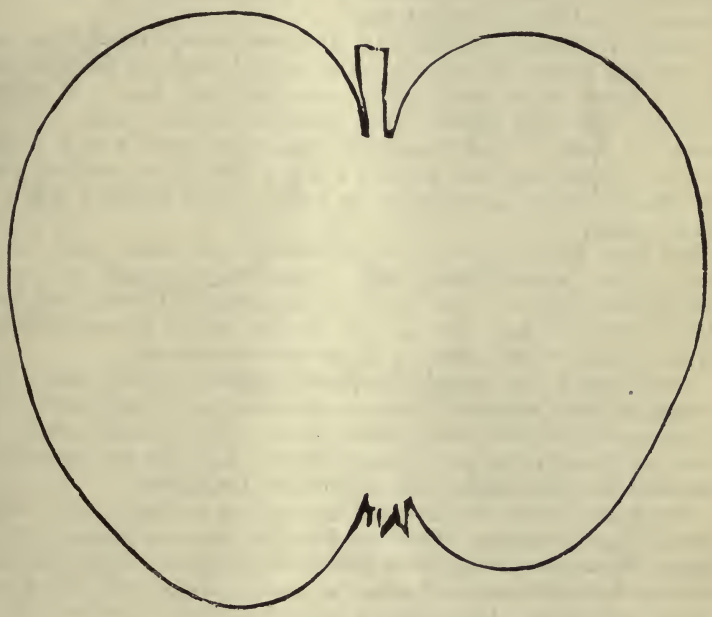
Stamford Pippin.—An old and popular English variety, with medium-sized roundish-ovate fruit. Skin bright-yellow, with a deep-orange cheek. Flesh yellowish, crisp, very juicy, with a brisk pleasant and slightly aromatic flavour. Ripens late, will keep three or four months, aud is a good Apple for dessert or cooking. Tree moderately robust and a fairly good bearer

Stansill.—A first-class American variety, with roundish-oblate fruit, medium-sized or larger. Skin yellowish-green, richly striped with red, and sometimes a blush cheek. Flesh yellow, juicy, sub-acid, and well flavoured. Ripens, late will keep a long time, and is an excellent dessert Apple. Suitable for export. Tree vigorous, hardy, productive, and an early bearer.

Stewarts Seedling.—An excellent Victorian variety, raised in the Ballarat district, with roundish-ovate fruit, above the medium-size. Skin

yellowish-green, heavily flushed, and shaded with red. Flesh greenish-white, juicy, with a good flavour. Ripens late, will keep several months, and is a first-class dessert Apple; also suitable for export.

Stone Pippin—A well-known and popular English variety, which is largely cultivated in Australasia. Fruit medium-sized, or larger, roundish-conical. Skin pale-green, sometimes with a brownish-red tinge on the cheek, and dotted with white specks. Flesh greenish-white, firm, crisp, juicy, with a pleasant sub-acid flavour. Ripens late, will keep for a very long time, and is a first-class culinary and dessert variety; also a good Apple for exporting, and one of the most popular kinds for our local markets. Tree upright in habit, vigorous, hardy, and a very free bearer.



Stone Pippin.

Striped Beefing.—An excellent old English culinary variety, with large roundish and slightly-flattened fruit. Skin greenish-yellow, almost entirely covered with broken streaks and patches of red. Flesh yellowish, firm, crisp, juicy, with a pleasant acid flavour. Ripens late, will keep for a long time, is a first-class culinary Apple, and well suited for drying. Tree vigorous and prolific,

Sturmer Pippin.—A popular and first-class old English variety, with roundish somewhat flattened fruit, medium-sized, Skin yellow, with a brownish-red cheek. Flesh yellowish, firm, with a rich sub-acid flavour,

Ripens late, will keep for a long period, and ranks as one of the finest dessert Apples. A very popular variety in our local markets, and suitable for export. Tree hardy, thrifty, and bears freely.

Summer Pearmain (*Autumn Pearmain*).—An old English variety, with medium-sized, or larger, roundish-conical fruit. Skin yellow, striped and mottled with red and orange, and dotted with brown. Flesh yellowish-white, crisp, juicy, with an aromatic flavour. Ripens medium late, will keep for three or four months, and is an excellent dessert Apple. Tree robust and productive.

Summer Golden Pippin.—An old and good English variety, with ovate fruit, below the medium size. Skin bright-yellow, with an orange-red cheek Flesh yellowish, firm, very juicy, with a rich vinous flavour. An excellent early dessert Apple, but will only keep a few weeks. Tree moderately robust and a free bearer.

Swaar (*Hardwick*).—A first-class American variety, raised by a Dutch settler, that derives its name from the unusual weight of the fruit, which in Low Dutch means *heavy*. Fruit roundish-oblate, large, and regularly formed. Skin deep-yellow, with numerous brown specks and faint traces of russet. Flesh yellowish, firm, juicy, with a rich aromatic flavour. Ripens late, will keep for a long period, is an excellent dessert or culinary Apple, and suitable for export. Tree vigorous and a very good cropper.

Sykehouse Russet.—An old English variety, with rather small roundish fruit. Skin greenish-yellow, with a brownish-red cheek and partially covered with russet. Flesh yellowish, firm, crisp, with a sub-acid flavour. Ripens late, will keep four or five months, and is an excellent dessert Apple. Tree robust, spreading in habit, and productive.

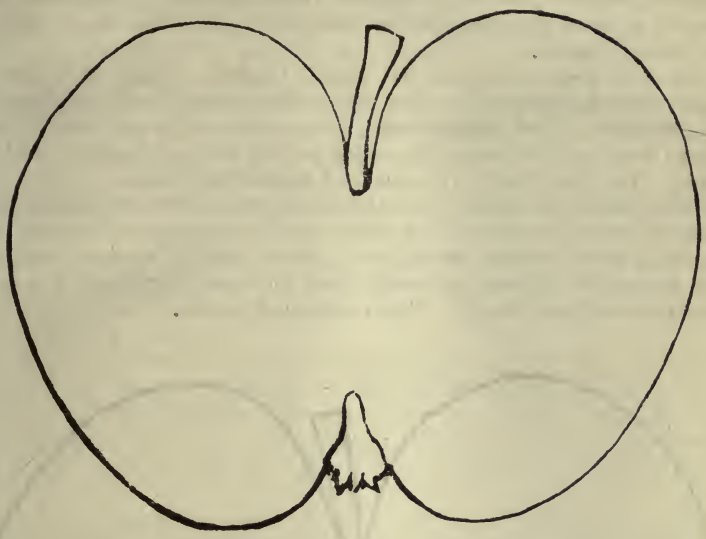
Sandringham.—A recently imported English variety, and said to possess valuable qualities. Fruit large, conical, and very heavy. Skin green, sprinkled with small russet spots. Flesh greenish-white, firm, crisp, juicy, and sub acid. Ripens late, will keep for a long period, an excellent cooking Apple, and suitable for the dessert.

The Queen.—A variety imported two or three years ago from England with a high character. Fruit medium-sized to large, roundish-oblate, with a ribbed eye. Skin lemon-yellow, but almost covered with bright-crimson, with broken streaks and patches or darker-red. Flesh white, tender, and juicy. Ripens late, a good cooking and dessert Apple, and will keep a long time. Tree bears freely.

Tower of Glammis (*Carse of Gowrie, Glammis Castle*).—An old and popular Scotch variety, with large roundish-conical and somewhat unequal sided fruit. Skin pale-yellow, with a blush of red on the cheek. Flesh whitish, crisp, very juicy, and briskly sub-acid. Ripens late, will keep three or four months, and is a first-class cooking variety, also suitable for drying. Tree robust, hardy, and a free bearer.

Twenty Ounce (*Aurora, Coleman, Cayuga Red Streak, Lima, Morgan's Favorite*).—A favorite and useful American variety, with very large roundish slightly uneven fruit. Skin greenish-yellow, heavily splashed, marbled, and striped with red. Flesh greenish-white, crisp, juicy, and briskly sub-acid. Ripens medium late, will deep for three or four months,

is a good culinary Apple, and suitable for drying. Tree hardy, vigorous, and a free and regular bearer.



The Queen.

Twyford Beauty.—An excellent Victorian variety, with medium sized roundish conical fruit. Skin yellow, with a blush cheek and broken streaks of red. Flesh crisp, juicy, and richly flavoured. Ripens medium late, and is a good cooking and dessert Apple. Tree a free bearer.

Tuscaloosa.—An American variety, with medium-sized, or larger, roundish-conical fruit. Skin yellow, shaded, striped, and marbled with red, speckled with a few grey dots, and russety near the stalk. Flesh yellowish, firm, juicy, and mildly sub-acid. Ripens late, will keep three or four months, and is a good, dessert or culinary Apple. Tree moderately vigorous, spreading in habit, and productive.

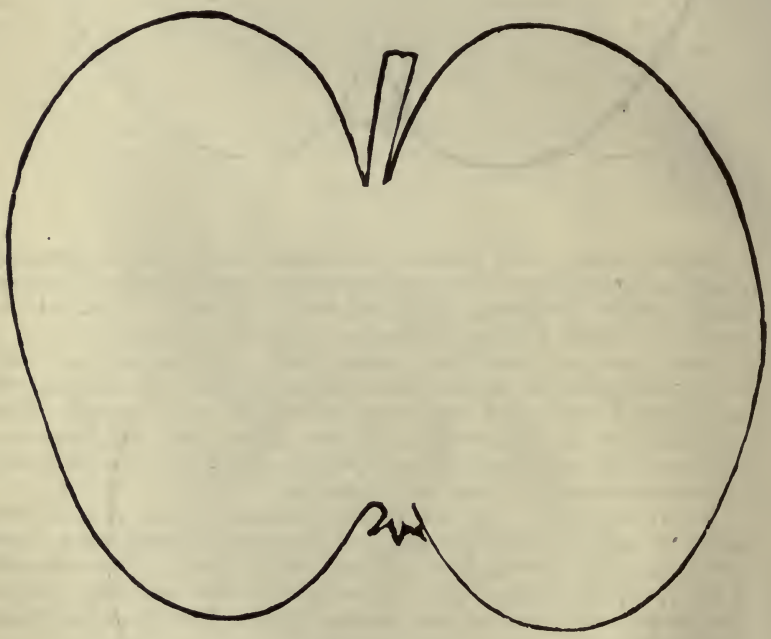
Wadhurst Pippin. An old English culinary variety, with medium-sized, or larger, roundish-conical, and somewhat angular fruit. Skin yellow, splashed and marbled with red on the check. Flesh yellowish, crisp, juicy, and briskly acid. Ripens medium late, will keep three or four months, and is an excellent cooking Apple. Tree strong, hardy, and bears freely.

Waltham Abbey Seedling.—An excellent English variety, with large roundish-conical fruit. Skin yellow, with a red blush on the cheek and speckled with minute russet dots. Flesh yellowish, tender, juicy, and pleasantly flavoured. Ripens medium late, will keep three or four months, a good culinary Apple, and when cooked is a pale-amber colour. Tree moderately vigorous and a good bearer.

Wagener.—A first-class American variety with medium-sized, or larger, roundish-oblate fruit. Skin yellow ground, but heavily shaded with crimson, obscurely striped with red, and sprinkled with light dots. Flesh yellowish, tender, juicy, with a brisk vinous flavour. Ripens late, will keep a long time, and is an excellent dessert Apple. Tree hardy, thrifty, and an early bearer.

Warner's King.—A good and useful English culinary variety, with large roundish-ovate fruit. Skin deep-yellow, marked with patches and dots of russet, Flesh white, tender, juicy, with a brisk sub-acid flavour. Ripens late, may be kept for a long period, and an excellent cooking Apple. Tree very hardy, vigorous, and an excellent bearer.

Westfield Seek-no-Further.—An American variety, with roundish-conical regularly-formed fruit. Skin nearly covered with pale or dull red, and sprinkled with obscure russet dots. Flesh whitish, tender, juicy and well flavoured. Ripens late, will keep for some time, and is a good dessert and culinary Apple. Tree thrifty and prolific.



White Calville.

White Calville (*Calville Blanche, White Winter Calville*).—An old and formerly very popular French Apple. Fruit large, roundish, and somewhat flattened, with angular sides extending to the crown. Skin deep yellow, with sometimes a faint blush of red on the cheeks. Flesh white,

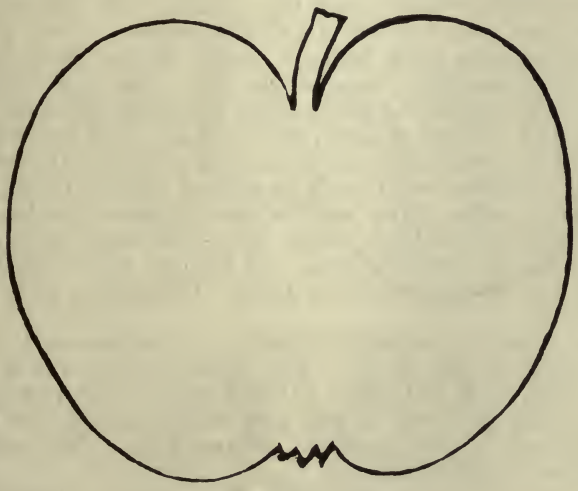
tender, very juicy, with a slightly aromatic flavour. Ripens soon after mid-season, will keep two or three months, and is a good dessert or culinary Apple. Tree robust and productive.

White Spanish Reinette (*Cobbett's Fall Pippin, Reinette Blanche d'Espagne*).—A very old and popular Spanish variety, with very large roundish-oblate fruit, somewhat angular. Skin greenish-yellow, with an orange-red cheek and sprinkled with brown dots. Flesh yellowish-white, crisp, tender, with a rich sub-acid flavour, Ripens late, will keep for a long time, and is a good culinary and also a dessert Apple. Tree hardy, vigorous, and a very good bearer.

Whorle Pippin (*Thorle Pippin*).—An old and good English variety, with roundish-oblate fruit, rather below the medium size. Skin nearly covered with bright-crimson. Flesh yellowish white, firm, crisp, very juicy, and well flavoured. Ripens about mid-season, will keep for a few weeks, and is a useful summer dessert Apple. Tree moderately vigorous and a fairly good bearer.

Winter Codlin.—An old English culinary variety, with large roundish conical fruit, five-sided and ribbed. Skin yellowish-green, with sometimes a blush cheek and sprinkled with a few grey dots, Flesh greenish-white tender, juicy, and sub-acid. Ripens late, will keep three or four months and is an excellent cooking Apple. Tree vigorous, spreading in habit and productive.

Winter Hawthornden (*New Hawthornden*).—A culinary Apple of English origin, similar in appearance to the old Hawthornden, but later, and a better keeper. Skin yellowish-green, with a brownish-red cheek. Flesh white, tender, juicy, with a pleasant sub-acid flavour. Ripens medium late, will keep three or four months, and is a good cooking Apple. Tree rather dwarf in habit, but an abundant and early bearer.



Winter Majetin

Winter Majetin.—An English variety that has become well known and popular as it is not affected by the American blight, and therefore largely used to supply stocks for grafting other kinds upon. But is is an excellent variety to grow for its fruit, which is large, roundish, and has at the apex five prominent crowns like the London Pippin. Skin yellowish-green, with a dull-red cheek. Flesh greenish-white, firm, with a pleasant sub-acid flavour. Ripens late, may be kept for a long period, and is an excellent culinary Apple. Tree hardy, robust, and bears very freely.

Winter Pearmain (*Old Pearmain*).—One of the oldest varieties in cultivation, and supposed to be of English origin. Fruit large roundish-conical. Skin greenish-yellow, with a lively red cheek. Flesh yellowish-white, firm, crisp, juicy, with a brisk and pleasant flavour. Ripens late, will keep for a long period; a valuable Apple for dessert or culinary purposes, a popular market kind, and suitable for export. Tree hardy, and an excellent bearer.

Winter Quoining (*Winter Queening*).—Another very old English variety, with medium-sized, or larger, conical fruit. Skin ground greenish-yellow, with a widespread red cheek and streaks of the same colour. Flesh greenish-yellow with an aromatic flavour. Ripens late, will keep for a long period, and is a good apple either for dessert or cooking. Tree hardy and an excellent bearer.

Winter Strawberry.—An American variety, with medium-sized, roundish-conical fruit· Skin yellow. shaded and striped with red. Flesh yellowish. crisp, juicy, slightly sub-acid, with an aromatic flavour. Ripens late, keeps a long time, and is a useful dessert or culinary Apple; also suitable for exporting. Tree moderately vigorous, upright in habit, and a good and regular bearer.

Wine Sop (*Wine Sap*)·—A first.class and very useful American variety, with medium-sized roundish-oblong fruit. Skin a fine dark-red, with a few streaks and a small patch of yellow sometimes. Flesh yellowish, firm, crisp, juicy, with a rich flavour. Ripens late, will keep for a long time, and is an excellent dessert Apple. It is also a first-class cider variety, and the fruit has the good quality of hanging well upon the trees after it it is ripe. Tree very hardy, will thrive in almost any soil, and it is considered in America to be one of the most profitable varieties.

Worcester Pearmain.—A recently introduced English variety, said to be of excellent quality. Fruit medium-sized or larger, roundish-conical. Skin nearly covered with bright scarlet-red. Flesh tender, juicy, and well flavoured. Ripens after mid-season, will keep for several months, and useful both as a dessert and cooking Apple. Tree said to be strong and productive.

Wormsley Pippin.—An English variety, with medium-sized, roundish fruit, narrowing towards the eye. Skin greenish-yellow, with an orange-red flush on the cheek, and dotted with dark specks. Flesh white, crisp, juicy, and highly flavoured. Ripens soon after mid-season, will keep for a few weeks, and is a good dessert and culinary Apple,. Tree moderately strong and bears pretty freely.

Wyken Pippin, (*Arley, Girkin Pippin, Warwickshire Pippin.*)—A very

old but excellent English variety, with roundish-conical somewhat flattened fruit, rather under the medium size. Skin yellowish-green, with a dull-orange cheek and dots and tracings of russet. Flesh greenish-yellow, crisp, very juicy, with a sweet rich flavour. Ripens late, will keep for a long period, and is a first-class dessert Apple. Tree hardy, upright in growth, and a free bearer.

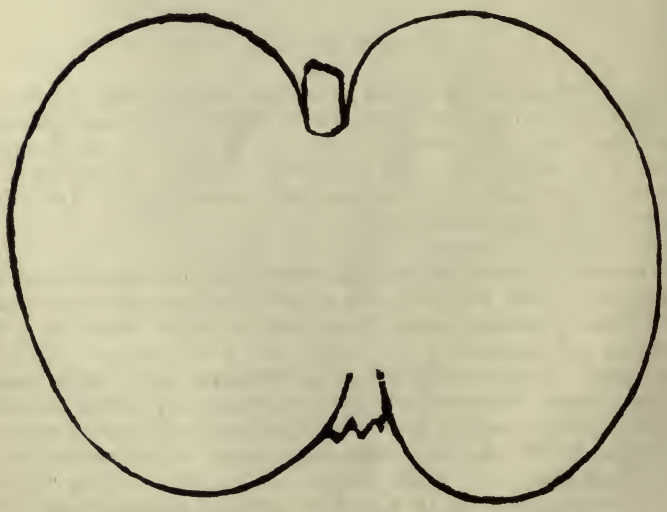
Worcester Pearmain.

Yates.—A first-class and popular American variety, with rather small oblate fruit. Skin nearly overspread with shades, stripes, and splashes of red, and freely sprinkled with light dots. Flesh white, sometimes stained near the skin, tender, juicy, and pleasantly sub-acid. Ripens late, will keep a long period, and is an excellent little dessert Apple. Tree strong, upright in habit, and a heavy bearer.

Yellow Bellefleur (*Bishops Pippin, Lady Washington, Warren Pippin*).—An excellent American variety, with very large oblong and somewhat irregular fruit. Skin pale-lemon colour, with often a slight blush on the cheek. Flesh yellowish, crisp, juicy, with a slightly sub-acid flavour. Ripens late, will keep for a long time, and is a first-class cooking or dessert Apple. Tree moderately vigorous and a free and regular bearer.

Yellow Newtown Pippin (*Albermarle Pippin*).—An American variety, somewhat like the common Newtown Pippin, but with harder flesh, and rather more flat in shape,. Skin deep-yellow. with sometimes a red cheek- Flesh firm, crisp, juicy, with a rich flavour. Ripens late, will keep for a long period, and is a good dessert and cooking Apple. Tree hardy, robust, and an excellent bearer.

Yellow Bellefleur.



Yellow Newtown Pippin.

Yorkshire Beauty.—A good English culinary Apple, with large roundish-oval fruit. Skin yellow-green, with a rich flush on the cheek and large dots of russet. Flesh juicy, and pleasantly sub-acid. Ripens after mid-season, is a first-class cooking Apple, and will keep for a few weeks. Tree a good bearer.

Yorkshire Greening (*Coates, Yorkshire Goose Sauce*).—An old and excellent English variety, with large roundish-oblate irregular slightly-ribbed fruit. Skin dark-green, with shades and broken stripes of dull-red and traces of russet. Flesh greenish-white, firm, crisp, very juicy, with a pleasant sub-acid flavour. Ripens late, will keep for a long time, and is a first-class cooking Apple. Tree vigorous, hardy, and very productive.

Crab Apples.

The term "Crab Apple" is applied to the fruit of several species of the genus *Pyrus* when growing in a wild or unimproved state. There are various kinds in cultivation, though they are mainly grown for ornament, the fruit being of but little value for commercial purposes. Several are utilized for making cider and preserving, but the fruit is too harsh to be utilized in any other way, though very attractive in appearance. The Siberian Crab (*Pyrus baccata*) has been used with effect in hybridizing the ordinary varieties of *Pyrus malus*, and some good kinds have been obtained in this way. Several good American Apples are said to have originated in this way, the Crab giving a harder constitution, which makes them better adapted for certain localities than the ordinary sorts. The following list embraces the more popular kinds :—

Coral.—Raised in America, a variety with very small conical fruit, flattened at the ends. Skin rich-yellow, with a crimson cheek. Flesh yellowish, crisp, juicy, and sprightly acid.

Currant.—A variety with fruit not larger than Currants, and like them borne in clusters. Skin red, slightly striped with a deeper tint. Flesh rather harsh. Very ornamental.

Foxley.—An English variety raised from the Siberian Crab. Fruit as large as Cherry Plums, roundish-oblate, and produced in clusters. Skin deep-yellow. Flesh yellow, crisp, juicy, sub-acid. Is used for cider and preserving.

Lady Crab.—A handsome English variety somewhat resembling the Lady Apple in appearance, hence its name. Fruit roundish-oblate and about the size of a large Cherry. Flesh yellowish, moderately juicy, and sub-acid. Very ornamental.

Marengo.—A handsome variety of the Siberian Crab, with roundish-oval fruit, which is rather larger than that of the parent. Skin warm-red on a yellow ground, with a few scattered dots. Flesh yellowish-white, crisp, juicy, and sub-acid. An ornamental variety, and one of the best of the Crab Apples.

Scarlet Siberian (*Cherry Crab*). One of the handsomest and most popular of Crab Apples for ornament. Fruit small, roundish-oblong, the

size of a Cherry, and in colour a bright shining scarlet. Flesh crisp, juicy, and sub-acid.

Transcendent.—An early variety, with roundish-oblong fruit, which is rather large for its class, and slightly ribbed. Skin golden yellow, with a rich crimson cheek, covered with a white bloom. Flesh creamy-yellow, crisp, juicy, and somewhat astringent. A very ornamental variety.

Transparent.—A pretty variety, with small roundish-flattened fruit. Skin yellowish white, with a waxy appearance. Flesh translucent, juicy, with a briskly acid flavour. Makes a good ornamental tree.

Yellow Siberian (*Amber*).—A handsome variety, somewhat similar to the common Siberian, but the fruit is a little larger, and in colour a fine golden-yellow, with sometimes a tinge of red.

APRICOT.

History.

This fruit belongs to the natural order *Rosaceæ*, or the Rose family sub-order *Amygdaleæ*, its botanical name being *Armeniaca vulgaris*. By some botanists it is classed as a plum, under the name of *Prunus Armeniaca*. There is no certainty as to where the Apricot originated. as, in its wild state, it is widely diffused in Asia and Northern Africa. It is said to be found growing naturally in Barbary, Egypt, China, Japan, Persia, India, on the slopes of the Caucasus, and in other countries remote from each other. The scientific name has been obtained through the Apricot almost covering the slopes of the mountains of Armenia, nearly up to the margin of perpetual snow. By the ancient Romans this fruit was known as the Early Persian Apple (*Mala persica precocia*), because it ripened before the Peach and most other kinds. This name was in time shortened to *Precocia*, and from this the common name is supposed to have originated. In the early English horticultural works this fruit was always styled A-precok, and it was not till the end of the 17th century that the word Apricot was used. Some authorities, however, are of opinion that Apricot has been derived from the Arabic name of the fruit Berkoche.

The Apricot is said to have been introduced to England in the reign of Henry VIII., but according to some accounts it was known in that country at a much earlier date. Being of a somewhat tender nature for the climate of the United Kingdom, the Apricot never became so popular as the hardier fruits, and in that part of the world, where it can only be successfully cultivated with the protection of walls, its use has been mainly confined to the wealthier classes. In milder climates it does well as a standard, and under favourable conditions becomes a thrifty tree of from twenty to twenty-five feet in height.

Uses.

In addition to its value as a dessert fruit and for culinary purposes, the Apricot is utilized to a great extent in various other ways. Very large

quantities of the fruit are used for making jam and jelly. The Apricot is also extensively used for canning, and when preserved this way is preferred by many to any other fruit. For drying there is no better fruit than the Apricot, and none in greater demand. In the south of Europe and America large quantities of Apricots are now dried and exported to other countries. Drying may be affected by simply splitting the fruit, removing the stones, and exposing it, the cut side uppermost, upon trays to the sun till the moisture has evaporated. The fruit may also be dried with artificial heat in an evaporator. Apricots are excellent when preserved in syrup or brandy, and the Chinese by these means can keep the fruit for several years, so that it will retain its full flavour. In the south of Europe an excellent wine is commonly made from the Apricot, and by distillation it yields a highly flavoured spirit. The Chinese make lozenges from the clarified juice of the Apricot, and when these are dissolved in water they afford a very agreeeble beverage. From the kernels of the wild Apricot, which affords but little pulp, these people also extract an oil that is greatly esteemed. The wood of the Apricot is fine grained, takes a good polish, and is much used by the Chinese and Japanese for cabinet work and other purposes. Sometimes these people use a yellow dye for woollen cloth which is extracted from the young shoots.

Cultivation.

The Apricot may be grown successfully in most parts of Australasia but it is a fruit better adapted for the warmer than the cooler districts In the warmer parts (not tropical), the fruit develops the richest flavour and is produced with greater certainty. This fruit deserves special attention from growers in any of the moderately warm districts, as there is a large and growing demand for dried and canned Apricots. Produce prepared in these ways is in great demand locally, and if in the future a surplus is obtained, a market can be opened for it elsewhere. Cultivators must, however, bear in mind that, either for canning or drying, varieties with fruit that has a firm, tough fibre are preferable to those whose flesh is more melting and juicy. Apricots are broadly divided into two classes, viz.—Freestones, which separate readily from the seeds ; and cling-stones, in which the flesh adheres to the stones. As this fruit is only in season for a comparatively short period of the year, cultivators require but a few sorts, which will give greater satisfaction than a large number. If dessert fruit is required, the grower should select not more than half-a-dozen kinds, highly flavoured and luscious, as also to mature early, at mid-season, and late. The requirements for drying or canning have been already stated, and it does not matter whether the sorts are early, medium or late.

Apricots will thrive in any ordinary good soil, but the one most congenial is a rich sandy loam. The ground should be deeply stirred, when the soil is heavy more especially, and the root bed ought to be from fifteen to eighteen inches deep at the least. In loose land, or when the subsoil is an open sand, gravel, or limestone, the necessity for deep working

is not so great. Drainage should always be provided for in heavy. retentive soils, as Apricots are especially liable to suffer if the ground remains soddened for any length of time. In the case of land with open gravelly or sandy subsoils, there will often be sufficient natural drainage, but if not provision must be made for it.

Planting may be done at any time between the fall of the leaf and the time when growth commences, but the writer prefers from the end of July to the middle of August, according to the district. Vigorous young trees, with straight stems, well-formed heads, and plenty of fibrous roots. should be selected in preferance to others. The trees should be planted not less than eighteen feet apart, and care must be taken not to place them too deeply in the ground. It will be sufficient if the upper roots are just below the surface, In order to fully utilize the ground, temporary trees may be planted between if desirable, but care must be taken that they are not allowed to remain long enough to injure the Apricots. Before the hot weather sets in it will be advisable to mulch the trees four or five inches deep with long stable manure or other convenient material. taking care to spread it over the ground as far as the roots extend. Care must also be taken to keep the mulching material clear of the stems of the trees. The surface should be kept as free from grass and other weeds as possible, as an undergrowth of this kind is injurious, and more especially in the spring and early summer. The work of keeping down weeds is most economically and effectively done by frequent and light stirrings of the surface soil with scarifier or hoe. Deep ploughing or digging is hurtful, causing much damage to the roots, and should be avoided as a rule. Apricots like all fruit trees, must be supplied with congenial food, and as the land becomes exhausted suitable manures should be given to make good any deficiencies. Even the richest soils will fail sooner or later if the materials extracted from them are not returned in some shape or form, and their wants should be attended to before the trees suffer to any extent. Ordinary manure will generally keep the trees in a thrifty state but if there are special deficiencies—as for instance, a lack of lime, or other necessary mineral—these should be supplied.

Pruning.

The Apricot requires more attention in the way of pruning than any other stone fruit, excepting the Peach and Nectarine. The fruit is mainly produced upon wood of the previous season's growth, bnt also to a large extent upon spurs of older wood. It is advisable in pruning to thin out the previous season's shoots when too numerous, shortening those that are left to one or two leaf bnds beyond two or three well-developed fruit buds. By adopting this method of pruning growth is kept compact, and the fruit is not only finer but is produced more regularly than if the wood is left to advance at random. In the case of young trees, a strong and regular growth of wood is more required for two or three years than the production of fruit, and the shoots should be thinned out and shortened so as to best effect this object. Summer pruning should be practised when practicable, and more especially in the

Branch showing Fruit Buds. A Place where it should be cut.

The same Branch the following season if not shortened back.

Branch the second year Line A showing where it should be shortened to strengthen the lower branches.

case of young trees, as it helps to conserve the energies of the plants and lessens the necessity for trimming in the winter. Care must, however, be taken not to bare the trees too much, as a good proportion of foliage is essential to perfect root action and is also wanted to shade the trees. It is advisable to always train the trees with low heads, which are, for various reasons, preferable to tall ones. The fruit on low-headed trees suffers least from the effects of high winds and is more easily gathered, there is a better shade for the stems (a matter of some importance in this part of the world), and pruning is more easily effected. Root pruning is not often required by the Apricot, though it may sometimes be practised with advantage when trees are making an over-luxurious growth of wood and produce but little fruit. Sometimes trees will produce flowers in abundance but little or no fruit sets. When this happens it is a good plan to ring the bark half-way round the tree just as it comes into flower. The writer for several years adopted this practice with success, and through it managed to obtain crops that otherwise would have been

failures. Late frosts often seriously injure or destroy crops of Apricots, and in order to avoid this risk the writer has with success built light roofs of brushwood over the trees, which remained while the danger lasted. The plan is not expensive, and can be easily followed. The directions are as follows :—Sink firmly in the ground at equal distances four posts or saplings, nail lighter ones or battens across the tops, and then cover with a light layer of bushes. It is astonishing what an amount of protection this covering gives, and the extra trouble and expense will generally prove a sound investment in localities where late frosts are troublesome.

Propagation.

Propagation is effected by seeds, budding, and grafting. Plants from seeds are, as a matter of course, uncertain in character, which is not known till the fruit is produced. Budding is the method most usually adopted for perpetuating recognised varieties, and may be performed at any time during the growing period when the bark rises freely from the wood. The work, however, is mostly done within a few weeks after midsummer. Apricots, as a rule, thrive best when worked upon their own stocks, and there can be no doubt but that, as in the case of other trees, the closer the affinity between root and scion the more enduring is the tree likely to be. Very frequently the Apricot is worked upon the Plum, Peach, or Almond, but these stocks, as a rule, are not desirable except to meet peculiar local conditions. Plum stocks are objectionable because of their tendency to throw up suckers, which are troublesome to the cultivator, and, though growth may be vigorous for a time, the trees often go off at an early age. The Cherry Plum is less objectionable than other Plums, and trees worked upon it will often attain a good size and age. For heavy soils, or where retentive sub-soils are not far below the surface, the Plum will often prove the better stock. When worked upon Almond or Peach stocks the trees will often make vigorous growth for a few years, but they are generally short-lived and more prone to diseases than when grown upon their own roots. Some growers are of opinion that the Almond is a seviceable stock for the Apricot in very dry soils, but this has not been sufficiently proved. Grafting is less practised than budding in raising Apricots, and should be done, if necessary, before growth becomes active in the spring. Stocks for either budding or grafting should invariably be seedlings, as suckers and layers never make good trees.

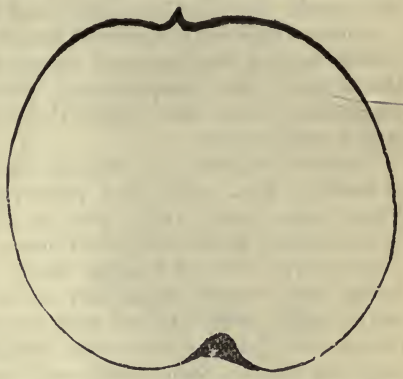
Varieties.

The following list embraces the most desirable varieties ;—

Beaugé.—A hardy, prolific and very late variety, belonging to the *Moorpark* class. Skin deep yellow, with a red tint on the sunny side. Flesh deep-yellow, firm, but scarcely so well flavoured as the Moorpark and some other varieties, and separating freely. Stone large, and kernel bitter. A good sort for carrying well, canning, and drying.

Blenheim (*Shipley's*).—An early prolific variety, with medium-sized, round, moderately rich, and juicy fruit. Skin deep yellow. Flesh yellow and full flavoured. Stone roundish, kernel bitter. Suitable for canning and drying.

Breda.



Beaugé.

Breda.—A hardy, medium early variety, said to have originated in Africa, with rather small, roundish fruit, compressed at the sides. Skin deep orange, dotted with brown spots next the sun. Flesh deep orange, highly flavoured, and separating freely from the stone. Stone small, round, kernel sweet, and used as a sweetmeat in some parts of Europe. Tree vigorous and prolific.

Brussels.—A vigorous, hardy, mid-season variety, with medium-sized oval fruit, flattened on the sides. Skin pale yellow, with white dots on the shady side, and red ones towards the sun. Flesh yellow, firm, free, and moderately well flavoured. Stone small, and kernel bitter. Tree a good bearer, and will thrive in poorer soils than some varieties.

Canino Grosso—An Italian variety, which produces large oval fruit, and ripens early. Skin orange, deeply marked with red next the sun. Flesh reddish-yellow, high flavoured, melting, and free. Stone large, and kernel bitter. Tree hardy and prolific.

Campbellfield Seedling.—An excellent variety, with medium-sized, roundish-oval fruit, and ripening early in the season. Skin deep orange-yellow. Flesh yellow, melting, juicy, well flavoured, and free. Stone small, and kerne bitter.

Canino Grosso.

Early Moorpark.—A variety very similar in appearance and quality to the ordinary *Moorpark*, but ripening two or three weeks sooner. Fruit roundish, inclining to oval, with deep yellow skin, mottled and dotted with red on the sunny side. Flesh in all respects the same as the *Moorpark*. Stone oblong, large, and kernel bitter.

Golden Drop.—An excellent variety, said to be a seedling from *Musch Musch*, bearing medium-sized roundish-oval fruit, which ripens early in the season. Skin deep orange, suffused with crimson next the sun. Flesh deep-yellow, firm, with a rich fine flavour, and free. Stone small, with a bitter kernel.

Hâtive d'Auvergne.—A medium early variety, with roundish-oval fruit of moderate size. Skin deep yellow, with a darker tinge next the sun. Flesh yellow, juicy, with a pleasant brisk flavour, and separating freely, Stone medium sized, and kernel bitter. Tree vigorous, and bears freely.

Hemskirk.—An old English variety, belonging to the *Moorpark* class, having large roundish fruit, flattened at the sides, and ripening medium early. Skin orange, tinged with red on the sunny side. Flesh deep orange, very juicy, with a rich luscious flavour, and separating freely from the stone. Stone small, and kernel bitter. Tree hardy, vigorous, and an excellent bearer.

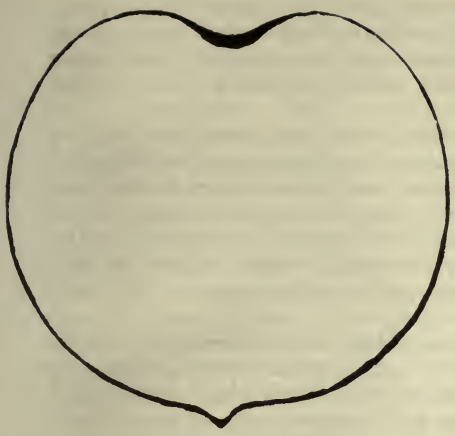
Kaisha.—A well-known variety, supposed to have originated in Syria, and belonging to the *Moorpark* type. Fruit medium-sized, roundish, and ripening at mid-season. Skin pale yellow, mottled and tinged with red next the sun. Flesh pale yellow, tender, very juicy, sugary, highly flavoured, and separating freely from the stone. Stone small, roundish, with a sweet kernel.

Kaisha.

Large Early (*Gros Précoce*).—A variety of French origin, with large rather oblong fruit, much flattened at the sides, which ripens very early in the season. Skin pale orange, with a deeper tinge and red dots next the sun. Flesh deep orange, juicy, with a rich luscious flavour, separating freely from the stone. Stone large, rather flat, and kernel bitter. Tree vigorous, But sometimes a rather shy bearer.

Large Red (*Gros Rouge*).—A late-fruiting variety of the *Peach-Apricot* class, and supposed to be of French origin. Fruit large, roundish, and of a deep orange-red colour. Flesh yellow, juicy, well flavoured, and separates freely from the stone. Stone large, and kernel bitter. Tree hardy and vigorous.

Mansfield Seedling.—An excellent variety, with large roundish fruit, which ripens late. Skin pale yellow, tinged with red on the sunny side. Flesh deep yellow, juicy, luscious, and separates freely from the stone. Stone large, kernel bitter. Tree hardy and prolific.



Large Early

Moorpark

Moorpark.—This is an old and well-known variety, the type of its class, which has been cultivated in England for more than 160 years. The fruit is large roundish-oval, and compressed on the sides. Skin pale yellow, with a deeper tint and red specks on the sunny side. Flesh bright orange, very juicy, flavour rich and luscious, separating from the stone freely. Stone rough, large, and kernel bitter. Tree vigorous and a free bearer. This variety takes its name from *Moorpark*, an estate in England, where it was first cultivated. It is one of the finest Apricots for the dessert, and is, as also others of its class, well suited for canning and drying.

Montgamet.—A French variety, with small oval fruit, rather compressed on the sides, ripening medium early. Skin pale yellow, slightly tinged with red next the sun. Flesh yellow, firm, juicy, sub-acid, and adhering to the stone. Stone round, small, and kernel bitter. Tree hardy and thrifty, and fruit useful for culinary purposes and jam.

Musch Musch.—This variety takes its name from Musch on the frontiers of Turkey in Asia, and is common to many parts of Syria and Egypt. The fruit is small, round, and ripens rather late. Skin deep yellow, and orange-red next the sun. Flesh yellow, tender, very sweet, and separates freely. Stone small, kernel sweet. Tree moderately hardy, and free bearer. This is the sweetest of all Apricots, and in Turkey the fruit is dried in large quantities.

Orange (*Royal George*, *Royal Persian*, *Royal Orange*).—A variety with large roundish fruit, which ripens at mid-season. Skin pale orange, with a deeper shade tinged with red next the sun. Flesh deep orange, firm, moderately juicy, and adhering to the stone. Stone small, smooth, kernel sweet. Tree vigorous and prolific.

Oullin's Early Peach.—A variety of the *Peach Apricot*, from which it does not differ materially except in the period of ripening, which is about three weeks earlier. Fruit large, somewhat flattened. Skin bright

yellow, tinged with red towards the sun. Flesh deep yellow, juicy, sugary, with a rich luscious flavour, and separating freely from the stone. Stone large, kernel bitter. Tree hardy and very prolific. This variety is well adapted for canning or drying, and should find a place in every orchard.

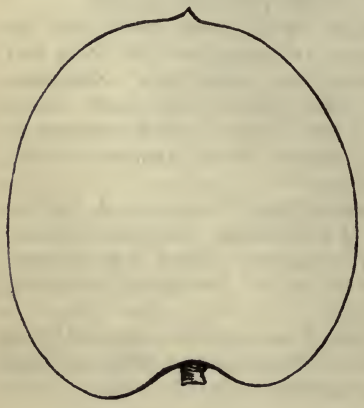
Peach Apricot (*Royal Peach*).—This variety originated in Italy, and has always been held in high repute. Fruit large, somewhat flattened, and ripening late in the season. Skin pale yellow, tinged with red on the sunny side. Flesh deep yellow, juicy, with a rich delicate flavour, and separating freely. Stone large, flat, rugged; kernel bitter. This variety and others closely allied are somewhat similar to the Moorpark class, and are supposed to have originated from the same source. It is an excellent kind for canning and drying.

Pennant Hill's Oval.—This is an excellent variety raised in New South Wales, with large, showy, oval fruit, which ripens rather late. Skin deep yellow, with a red tinge on the sunny side. Flesh bright yellow, high flavoured, firm, but less juicy than the *Moorpark*, and separates freely from the stone. Stone large, kernel bitter. Tree robust and a good bearer. An excellent kind for canning and drying.

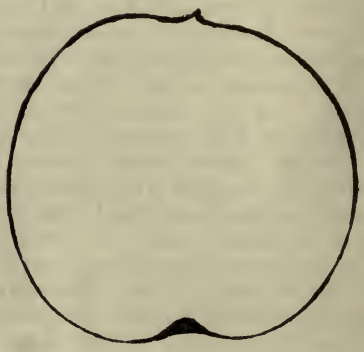
Pine Apple (*Ananas*).—A rather late variety, with large, roundish, somewhat flattened fruit. Skin deep yellow, with a red cheek on the sunny side. Flesh deep yellow, tender, with a rich sugary flavour, somewhat resembling that of the Pine Apple, and adherent to the stone. Stone large roundish-oval, and kernel bitter.

Red Masculine.—A very hardy and productive variety, bearing small roundish fruit, which ripens early in the season. Skin bright yellow, with a deeper tinge and red spots next the sun. Flesh yellow, juicy, and rather musky. Stone small, thick, and kernel bitter.

Roman (*Transparent*).—A vigorous, hardy, and prolific variety, with large oval fruit, slightly compressed, and ripening at mid-season. Skin pale yellow, with a red tinge on the sunny side. Flesh deep yellow, rather dry, not very high flavoured, and separating freely from the stone. Stone large, oblong, and kernel bitter.



Pennant Hil's Oval.



Turkey.

Royal.—A French variety of the *Moorpark* class, with large oval slightly compressed fruit, which ripens about mid-season. Skin yellow, with an orange tinge on the sunny side and slightly shaded with red. Flesh bright yellow, juicy, rich, vinous, and separates freely from the stone. Stone large, oval, and kernel bitter. An excellent Apricot, suitable for dessert, canning, or drying.

Sardinian—A very hardy and prolific early variety, with small roundish fruit that ripens at the beginning of the season. Skin pale, tinged and spotted with crimson on the sunny side. Flesh pale, juicy, with a sweet, sprightly flavour. Stone small, and kernel bitter.

St. Ambroise.—This is a large, medium early Apricot of the *Moorpark* type, with oval, compressed fruit. Skin deep yellow, with a reddish tinge on the sunny side. Flesh firm, rich, juicy, sugary, and somewhat adherent to the stone. Stone large, with a bitter kernel. Tree hardy, vigorous and a good bearer.

Stewart's—This is a variety with medium-sized oblong fruit, especially valuable as it ripens very late. Skin deep orange, with a red tinge next the sun. Flesh deep yellow, juicy, and well flavoured.

Turkey.—This is a hardy, vigorous, free-bearing variety, with medium-sized round fruit, not compressed, ripening at mid-season. Skin deep yellow, mottled with orange next the sun. Flesh pale yellow, firm, juicy, sweet, pleasantly sub-acid, and separating freely from the stone. Stone large, rugged, with a very sweet kernel.

Viard.—An excellent variety belonging to the *Peach-Apricot* class, with medium-sized roundish-oval fruit, which ripens at mid-season. Skin bright pale yellow, with a reddish tinge towards the sun. Flesh pale yellow, juicy, rich, melting, and separates freely. Stone medium-sized, and kernel bitter. Tree vigorous and prolific.

ARGAN.

History and Uses.

This is a widely spreading but somewhat low evergreen, tree with small leaves, indigenous to Barbary and other parts of North Western Africa. Botanically it is known as *Argania sideroxylon, (Sideroxylon spinosum, Eleodendron argania)*, and it belongs to the natural order Sapotaceæ, the Sappodilla or Star Apple Family. Several plants belonging to this family yield edible fruits, and one, *Isonandra gutta*, is the principal source from which gutta percha is obtained. The Argan flourishes in the driest districts in its native country, and has the reputation of being a very long lived and hardy tree. It is an abundant bearer, the fruit being fleshy and about the size and shape of a small plum. In its native country the fruit is utilized to a large extent for feeding cattle, who are very fond of it. But in chewing the cud the kernels are ejected, when they are collected and crushed for oil. The kernels yield a large proportion of excellent oil. The wood is close grained and hard, and well suited for turnery and other purposes.

Cultivation and Propagation.

The Argan is a hardy tree and will adopt itself to a somewhat wide range of climate or soil, and may be grown with more or less success in any district where there is little or no trouble from frosts. It is a tree specially well adapted for the warm interior districts of Queensland and Western Australia, and would prove very serviceable to the owners of stock. Probably if this tree were acclimatised in congenial regions it would increase naturally and spread over large areas. As an ornamental tree the Argan is worthy of cultivation, and in dry districts it might advantageously be grown for shade. The trees should be planted in well prepared ground, at such distances apart as will allow ample room for free development. Propagation may be effected by seed, suckers, layers, and cuttings. Seed should be sown soon after it is ripe, covering it an inch and a half deep. When the young seedlings are large enough to handle, transplant into small beds, leaving them about six inches apart. The following season they may be planted out. Suckers from the roots make very good plants if taken off carefully in early spring or autumn. Plants are readily raised from layers, which should be put down either in the spring or autumn. Cuttings of the current seasons's wood, when fairly ripened, will strike in sand or light soil.

AUSTRALIAN APPLE.

Australia is not rich in native fruits, and the great majority of such as are edible are so inferior as compared with exotic kinds that have been introduced, that they are not worth cultivating, except as ornamental plants. There are two or three exceptions, and it is possible that some kinds now worthless for their fruit, may in time be improved by cultivation. But though of but little commercial value, the writer is of opinion that his work would be incomplete without referring to indigenous fruits. The fruits of many species are known under vernacular names, which have been given from some real or fancied resemblance to well-known exotic kinds, though they may belong to very different families. These are dealt with by the writer in this portion of his work. Another class are merely indigenous species of fruits that are cultivated, and these are placed with the families they belong to.

The fruit known in some of its native localities as the Australian Apple is yielded by a tall evergreen tree known botanically as *Achras australis* (*Sideroxylon australe* of some botanists). It belongs to the natural order Sapotaceæ and is indigenous to Eastern Queensland and the northern coast rivers of New South Wales. The fruit is similar in appearance to a moderate-sized plum, and the flesh is succulent, though somewhat harsh. In many localities the fruit is better known as the Native Plum. The tree when growing under favourable conditions will attain a height of forty or fifty feet, but in poor soils it becomes stunted. It is an ornamental tree, and is worthy of a place in the

shrubbery. Any ordinary good soil will suit this tree, but it thrives best in rich deep land and sheltered situation. It may be grown successfully in localities where the climate is not colder than in Sydney. Propagation is easily effected by seeds, layers, and cuttings of the current season's shoots, when fairly ripened.

AUSTRALIAN CHERRY.

The Australian Cherry, or Native Cherry as it is more generally called, is a tree with foliage and habit of growth similar to a Cypress belonging to the natural order Thymelaceæ or the Daphne family. It is indigenous to a considerable part of Eastern Australia, and is also found in other colonies. Botanically it is known as *Exocarpus cupressiformis*, the specific name being derived from *exo* outside and *karpus* a fruit, in allusion to the curious position of the latter which protrudes from the points of the fleshy receptacles. The berries have a harsh astringent flavor, but they are often eaten by children where the trees grow naturally. For its fruit this tree may be considered absolutely worthless, but its Cypress like foliage and compact habit of growth entitles it to rank as a good ornamental plant. It is very hardy, may be grown in almost any soil or situation, and will thrive in any locality where the frosts are not severe. Propagation is readily effected by seed, and plants may be obtained by either cuttings or layers.

AUSTRALIAN CRANBERRY.

The fruit most generally known as the Native Cranberry, is produced by a plant known botanically as *Lissanthe sapida* belonging to the natural order Epacrideæ or the Epacris family. It is indigenous to the Blue Mountains of New South Wales and other parts of Eastern Australia, and is an erect shrub growing to a height of two or three feet. The flowers are white, produced in loose racemes, and the fruit is red, about the size of Currants. The fruit has a somewhat mealy pulp and an acid flavour. The term Native Cranberry is also applied to the fruit of several species of *Styphelia*, and more particularly to *S. humisifusa* and *S. pinifolia*, which are also known as Groundberries. They are dwarf shrubs indigenous to New South Wales, Victoria, and Tasmania.

AUSTRALIAN DAMSON.

What is known as the "Native Damson" is the fruit of *Nageia spinulosus*, (*Podocarpus spinulosus*) an evergreen tree belonging to the natural order Taxaceæ or the Yew family. It is indigenous to the northern coast districts of New South Wales and Queensland. The tree

attains a height of from thirty to forty feet, is of compact habit of growth, and well adapted for ornamental planting. The fruit which in some localities is also known as the Native Plum, is a small black drupe, having a somewhat austere flavour. The tree is not worth cultivating for its fruit, but is worthy of attention as an ornamental plant. It will succeed in any locality that is not subject to frost. Propagation is most generally effected by seeds, but if necessary plants may be obtained from either layers or cuttings.

AUSTRALIAN DESERT LEMON.

The plant known under this name is *Atalantia glauca* a medium-sized tree belonging to the Aurantaceæ or Citrus family. It is indigenous to various parts of Queensland and New South Wales, and is found more especially in hot arid districts. The fruit which is also known as the Native Kumquat is bright yellow, about half an inch in diameter, and has a sharp acid flavour. Probably it might be improved in size by cultivation. Though the fruit in point of utility is far inferior to the ordinary Lemon yet as the plant is very hardy and capable of withstanding long and severe droughts it might prove worthy of being cultivated in some of the dry interior parts of Australia. Propagation is readily effected by seeds. Plants can also be increased by layers and cuttings of the previous season's wood which will strike freely in sand or light soil.

AUSTRALIAN MULBERRY.

The fruit most widely known under this name is yielded by *Pipturus argenteus* a tree belonging to the order Urticaceæ or the Nettle family. It is indigenous to Queensland and New South Wales. The fruit is whitish, insipid, and of no value commercially though it is eaten by the aboriginals. Another fruit known in some localities as Native Mulberry, is *Hedycarya Cunninghami* (*augustifolia*) a tall shrub or small tree belonging to the natural order Monominiaceæ. The fruit is a small, nearly globular succulent berry, somewhat unpalatable, but eaten by the aboriginals. It is indigenous to Queensland, New South Wales and Victoria. The term Native Mulberry is also applied to the fruit of *Litsea dealbata* a tall robust tree belonging to the Laurineæ or Laurel family. It bears small gobular fruit which are also known as Pigeon Berries.

AUSTRALIAN CURRANT

History and Uses.

This is one of the best of our Australian fruits, and is well deserving of attention for cultivation. It is the plant known in New South Wales

as the Native Currant, and botanically as *Leptomeria acida*, a genus belonging to the natural order *Santalaceæ* or the Santalwood family. The plant is a perennial shrub with slender foliage, somewhat like that of the Broom (*Spartium*), and is an ornamental species. It is found growing plentifully in the sandy soil around Sydney and Botany Bay, but also in other localities in New South Wales where the land is different in character. The plant is also indigenous to several of the other colonies. The fruit is about the size of, and similar in appearance to, the unripe berries of the Red Currant, but does not grow in bunches. It is intensely acid, and so much so that it cannot be eaten in its natural state. This acid flavour is peculiar and unique, as no amount of sugar will obliterate it entirely. The fruit makes an excellent jam, which the writer can recommend as possessing a very palatable flavour, quite distinct from any other kind of fruit. In making the jam, sugar should be used very freely, and must at the least be weight for weight with the fruit. When carefully made the jam may be kept in good condition for several years. The plants yield fruit very regularly, and in fairly large quantities.

Cultivation.

Though as yet, as far as the writer is aware, the Native Currant has not been cultivated as a fruit plant, it is certainly worthy of attention. There ought to be no great difficulty in growing it, as may be assumed from the fact that it has been cultivated in Europe for many years as an ornamental pot plant. It is a plant that would be specially well adapted for peaty or sandy soils containing a fair amount of vegetable matter. This plant resists drought well, and may be grown in any climate where the frosts are but light. The fruit would necessarily become popular when generally known, and doubtless will always find a ready sale. The natural sources of supply in New South Wales are getting exhausted through the careless destruction of the plants, and if the fruit is to be preserved it must be systematically cultivated.

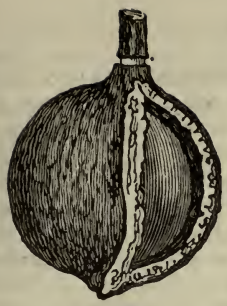
Propagation.

Propagation may be effected by seeds or cuttings. Seed should be sown in rich sandy soil, in pots or boxes, covering it to the depth of half an inch. When the young plants are fit to handle they should be potted off singly into small pots. They are likely to do best in pots, as, like many of our native plants, they are somewhat difficult to shift if their roots get broken, as must necessarily be the case when they are lifted from the ground. Plant in lines four or five feet apart, leaving the same distance between in the rows. The most favourable time for planting is early in the autumn, though it may be done successfully in the winter or spring. Cuttings of the ripened wood will root readily in sand if placed under a bell glass, but, as a rule, better plants will be obtained from seed. After they are established the plants require but little care, and they will be able to stand heat and drought with impunity. A plantation will last several years without requiring renewal.

Fruits passing under the name of Native Currants are also yielded by two other plants, but they are far inferior to those obtained from *Leptomeria acida.* One of these plants is *Coprosma Billardeira,* an evergreen shrub belonging to the order Rubiaceæ. It has round fruit about the size of small peas, and is indigenous to Victoria, New South Wales, and Tasmania. The other is *Myoporum serratum,* a shrub belonging to the order Myoporineæ. Commonly it is known as the Native Myrtle, Native Juniper, and Cockatoo Bush. The fruit is a small globular blue berry. This plant is indigenous to Victoria New South Wales, South Australia, West Australia, and Tasmania.

AUSTRALIAN NUT.

Branch showing Foliage and Fruit.



Nut, natural size.

Kernel, natural size.

History and Uses.

This is a handsome evergreen tree indigenous to the coastal districts of Southern Queensland and the northern rivers of New South Wales. It is commonly known as the Queensland Nut, but the one used in the heading is more appropriate. Botanically it is known as *Macadamia ternifolia*, and it belongs to the natural order Proteaceæ. The tree attains a height of from forty to fifty feet, and has deep green leaves from five to eight inches long, generally serrated, but sometimes not. The flowers are white, produced in long racemes, and in great abundance. The fruit is nearly round, and from three quarters of an inch to an inch in diameter. These nuts, which have very hard shells, enclose a kernel similar in appearance to a Hazel Nut, but richer in flavour. As the trees are very prolific, they are worth cultivating for the sake of their nuts, in congenial localities. They are also well worthy of attention as ornamental trees, and their handsome evergreen foliage will be seen to advantage in the shrubbery. The tree is also of some value for its timber, which is of a red colour, beautifully marked aud close grained, being well adapted for the use of cabinet makers and turners.

Cultivation.

The Australian Nut may be grown successfully in localities where frosts do not occur, bet it is useless to plant it in the cooler districts. It may do well in all but very stiff soils, but thrives best in a deep sandy loam where the drainage is perfect. Shelter is also required, as the trees are apt to suffer when exposed to the full effects of strong winds. The best time for planting is in the autumn, though it may be done at any time between then and September. If planted as orchard trees the distance apart should not be less than thirty feet, as that space will be eventually required by the branches, though not for many years. While the trees are young they should be pruned so as to get them into the desired form. When they get larger they will require but little attention in the way of pruning, all that is necessary being to regulate the growth of over-vigorous shoots, and to thin out the branches when the heads are too much crowded.

Propagation.

Propagation is most readily effected by seeds, but plants may be obtained from layers and cuttings. Seeds may be put in at any time, planting them an inch deep in light soil. As the nuts are very hard, they will, in the ordinary way of planting, take a long time to germinate, and this process may be facilitated, if desired, by placing them previously in a heap of some material in a state of fermentation from heat. When three or four inches high the young plants should be lifted from the seed bed and transplanted into another, or placed in pots. Layering should be done early in the autumn or late in the spring. Cuttings of the ripened wood of the current season's growth will strike in sand or light soil under a hard glass or in a frame.

AUSTRALIAN PEACH.

The plant most generally known as the Native Peach is a small tree called *Santalum Preissianum* (*acuminatum*) belonging to the order Santalaceæ, or the Santalwood family. This plant, however, most commonly passes under its aboriginal name of "Quandong." It is an evergreen with pale green foliage. The succulent fleshy part of the fruit, as also the kernels are edible and used as food by the aborigin als, but the flavour is not very inviting. The hard nuts are extensively used by jewellers for necklaces, pins, and brooches, and are often carved with pretty designs. The Quandong is indigenous to the dry interior districts of Australia, and covers large areas. It is a handsome ornamental tree of compact habit, and the peculiar pale green foliage contrasts well with the darker hues of other shrubs. This plant, however is somewhat capricious under cultivation, and will not bear transplanting The name, Native Peach, is in some localities applied to *Owenia acidula*, which is described under the heading of Australian Plums.

AUSTRALIAN PLUMS.

Fruits of various kinds are known under the name of Native Plum in different parts of Australia. What is known as the Illawarra Black Plum is the fruit of *Cargillea australis* (*Diospyrus Cargillea*, *Maba Cargillea*), a small evergreen tree belonging to the order Ebenaceæ or the Ebony family. The fruit is harsh in flavour, and about half-an-inch in diameter. It is indigenous to Eastern Australia from Queensland as far south as Illawarra. Another species. *Cargillea pentamera*, which is indigenous to the same regions, yields a fruit called the Grey Plum, which is similar in size and flavour to the other kind. *Owenia acidula*, an evergreen tree attaining a height of from thirty to forty feet, is the Sour Plum of Queensland, and also passes under the name of the Native Peach. It belongs to the natural order Meliaceæ. Two other species of *Owenia* vis *cerasifera* and *venosa* also yield fruits similar to the preceding, and these pass under, the

one name of Plums. These species are indigenous to Queensland and the north east portion of New South Wales. All the species yield strong and finely grained wood What is known as Davidson's Plum in Northern Queensland is *Davidsonia pruriens*, an evergreen tree belonging to the natural order Saxifrageæ. This fruit is somewhat remarkable as one of the few edible kinds included in the Saxifrage family. The fruit is dark blue, similar in appearance to a plum, varying somewhat in size, but often as large as a hen's egg, the seeds being comparatively small It has an acid and somewhat sharp flavour, but is pleasant and wholesome. According to Baron von Mueller it is indigenous to the forest ranges of the coastal districts extending from Northern Queensland to the northern part of New South Wales. *Chrysophyllum pruniferum*, a small evergreen tree indigenous to North Queensland, yields a fruit called a Plum in some of its native localities. The fruit is about the size of an Orleans Plum, and is somewhat austere in flavour. This tree belongs to the order Sapotaceæ, and is the only species of the genus found in Australia. *Spondias glabra*, an evergreen small tree belonging to the order Anacardiaceæ, indigenous to the tropical coast regions of Queensland, is known in some places as a Native Plum. The fruit is from an inch to an inch and a-half in diameter, shaped like a plum, flesh reddish-yellow, with a sharp acid flavour. *Spondias Solandri*, a closely allied species also yields and edible plum-like fruit. This is a more hardy species, and extends to the south of the tropical zone. All the trees mentioned may with advantage be cultivated for ornament, and it is possible that the fruits of some of them may be improved by cultivation.

AUSTRALIAN POMEGRANITE.

This is the vernacular name of a small evergreen tree, growing from fourteen to twenty feet high, known botanically as *Capparis Mitchelli*, and belonging to the order Capparidaceæ, or the Caper family. It bears orange coloured fruit from one to two inches in diameter, with a fairly agreeable pulp. Another species, *Capparis arborea*, a somewhat larger tree, also yields an edible fruit similar in size and quality. The last named species is known in some localities as the Grey Plum and Caper Tree The first is rather widely distributed through Victoria, New South Wales, and Queensland, and the second is indigenous to the two last named colonies Both are ornamental trees, and are worth cultivating as such in congenial localities.

AVOCADO PEAR.

History and Uses.

This fruit, which is also known as the Alligator Pear and Subalterns Butter, is indigenous to the West Indies, Mexico, Brazil, and other warm regions in South America. It is a handsome spreading evergreen

tree growing to the height of about 20 feet, and is known botanically as *Persea gratissima* (*Laurus Persea*), natural order Lauraceæ or the Laurel family. The leaves are oblong, with thick prominent veins, and the flowers are a greenish-yellow. The fruit is in shape similar to a large pear, and often attains a weight of two pounds. In flavour the flesh is rich and luscious, and is by many thought to be the most delicious fruit known. It is eaten fresh, and used to some extent when sliced for salads. Very often it is boiled as a vegetable, and eaten with salt and pepper. Through being used in this way it is slso known as the Vegetable Marrow Fruit. Owing to the lusciousness of the pulp, it is usual to use lime juice, vinegar, or spice with the cooked fruit to reduce its richness. The pulp yields about eight per cent. of oil, and the seeds have some medicinal value.

Avocado Pear.

Cultivation and Propagation.

This fruit, being a native of warm regions, can only be grown successfully in those parts of Australia where the climatic conditions are congenial It will, however, adapt itself to a wider range of climate than many other tropical fruits, and is successfully cultivated on the Azore and Canary Islands, as also at Madeira, where the conditions differ considerably from those of its native habitat. The Avocado Pear may be grown successfully through the greater part of Queensland, and more especially in regions bordering the sea-coast, and it would thrive in the Northern River districts of New South Wales. It is also a fruit well suited to the Northern Territory and other tropical and sub-tropical regions. Independent of its value as a fruit tree, the Avocado Pear is worthy of cultivation for ornament in congenial localities. Propagation is readily effected by layers or cuttings of the ripened wood taken off at a joint, and inserted about two inches deep in sand or light soil. Plants may also be readily obtained from seed.

BANANA.

History.

Strictly this name belongs to *Musa sapientum*, though it is also generally applied to the fruit of *Musa paradisiaca* more correctly known as the Plantain. Some botanists maintain that the Banana

is merely a variety of the Plantain, and it is a difficult matter to define the boundary line between the two. The Banana has a shorter and thicker fruit than the Plantain, but there is not much difference in flavour. The stems of the Banana are also more spotted, but they do not differ much in other respects. Though the fruit used in these colonies is commonly known as Bananas, they are in reality Plantains. Musa is the type of the natural order Musaceæ, and the species rank among our largest herbaceous plants. The stems are soft, varying from four to fifteen feet in height, with leaves measuring from six to ten feet in length with a proportionate breadth. The species are indigenous to the warmer parts of Asia, and the useful kinds have been widely distributed by mankind through the tropical regions of the world.

Banana.

Plantain.

Uses.

The Banana is one of the chief food plants in most tropical countries. and is extensively cultivated. It is a fruit that is produced within a year of the time of planting, and will yield a larger amount of food from a given area than any other plant. According to a calculation made by Humbolt the celebrated German traveller and scientist, an area that will yield thirty-three pounds of wheat and ninety-nine of potatoes will produce *four thousand pounds* of Bananas. Consequently the produce of Bananas in proportion to wheat is 133 to 1, and potatoes 44 to 1. Another great recommendation for the Banana is that the fruit is proproduced in succession, and is in season throughout the year. The bunches are produced at the top of the stems, the young fruit surrounding the flower stalk. Bunches will carry from sixty to two hundred and

fifty fruit. and will often weigh over one hundred pounds. The largest number of fruits upon the bunches is obtained from the Chinese Banana, (*Musa Cavendishii*), a distinct species. This species is also known variously as *M. Chinensis*, *M. Nana*, and *M. Regia*. The fruit of the Banana is highly nutritive, and is a staple food in most tropical countries. Bananas are also highly appreciated as a dessert fruit in countries where there is no occasion to depend upon them as food. In India, and other countries, the fruit is largely used when cooked, in various forms as well as in a fresh state. The pulp is also used in the same way as butter when spread upon bread. Bananas are to some extent utilised in India and China when dried, and if properly prepared they can be kept in good condition for several years. The ordinary mode of drying is to remove the skins and expose the fruit on boards or mats to the full power of the sun, taking care to turn it every day till the process is complete. As in drying other fruit, care must be taken that the Bananas are not exposed to rain or dew during the process. When the fruit is thoroughly dry it should be packed firmly in regular layers in small boxes or jars till required for use. If large quantities of fruit have to be dried it may be an advantage to employ artificial heat with an evaporator, as by this means the work can be done more expeditiously. Fruit of the Banana can be turned to account in the form of meal or flour which is very palatable, easy of digestion, and an excellent food for invalids or infants. It also makes palatable puddings and custards, and is considered to be very nourishing. Meal is prepared by slicing and drying, and afterwards grinding the fruit. This meal if carefully prepared can be kept for a long period in close jars or boxes. The fruit by fermentation and pressure will yield a palatable wine, and by distillation a strong and excellent spirit can be obtained.

Cultivation.

The Banana flourishes to perfection in tropical and sub-tropical regions, and will be a profitable fruit to grow in those portions of Australia embraced by those terms. But it is more hardy than many other tropical plants, and may be grown successfully in the warmer portions of the temperate zone. The Banana delights in a rich deep soil, and is specially well adapted for alluvial land, bordering rivers or creeks. If the land is not naturally rich it should be made so, by the free use of manure. In preparing the ground it should be stirred to the depth of at least eighteen inches, so that the plants will have plenty of root room. If necessary, provision must also be made for drainage, as though the banana requires a fairly moist soil, yet it will not thrive when water is stagnating at its roots. Shelter is an important matter in the cultivation of Bananas, as the plants suffer severely when exposed to strong winds. If no natural shelter exists it must be provided by planting dense break-winds of suitable trees. Plantations of Bananas may be made at any time, but the most favourable periods are September and March or April. In order to give the plants ample room for development, and allow space for

working, they should be arranged so as to stand about fifteen feet apart. Planted this distance apart 193 plants will go to an acre. The plantation must be kept as free from weeds as possible, and more especially while the plants are young. When older, with a good spread of leaves, weeds will prove less troublesome. Bananas will commence to yield fruit in from nine to eighteen months after they are planted, according to the size and vigor of the plants. A stem bears only one bunch, and as soon as the fruit is removed this should be cut away, being of no further use. As the plants gain in strength the number of stems will increase. These stems are formed by suckers which spring from the roots, and a strong plant will have them in all stages of development, from the one with its full grown bunch of fruit to another a few inches above the ground. When used in the locality where grown, or for a near market, the bunches should be cut as the fruit shows signs of ripeness. If required for sending long distances, or export, it will be necessary to cut the bunches at an earlier stage. The bunches ripen readily in dark rooms or cellars, or when covered with sand or soil. In addition to cutting away the old fruiting stems, it will be advisable to thin out some of the suckers when too numerous, removing the more weakly ones. As the Banana is a very exhausting crop, frequent dressings of manure are necessary to keep the land in good heart. With good management a plantation will give good returns for seven or eight years. The Chinese or Cavendish Banana is somewhat more hardy than the other kinds, and may be grown successfully with less heat. It has also the recommendation of being more dwarf in habit, as it rarely exceeds six feet in height, and is consequently less liable to injury from high winds.

Propagation and Planting.

Bananas are propagated by the removal of suckers or young shoots that spring from the roots of the old plants. In taking them off as many roots as possible should be removed with them. Care should be taken in planting, that the holes are sufficiently large to allow the roots to be regularly spread in a horizontal position. Deep planting must also be avoided and it will be sufficient to place the roots two or three inches below the surface. When the roots are arranged in their places they should be covered with finely pulverized earth, and this must be firmed by pressure with the foot of the planter.

BAOBAB.

History and Uses.

Baobab is the native name of the fruit of *Adansonia digitata*, an evergreen tree belonging to the natural order Sterculiaceæ. It is indigenous to a large portion of Western Africa, and is said to be the largest fruit tree in the world, though its height is not proportionate to the size of the

trunk and the spread of the branches. Only under exceptional circumstances does this tree attain a greater height than twenty-five feet, but specimens are common whose trunks are from twenty to thirty feet in circumference. The branches will extend from the main stem forty or fifty feet, and are sometimes as thick as the trunks of fairly-sized trees. The flowers are white, and the fruit, which is from eight to twelve inches in length, is covered with a green velvety down, changing to brown when dry. The pulp, in which numerous seeds are imbedded, has a slightly acid and very agreeable flavour. The juice mixed with sugar is considered to be a pleasant drink, and also a specific for pestilential fevers. The leaves dried and reduced to powder are extensively used by the Africans to mix with their food, as they are considered to be effective in diminishing excessive perspiration. By Europeans the leaves and bark, as also the fruit are used medicinally in cases of diarrhœa, fevers and other maladies. The bark of the tree is turned to good account by the Africans for making ropes and cloth. The Baobab is known under the English names of Monkey's Bread and Sour Gourd. An allied species. *Adansonia Gregorii*, commonly known as the Gouty Tree and Cream of Tartar Tree, is indigenous to Northern Australia, and has qualities that should command attention in tropical regions. In habit of growth it is somewhat similar to the African Baobab, though not so large, and from its apparently swollen trunk the name Gouty Tree has originated. The fruit is about six inches in length and three or four in diameter, the pulp having an acid taste somewhat like cream of tartar, hence the other vernacular name. The wood of the Australian species is very soft and spongy, retaining a considerable amount of water which it will yield by pressure. This peculiarity alone would make the tree serviceable in some regions.

The Baobab.

Cultivation and Propagation.

The African Baobab, as also the Australian species, being natives of tropical regions, can only be cultivated in those parts of Australia where the climatic conditions are similar. In suitable localities both should prove useful acquisitions for their fruit, and also as ornamental trees. They would be at home in the coast districts of Queensland and the Northern Territory, or any other region where the Banana and Pine Apple

will thrive. The trees will thrive in any ordinary good land, but the most congenial soil is a deep, rich, sandy loam. Baobab trees in their native regions attain a great age, and there are specimens living supposed to be over one thousand years oid. Propagation is affected by seeds which may be sown at any time, layers which root freely if put down in the autumn or spring, and cuttings of the previous season's wood, inserted in sand in a frame, or under a glass.

BARBERRY.

History and Uses.

Edible fruits are obtained from several species of *Berberis*, a genus which is the type of the natural order *Berberidacæ*. The name is derived from the Arabic *Berberys*. They are mostly deciduous shrubs, found growing in mountain regions in various parts of the world. In the United Kingdom the fruit of *Berberis vulgaris*, a species indigenous to most parts of Europe, is used to some extent under the name of Berberries or Barberries. The berries are red, grow in bunches, are intensely acid, and cannot be eaten in a raw state. They, however, make a piquant acid jelly when preserved with sugar, which is considered to be of some medicinal value, and also a pleasant pickle. This species was formerly very common in England, but it has been banished to a large extent of late years, from the general belief that the plants afforded breeding grounds for the rust fungus that is so troublesome to wheat crops. It embraces a number of varieties that vary considerably in habit, foliage, and colour of the fruit, which includes various shades of red, purple, violet, black, yellow, and white. *Berberis Canadensis*, which yields the American Barberry, is somewhat similar to the European species, and by some botanists is considered to be identical. *Berberis Fremonti*, a handsome American evergreen species, grows eight or ten feet high, and and bears ovate dark blue berries about the size of small Currants. *Berberis Siberica* is a Siberian dwarf species with oval red fruit. *Berberis buxifolia*, a South American species, yields comparatively large black fruit, which is less acid than the common Barberry, but more astringent. This fruit is used to some extent in Chili and Peru. Two species from the Himalayas known as *Berberris Asiatica* and *Berberis Nepalensis*, the latter being an evergreen shrub, also yield edible berries that are utilized in their native localities.

Cultivation and Propagation.

In this part of the world the *Berberis* family are well known as ornamental shrubs, and many species are cultivated as such, but they are not utilised as fruit-bearing plants. It is somewhat doubtful whether they will ever become popular as such, as they are greatly inferior

BARBERRY.

Plant showing Flower and Fruit.

to other fruits that can be as readily grown. As ornamental plants, however, they are well worthy of cultivation, and possibly some people might like to grow them for the double purpose. They are very hardy, will thrive in many parts of Australasia, and more especially in the cooler regions. Any of the species will readily adapt themselves to various kinds of soil, though, as a matter of course, they will flourish more in good than in poor land. They may be introduced with advantage to any garden, and are very effective ornamental plants when growing in the front of shrubberies. Plants are readily obtained from layers or cuttings. The former will root freely if the branches are layered in the spring. Cuttings strike readily in light soil, in the open gronud if put in before the spring growth commences. Propagation may be readily effected by suckers which are generally produced freely from old plants and also by seeds. Seeds should be sown as soon as possible after the berries are fully ripe, covering them half an inch deep.

BARBADOES GOOSEBERRY.

This name is applied to *Peireskia aculeata* (*Cactus Peireskia*), a plant belonging to the Cactacea or Cactus family. It is a native of the West Indies, and differs from other genera belonging to the same order, in having woody branches and proper leaves. In habit of growth the branches have a tendency to trail, or they may become climbers under favourable conditions, and, again, the plants may be shrubby. The branches are round, and furnished with thick flat leaves, more or less covered with stiff spines. The fruit attains the size of a large Gooseberry, and has a juicy pleasant flavour. It is

used to some extent in the West Indies, both fresh and preserved. The young leaves are also turned to account in making salads. The Barbadoes Gooseberry is scarcely worth cultivating for its fruit, as superior kinds are obtainable from other plants. As, however, it is a drought-resisting plant, it may prove useful in the arid desert regions of Australia. Being a native of a warm climate, this plant will only flourish in tropical or sub-tropical regions. Propagation is affected readily by cuttings and seeds. The name Barbadoes Gooseberry is sometimes applied to *Physalis pubescens*, a plant closely allied to the Cape Gooseberry, and described under that heading.

BHEL FRUIT

History and Uses.

Bhel, or Bael, is the Hindustani name for the fruit of *Ægle marmelos*, a large evergreen shrub belonging to the natural order Aurantaceæ or the Orange family. It is indigenous to India and other tropical regions in Asia. The flowers are red and white, very fragrant, and will yield a choice perfume. The fruit is similar in size and shape to an orange, but has a hard rind. It contains from ten to fifteen cells, which are filled with a transparent glutinous pulp that has a fragrant and delicious flavour. So tenacious is this substance that it may be drawn out into fine threads. Medicinally the fruit is considered to be a valuable aperient, and when dried is used as an astringent. From the rind a useful perfume is extracted. The English name for the fruit is Bengal Quince.

Cultivation and Propagation.

As this fruit is a native of tropical regions, it will only thrive in those parts of Australia where the conditions are similar. It may be grown successfully in many parts of Queensland, Port Darwin, and other regions within or near the tropics. In congenial localities this excellent fruit may be cultivated with advantage, as it is generally appreciated by those that are acquainted with it. This plant will thrive in any fairly good soil, and in cultivation requires similar treatment to an Orange tree. Propagation is effected by seeds, layers, and cuttings of the ripened wood of the past season's growth.

BILBERRY.

History and Uses.

The British Bilberry, Bleaberry, or Whortleberry (as it is as often called) is known botanically as *Vaccinium myrtillus*, and belongs to the natural order Vaccinaceæ. It is closely allied to the Cranberry, and is indigenous to the greater part of Europe, Northern Asia, and North America. The plant is a deciduous erect shrub, which attains the height of from three to five feet, and its fruit is similar in size to black Currants, but have a bluish tint, and are covered with a grey

bloom. The fruit has a pleasant acid flavour, somewhat like the Cranberry, and is largely used in the northern countries of Europe and America, either raw with sugar and cream, in tarts, or preserved in the form of jam and jelly. When eaten in either form the fruit is considered to be wholesome, and to have useful medicinal properties. The juice of the berries is also said to be used as a hair dye in some parts of Northern Europe when mixed with the bark of the Alder tree.

Cultivation & Propagation.

This plant is found growing naturally in peaty soils, and yields its fruit in great abundance. Though this fruit has, as yet, received no attention in Australasia, it might prove to be worth cultivating in some of the colonies. Possibly this plant might be naturalized in the alpine regions with advantage. It requires a peaty or sandy soil containing a good proportion of vegetable matter.

In preparing land for this crop, stir deeply without bringing up the under soil, and make provision for taking away any surplus water that is likely to hang in the ground. Though this fruit likes a fair amount of moisture it will not thrive in boggy land, though some other species of the same family will do so. Plant in rows like vines, leaving a space of from eight to ten feet between. The time for planting is between the fall of the leaf in the autumn and the starting of growth in the spring. A plantation will last for a number of years, and when fairly started requires only a moderate amount of attention in keeping clean. But little pruning is required, all that is necessary being to keep the plants shapely, and to thin out the branches when overcrowded.

Propagation may be effected by seeds, cuttings, layers, and root suckers. Seeds should be sown in a frame or pots as soon as possible after they are obtained. When the young plants are large enough to handle they should be pricked out into beds, leaving them three or four inches apart, or shifted into small pots. Shift them again when the plants require more room, and the following season plant out where required. Cuttings of the previous season's wood, if put in before growth commences, will strike in sand or light soil. Layers should be put down before the spring, and will furnish good plants the following season.

Other Species.

Various other species of *Vaccinium* yield edible berries, and might prove worthy of attention from fruit cultivators. Prominent among them are the Bog Bilberry or Great Whortleberry (*Vaccinium uliginosum*), which is indigenous to Europe, Northern Asia, and America, and in habit is similar to the common Bilberry, but the fruit, though nearly alike in colour, is more astringent and inferior. This species flourishes in boggy land, and might prove serviceable in some localities. Two North American species, *Vaccinium Canadense* and *Vaccinium Pennsylvanicum*, which are very closely allied, yield what in the United States are known as Blueberries or Huckleberries, which are highly valued in that part of the world. These and other useful species will be dealt with under a separate heading.

BARBADOES CHERRY

This is the vernacular name for the fruit of *Malpighia glabra*, an evergreen tree, and *Malpighia punifolia* an evergreen shrub belonging to the natural order Malpighiaceæ. Both are indigenous to the West Indies and tropical America, the former being cultivated to some extent in those regions for the sake of its fruit, which in shape and size is similar to the common Cherry. The fruit is juicy and refreshing, and much appreciated in the West Indies. As both species are indigenous to tropical regions they can only be cultivated successfully in those parts of Australia where the climatic conditions are similar. They would probably prove serviceable fruits in many parts of Queensland and North Australia, and are also worthy of cultivation for ornamental purposes, as their bright evergreen foliage is very attractive. Their pretty rose coloured flowers are also a recommendation. Both species thrive best in a light rich soil. Propagation may be readily effected by seeds, layers, and ripened cuttings of the current seasons growth under a glass.

BEARBERRY

History and Uses.

The plant known under this name is *Arctostaphylos Uva-nrsi*, which belongs to the natural order Ericaceæ, or Heath family. Formerly it was called *Arbutus Uva ursi*. It is an evergreen trailing plant having white flowers, and it is indigenous to the alpine and northern regions of Europe, Asia, and America. It is to be found growing in various parts of Scotland, as also in Wales. The plant has leaves somewhat similar to those of the Cranberry, and the same trailing habit of growth. The fruit is red, and also somewhat similar but smaller and more dry and mealy. In some localities the fruit is used in the same way as Cranberries, but it is greatly inferior to them. The plant in some parts of America is known as the Hog Cranberry, in others Upland Cranberry, and also under the name of Grouseberry. As the whole plant has astringent properties it is used to some extent medicinally, and more especially the leaves, which are also sometimes utilized as a substitute for tea. Another species of this genus, *Arctostaphylos manzanita*, is the Mexican Manzanita (Little Apple). The fruit is a dull red, mealy, and pleasantly sub-acid. It is used to some extent by the Mexicans, and is eaten freely by birds and various animals.

Cultivation and Propagation.

The Bearberry grows naturally in poor dry heathy soils, and might prove serviceable in some of the alpine regions of Australia Tasmania and New Zealand. Though not nearly so valuable as the

Cranberry, yet it has the advantage of being able to flourish in poorer and drier land. Propagation is easily effected by seeds, or by layers from the trailing stems which root freely.

BLACKBERRY.

History and Uses

Under the name of Blackberries or Brambles are included several species of the genus *Rubus*, which belongs to the natural order Rosacæa. The genus is widely dispersed, and species are found in Europe, Asia, Africa, North and South America, and Australia has also representatives. All the species yield edible fruits of more or less value, including the Raspberry, and several are worthy of attention by cultivators. The common or English Blackberry is *Rubus fruticosus*, a thorny rambling plant, which is found growing naturally throughout Europe, Middle and Northern Asia· It adapts itself to a variety of soils and other local conditions, and in England and other European countries the fruit, which is produced in abundance, is extensively used for dessert, in tarts and puddings, or, when preserved, in the form if jam. It also makes an excellent wine. The common Blackberry has been naturalized in many parts of Australasia, but it does not maintain its European reputation as a fruit-producer, as the crops are often poor and uncertain. Then, again, from the rapid growth and straggling habit of the plant, it is apt to spread and become a noxious weed if not kept within bounds by constant attention. This has proved to be the case in many localities, and consequently the Blackberry has obtained a somewhat bad reputation. A little care, however, in trimming will keep the plants in order, and in suitable localities it may be cultivated profitably for its fruit, and as a hedge plant. Other European Blackberries are obtained from *Rubus corylifolius* and various other species, and some of these are worth cultivating for their fruit. North America is rich in having several useful species of *Rubus*, some of which yield excellent fruits that are much cultivated in the United States, but are scarcely known in Europe or Australia. The more prominent and useful of the American species are *Rubus cuneifolius*, or Sand Blackberry, which attains a height of three or four feet, is shrubby in habit, and produces well flavoured, black, medium-sized berries that ripen late. This species grows naturally in light sandy soils. *Rubus villosus* is a robust upright species, known in America as the High Blackberry. It attains a height of eight or ten feet, and has very strong thorns. Several excellent varieties have been raised from this species, including the Lawton. *Rubns vitifolius* is the Californian Blackberry. It is a strong free-growing species, with large, oblong, well flavoured fruit. Some of these have been crossed with the Raspberry, and the results have been some very desirable varieties. The British Dewberry is the product of *Rubus cæsius*, a species indigenous to Europe, Northern

and Western Asia, which is extremely hardy and will stand extremes of heat, drought, and frost. This fruit is popular in the countries of Northern Europe, being eaten fresh and preserved in various ways. The fruit also has the advantage of lasting for a considerable time, and till late in the season. This species might possibly prove worthy of cultivation in the cooler portions of Australasia. The American Dewbury is the product of *Rubus Canadensis*, which is extensively distributed over the North American continent. It is a trailing prickly plant with large black fruit of excellent quality, which is largely used in Canada and the United States. This species and its varieties may also be introduced with advantage to some localities. The Cloudberry of Northern Europe is *Rubus Chamæmoras*, a herbaceous perennial species which flourishes in cold regions. The berries which are as large as small Strawberries, are in colour from red to amber, very wholesome, and are largely used fresh or preserved, in Scotland, Sweden, Norway, and some parts of Russia. This plant might possibly succeed in most alpine regions, and prove worthy of cultivation. Several Indian, Japanese, and other species of Rubus may also possibly be utilized with advantage.

Cultivation and Propagation.

All the species and varieties of the Bramble family are easily cultivated, as most of them will readily adapt themselves to soils of different character, though they thrive to the greatest perfection in a rich sandy loam. They are better adapted for the cooler than other districts, and more particularly for alpine regions, where the fruit of all kinds is richer in flavour than when produced in warmer localities. Propagation is readily effected by suckers from the roots, or cuttings, which strike freely in sand or light soil if put in early in the spring. Plants may also be readily obtained from layers, as branches quickly produce roots if covered with a little soil. The trailing kinds require the support of a fence to keep them up, and may be successfully cultivated as hedges round orchards or paddocks. As a matter of course, the plants must be well cut back every winter to keep them within bounds, and care should be taken not to let growth get too dense. The following list includes most of the best kinds either species or varieties, some of the latter being hybrids of uncertain origin, and others having as much of the character of the Raspberry as the Blackberry, though classed as such :—

Species and Varieties.

Common Blackberry (*English Blackberry*).—Fruit medium size, roundish-conical, deep shining black, sweet, juicy, and pleasantly flavoured. Strong in habit, trailing, and a prolific bearer in cool mountain districts.

Cloudberry.—Fruit medium-sized, colour from red to amber, juicy and slightly sub-acid, habit herbaceous, and will thrive only in moist alpine regions.

Crandell's Early.—A popular American variety, which begins to ripen very early in the season. It continues to yield fruit for a long period in the season. The fruit is large and well flavoured, and the plant hardy, robust, and very prolific.

Dewberry.—Fruit medium-sized, bluish black, juicy and well-flavoured. Habit trailing, strong, and suitable for cool districts.

Dorchester.—An American hybrid variety. Fruit large oblong-conical, colour deep shining black, sweet and highly flavoured, large grain, ripens and carries well. Habit strong, upright, and prolific. May be grown where the Raspberry thrives.

English Blackberry.

Himalayan.—A useful and popular kind. Fruit very large, roundish-conical, juicy, with a pleasant flavour, and is produced in succession. Habit trailing and strong, and a good bearer. Will adapt itself to a wider range of climate than the English Blackberry, but thrives to the greatest perfection in cool regions.

Kittatinny.—A popular American variety which is extensively cultivated in th United States. Fruit large to very large, roundish-conical, fine glossy black, juicy, firm, with a rich sweet flavour. Habit upright, very hardy, a free bearer, and lasts for a long period. Requires similar conditions to the Raspberry.

Kittatinny.

Lawton (*New Rochelle*).—A fine American variety. Fruit very large, oval, intensely black, juicy, sweet, with a rich flavour. Habit strong, rambling, with large spines, very hardy and productive. Ripens rather late and lasts a long period Will adapt itself to various soils, and will thrive in any of the cooler districts.

Low Blackberry (*American Dewberry, Trailing Blackberry*).—An American species with very large, roundish-oblong, black fruit, juicy, sweet, and highly flavoured. Habit strong, and is a low trailing prickly shrub. Suitable only for alpine regions.

Dorchester.

Wilson's Early.

Wilson's Early.—An excellent American variety with very large, oblong-oval, slightly pointed, deep black berries, and one of the earliest Blackberries. The fruit has a rich sweet flavour, with a firm flesh, and bears packing and carriage better than most other kinds. In America it is considered to be one of the best Blackberries for market.

Wilson Junior.—This is a seedling from *Wilson's Early* and said to be superior to its parent in size and productiveness. It is also a very early kind, and in other respects similar to the parent.

BLOOD PLUM.

History and Uses.

This fruit is obtained from a small evergreen tree belonging to the Anacardiaceæ or Cashew Nut family, known botanically as *Hæmatostaphis Barteri*. It is indigenous to West Africa, and more especially to the River Niger districts. The leaves are winged, and the small white flowers are produced in panicles. The fruit is about the size of small Damsons, and is borne in bunches somewhat similar to Grapes. It is bright crimson, like blood, hence the vernacular name, and the scientific one has the same origin. The fruit has an acid flavour, and is much relished by the natives of countries where it is indigenous.

Cultivation and Propagation.

Though the Blood Plum is an edible fruit, it is not of sufficient value to make it worth cultivating for economical purposes. As an ornamental tree it may be worthy of attention in tropical or sub-tropical regions, Being a native of warm regions, as a matter of course, it cannot be cultivated in any but the warmest parts of Australia. Propaga ion may be effected by seeds, layers, or cuttings of the previous season's wood.

BRAZIL ALMOND.

History and Uses.

This is an evergreen tree known as *Geoffroya superba*, and belonging to the order Leguminoseæ. It attains a height of thirty of forty feet, and has winged glossy leaves and yellow flowers. The fruit is about the size of a Walnut, and has a greenish yellow skin covered with thick down. The pulp is fleshy, and encloses a very hard nut-like seed. By the South American Indians the pulpy portion of the fruit is used for food, and they turn the kernels of the seeds to account in the same way. The fruit is commonly known in South America under the name of Almender. The wood is very hard, fine grained, takes an excellent polish, and is used to some extent for fine cabinet work.

Cultivation and Propagation.

This tree is not likely to be cultivated to any extent in Australia, as its fruit is insipid, and greatly inferior to many other kinds, though the seeds or nuts have a fairly good flavour. As it is indigenous to warm regions it is suitable only for tropical or semi-tropical localities. Being a drought resisting tree, it might prove useful in some of the hot, dry, interior districts. It is also worth cultivating in shrubberies as an ornamental plant. The best mode of propagation is by seeds, but plants may also be readily obtained from cuttings of the ripened wood.

BRAZIL NUT.

History and Uses.

The Brazil Nut is the fruit of *Bertholletia excelsa* a large handsome tree belonging to the Lecythideæ section of the natural order Myrtaceæ. It is an evergreen with large smooth broad leaves nearly two feet in length, and attains a height of from 100 to 150 feet. The fruit grows upon the upper branches, and when mature, forms a perfect ball about six inches in diameter. It consists of an outer

woody shell which is closely packed with rough shelled three-sided nuts, about an inch and a half in length. Each of the larger shells contains from five to eight nuts. When fully ripe the fruit falls from the trees, and the nuts are eagerly collected, forming an important article of food for both men and some of the lower animals in their native localities, where they are known under the name of Juvia. Considerable quantities of the nuts are exported to Europe, where there is a large demand for them. This tree forms perfect forests in its native localities, and it is dangerous to enter them at the period when the fruit ripens, as being so large and heavy, it falls with great force. In addition to its value as an edible nut, the kernels by pressure yield a fine bland oil which is used to some extent by watchmakers.

Cultivation and Propagation.

The Brazil Nut can only be successfully cultivated in the tropical portions of Australia. Being a valuable tree it is worthy of attention in congenial localities. It grows naturally in deep rich soils bordering the rivers Amazon and Orenoca, and will doubtless thrive well in the coast districts of Queensland and North Australia. Propagation is most commonly effected by seeds, but cuttings of the ripened wood will strike in sand or light soil.

BREAD FRUIT.

History and Uses.

The Bread Fruit is a handsome evergreen tree known as *Artocarpus incisa* (*communis*) belonging to the Artocarpeæ section of the Urticaceæ or Nettle family. It is indigenous to Tahite, and other of the South Sea Islands, as also the Molucca and Sunda Islands. The botanic name is derived from *artos* bread, and *carpus* a fruit, in allusion to the purpose for which it is used. The tree attains a height of from twenty to thirty feet, and has large bright-green deeply lobed leaves which measure from eighteen inches to two feet in length. There are both male and female flowers, and the fruit is globular or oblong, from nine to twelve inches long, and somewhat similar to a melon. The fruit is marked with a number of diamond shaped scars or facets, and the so called Bread is a white spongy substance. The true fruit consists of seeds or nuts, that are embedded in this spongy mass. These seeds are however, seldom produced by trees under cultivation. Bread Fruit, like the Banana, is a staple article of food with the natives of many of the South Sea Islands. They prepare the fruit by roasting it till the outside covering, or shell, is charred sufficiently for it to be rubbed off. The pulp is then eaten, and has a flavour which may be compared to that of ordinary bread and Chestnuts combined. It should be eaten fresh, as when allowed to get stale, the material becomes harsh and woolly. Many Europeans are partial

to the Bread Fruit, and use it when baked, boiled, and in various other ways. It is considered to be wholesome and palatable. The fruits are produced in succession for eight or nine months in the year. Besides its value as a food plant the Bread Fruit is serviceable to the South Sea Islanders in various other ways. The inner bark is converted into a coarse kind of cloth, and the light yellow wood is utilised for various purposes. A tenacious gum or caoutchouc is obtained from the milky juice of the tree.

The earliest account of the Bread Fruit was given by Captain Dampier, who voyaged through the South Sea Islands over three hundred years ago. His description of the tree was a very glowing one. The scientific men who accompanied Captain Cook in his voyages had a very high opinion as to its value, and in his official report, Dr. Solander the botanist, stated it to be "the most useful vegetable in the world." These representations induced the British Government to take steps for the introduction of the Bread Fruit to the West Indian Colonies. With this object in view, a vessel called the Bounty, was fitted out expressly and placed under the command of Captain Bligh. The object however was not attained then, owing to a mutiny among the crew, and seizure of the vessel by the malcontents, which are matters of history. A few years afterwards, however the object was successfully accomplished by a vessel under the command of the same officer.

Bread Fruit.

A tree called *Treculia africana*, belonging to the same natural order, yields what is known as the African Bread Fruit. It is an evergreen, attaining a height of from twenty to thirty feet. The fruit is about twelve inches in diameter, but, unlike the ordinary Bread Fruit, the only portion used is the nuts or seeds. These seeds, which are numerous, are ground into meal and used as food by the natives of tropical West Africa, where the tree is indigenous.

Cultivation and Propagation.

The Bread Fruit can only be successfully cultivated in the tropical or sub-tropical regions of Australia. In congenial localities it is a serviceable fruit, and is also worthy of attention as an ornamental tree. There are several varieties that are known, and their fruit varies somewhat in size, and also in the period of ripening. By carefully selecting the kinds, a supply of fruit may be obtained throughout the year. A rich, deep, and moderately moist soil is required by the Bread Fruit. Shelter is also essential to the well-being of the trees. Propagation is easily effected by suckers, which

are generally produced freely from the roots. Cuttings of matured wood may be struck in sand under a glass, but they are very uncertain.

BREAD NUT.

This name is applied to the fruit of a large evergreen tree known as *Brosimum Alicastrum* belonging to the Artocarpeæ section of the order Urticaceæ. It is indigenous to the West Indies, and is allied to the Bread Fruit. The fruit is the size of large Plums, and is used by the negroes, when baked with salt, fish, or meat, and as a pickle. When roasted the fruit has a similar taste to a Chestnut, and is both wholesome and palatable. The leaves and young shoots are used to some extent in Jamaica for feeding cattle, and are said to make excellent fodder. An excellent timber is also obtained from this tree. This tree will only thrive within the sub-tropics, but in regions that are suitable, it is worthy of attention for its fruit, and also as a fodder plant. It is also desirable as an ornamental tree. The Bread Nut will thrive in any ordinary good soil, but prefers a rich deep sandy loam. Propagation may be effected by the same means as recommended for the Bread Fruit.

BUFFALO BERRY

History vnd Uses.

This is a deciduous shrub, or small tree, known botanically as *Shepherdia argentea* belonging to the natural order of Eleagnaceæ. It is indigenous to a considerable portion of North America, where its fruit formerly, was greatly valued by the aboriginal Indians. In some parts of America the fruit is more generally known as "Rabbit Berry." The leaves are oblong, silvery white on both sides, and the small yellow flowers are borne in the axils of the branches. There are both male and female flowers borne on separate plants, the former, or sterile ones, having a four-parted calyx and eight stamens. The female, or fertile flower, has an urn shaped calyx enclosing an ovary which develops into a round berry like fruit about the size of a Currant. The fruit is in colour a dull red, and has a sprightly acid flavour. It is borne in compact clusters, and ripens late in the summer or autumn. The fruit is produced abundantly and makes a very good preserve. It may also be used with advantage when fresh, for pies and puddings. Another species *Shepherdia canadensis* also yields an edible fruit, somewhat similar in appearance, but less acid in flavour and rather insipid.

Cultivation and Propagation

The Buffalo Berry may be cultivated successfully for its fruit in the cooler regions of Australia, and is well adapted for Tasmania and

BUFFALO BERRY.

Branch showing Flowers, Foliage and Fruit

New Zealand. As it is a free bearer it may prove a very useful fruit in many localities. As an ornamental plant it is well worthy of a place in the shrubbery or pleasure garden, where its beautiful silvery white foliage will be very effective. The thorn-like character

Male Flowers.

Female Flowers.

of the small branches also make it a very suitable plant for hedges. The Buffalo Berry may be cultivated successfully in any ordinary good soil, but it is partial to deep moist land that borders rivers and creeks. There being both male and female plants it is necessary that at least one of the former to six of the latter should be included in a plantation. The plants should be arranged so as to stand about twelve feet apart. Propagation may be readily effected by seeds, cuttings, suckers or layers. Seed should be sown thinly while fresh, in shallow drills, covering it an inch deep. The following season the young plants should be placed in rows a foot apart, leaving twice that space below the lines. They will usually bloom the third year from the seed, when the male and female plants can be separated. Layers root freely, the proper time for this method being in the spring. Suckers from the roots are sometimes produced, and these if taken off, make very good plants. Cuttings of the previous seasons wood will root freely if planted in the spring.

CAMBUCA.

This is the native name for the fruit of *Marliera glomerata*, a tall evergreen shrub, or small tree, indigenous to Brazil, and belonging to the order Myrtaceæ. The fruits are about the size of Apricots, pleasantly flavoured, and are popular in their native country. Another species, *Marliera tomentosa*, indigenous to the same country, yields sweet berries about the size of Cherries, known by the native name of Guaparanga. Both kinds may be grown successfully in the tropical and sub-tropical regions of Australia, and, being handsome plants, are worthy of cultivation for ornament only. They are also deserving of attention as fruit-bearing

trees in suitable localities. They will thrive in any ordinary good soil. Propagation is effected by seeds, which should be planted two or three inches deep, layers, and cuttings of the ripened wood of the current season's growth.

CAPE CHESTNUT.

History and Uses

This is a beautiful evergreen tree known to botanists as *Calodendron Capense*, and belonging to the natural order Rutaceæ, or the Rue family. It is a native of the Cape of Good Hope, and attains a height of forty or fifty feet. The leaves are broad and eliptical, and the flowers are white. The fruit is five-celled, and enclosed in a five-angled prickly capsule. In flavour it resembles the Chestnut, hence the common name, and it is used both raw and when roasted.

Cultivation and Propagation.

The Cape Chestnut may be cultivated successfully in all but the coldest districts in Australia and New Zealand. It is a remarkably handsome tr ee, makes rapid growth, and may be used with advantage in ornamental plantations. This tree is also well adapted for avenues and parks. As a fruit tree it is well worthy of attention, as it yields its palatable nuts freely. It may be grown successfully in any ordinary good soil, and requires but little attention after it has made a fair start. Propagation is easily effected by seeds, which should be sown in the spring or autumn, covering them about two inches. Young plants may also be obtained from cuttings of the ripened shoots of the current season's growth, which strike freely in sand or light soil under a glass.

CAPE GOOSEBERRY

History and Uses.

The plant bearing this name is a native of tropical America, known to botanists as *Physalis Peruviana*, and belonging to the natural order Solanaceæ. It is a perennial plant in warm regions, but in colder countries it becomes an annual. In some of the colonies the plant is cultivated to a limited extent for its fruit, but it has not received much attention generally, though it is well worthy of a place in the garden. The fruit is produced in abundance, has a pleasant acidulous flavour, and may be eaten fresh or preserved in the form of jam. It is yellow, about the size of a small Cherry, and is covered with a bladder-like calyx, from which circumstance the generic scientific name has been derived. The common name is by no means appropriate, as the plant is not a native of the Cape of

Good Hope neither has the fruit any resemblance to a Gooseberry. Closely allied to the Cape Gooseberry is the Strawberry Tomato, or Winter Cherry, which is the fruit of *Physalis Alkekengi*, a perennial species, said to have originally come from Persia, but now widely distributed throughout Southern Europe, North Africa, and Asia, extending to Japan. This plant is more hardy than the Cape Gooseberry, very prolific, and ripens its fruit later in the season. The fruit is red, pleasantly flavoured, very wholesome, and may be used fresh or preserved. Another closely allied and useful species is *Physalis pubescens*, which yields a fruit known as the Barbadoes Gooseberry or Gooseberry Tomato. It is an annual plant, and a native of the warmer parts of North and South America. The fruit is small, pleasantly acidulous, and much appreciated in the countries where it is found.

Cultivation and Propagation.

The Cape Gooseberry, Strawberry Tomato, and Gooseberry Tomato, may be grown successfully in all but the coldest parts of Australia with a little care, and deserve more attention than they now receive. They however require a rich soil and a sheltered situation, and thrive best in a highly-manured sandy loam. Though the two first named are naturally perennial, yet it will be advisable except in the warmer regions, to renew them annually, as they are apt to get cut back in the winter by frosts. The seed should be sown as with Tomatoes, and it will be an advantage to get the plants started as early as possible. Plants may be forwarded considerably by sowing the seed in a hot bed, and potting off the plants as soon as they are large enough to handle. As soon as all danger from frost has passed the plants may be put out where they are to remain. Plant singly in rows three or four feet apart, leaving the same distance between in the lines. Weeds should be kept down as far as is practicable, and more especially during the early stages of growth, so that the plants will be able to make fair headway. Mulching may be used with advantage if the ground is covered before the hot weather sets in. By adopting this plan the surface moisture will be retained much longer than otherwise, to the great advantage of the plants.

CAPE PLUM.

This is the common name for the fruit of *Carissa grandiflora*, a thorny South African shrub, belonging to the natural order Apocynaceæ. The fruit is similar in size and shape to a small plum, and makes an excellent jam. Another species, *Carissa Carandas*, indigenous to India and China, a large spiny shrub, yields a small plum-like fruit known as the Carandas, which is used for pickling and preserving as a jam. The fruit of a species indigenous to East Australia, (*Carissa Brownii*) which is somewhat similar, can also be utilized for the same purposes. All the species named may be grown successfully in the southern colonies of Australia,

and New Zealand. They are handsome ornamental shrubs, are well adapted for garden hedges, will adapt themselves to any soil or situation, and are able to withstand long droughts. Propagation is most readily effected by layers, which should be put down early in the autumn or spring. Cuttings of the ripened shoots of the current season's growth will strike readily in sand under a glass. Plants may also be raised from seeds, which should be covered to the depth of half-an-inch.

CAPSICUM.

History.

Capsicum is a genus belonging to the natural order Solanaceæ, and derives its name from the Greek *Kapto*, to bite, in allusion to the pungent properties of the fruit. There are a number of species, including annuals, biennials, and perennials, all possessing similar properties more or less. They are very widely dispersed, species being indigenous to both the East and West Indies, China, Japan, and Egypt, as also Brazil, Mexico, and other tropical parts of South America. Many of the species differ considerably from others in the shape, size, colour, and pungency of their fruits. Some of the species embrace several varieties, and these often differ materially in various ways from the parent plant. The small fruited kinds are more familiarly known to many as Chilies, which is said to be the Mexican name of the genus.

Uses.

Capsicums are used in a variety of ways, and they form an essential part of several well-known condiments. They are largely used in making mixed or other pickles, either when green or ripe, to give pungency. In the preparation of what is known as Chili Vinegar, Capsicums are the principal ingredient, and they are largely used for seasoning various dishes. Large quantities of Capsicums are used in the manufacture of Cayenne pepper, which is the most pungent of all condiments. In preparing Cayenne pepper the fruit is gathered when perfectly ripe, and dried in the sun, after which it is ground to a powder and mixed with a proportion of salt, but only a small quantity. The powder is then thoroughly dried and packed away in air-tight bottles or jars. When required for pickles the fruit may be used either green or ripe. Before using the fruit the seeds should be removed, and the pods soaked in salt and water for twenty-four hours. It is advisable to change the water after the fruit has been soaking twelve hours. The fruit, after the soaking process, should be thoroughly drained, and then it may be used either by itself or with other materials, by pouring boiling vinegar over it, and filling into bottles or jars. These, after their contents have cooled, must be tightly stopped to exclude the air. Chili Vinegar is made by putting a handful of fruit into a bottle, filling up with vinegar, and corking tightly.

In the West Indies a preparation called Cayenne Pepper Pot is much esteemed and extensively used. It is made from the ripe pods, which are first thoroughly dried by the sun, and then placed in earthen pots in layers, with flour between each. The vessels are then placed in an oven, and slightly heated to remove any moisture that may remain. After this process the fruit is taken out of the vessels without the flour, and the pods and seeds are ground into a fine powder. Flour is then added in the proportion of one pound to an ounce of the powder, and yeast as in making ordinary bread. The whole is then mixed well together, and made into small flat cakes which are baked in the ordinary way. These cakes may be kept for a considerable time, and are reduced to powder when required for use. In India a very popular preparation called Mandram is made chiefly from Capsicums. It is made from the ripe pods which are cut and mixed with thin slices of Cucumber, garlic, or shallots chopped fine, with a small quantity of lime juice and wine added. These materials are well mixed, and vinegar poured over them, when they are ready for use. This is considered to be an excellent preparation for stimulating the appetite. Capsicums or preparations made from them are used extensively by the natives of countries where they are indigenous, who consider them to have valuable properties.

Medicinally the Capsicum possesses some valuable qualities, and is serviceable in various complaints. The pods and seeds contain a warm acrid oil which is considered useful in promoting digestion, for invigorating the blood, assisting the action of the bowels, and correcting flatulency arising from the use of vegetables. For lethargy, coma, and delirium, which often accompany tropical fevers, a poultice of the bruised seeds is said to have a more speedy remedial effect than anything else. In dropsical complaints a small quantity of the powdered seed is said to frequently afford relief when other remedies fail. Capsicums are sometimes used successfully in cases of yellow fever, and are said to have a soothing effect upon the stomach, and to often cause a favourable turn in that complaint. Sometimes the seeds are used as a remedy for pleurisy and paralysis, being bruised, mixed with lard, and rubbed upon the affected parts. When used for these complaints, this remedy is said to frequently afford substantial relief when others fail. Capsicums have been used beneficially in cases of scarlatina, and as a throat gargle when mixed with barley water for sufferers from influenza. The pepper is often used effectively as a cure for tooth-ache when placed in the cavities of hollow teeth. In cases of opthalmia from relaxation of the membranes of the eye, the greatly diluted juice is said to have been employed with good effect, and in some parts of South America it is used by the Indians to strengthen their sight when they are spearing fish. If the pods of Capsicums are thrown upon a fire, a strong pungent vapour is produced that is noxious to most persons, as it will cause sneezing and even vomiting. Capsicums are generally admitted to be wholesome when used in moderation, but when used in excess by themselves or in preparations in which they form the basis, they are injurious, and the frequent cause of liver complaint. The fruit gathered fresh and eaten in small quantities before meals is said to be an aid to digestion, but when used too freely the stomach is liable to injury.

Cultivation.

The Capsicum is a tender plant, and cannot withstand frosts or cold winds consequently, it is no use attempting to cultivate when those contingencies are probable. The plants thrive to the greatest perfection in the warmer portions of Australia, where the perennial species will retain their vigor for several years. But it is quite possible to grow the annual species to perfection, and also other kinds with extra care, in the cooler districts, as also in Tasmania and New Zealand. In the medium warm or cooler regions it is useless either to sow seed or plant in the open ground till all danger from frost has passed. But growth may be forwarded by growing seed in a hot bed in winter, potting off the young plants as soon as they are fit to handle, and keeping them steadily growing till the season is sufficiently advanced for planting them out. In the warmer regions not subject to frost, planting or sowing should be done early in the spring. The biennial and perennial species will make uninterrupted growth through the winter in tropical or semi-tropical regions, but in cooler localities they must be slightly sheltered to protect them from the effects of frosts. In the colder districts it will be necessary to take up and house the plants during the winter, in order to preserve them. Capsicums may be classed as ornamental plants, and, independent of their value for economic purposes, are desirable for flower gardens, where their high coloured fruit is very effective. When grown as a crop Capsicums should be planted in rows, four or five feet apart, leaving the same distance between in the lines, according to the growth of the kind. All the species are strong feeders, and require a rich soil to bring them to perfection.

Propagation.

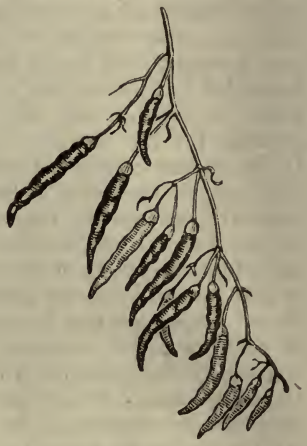
Capsicums are usually raised from seed, but, if necessary, the biennial and perennial species may be readily propagated from cuttings. When seed is required the largest and best shaped pods should be selected for the purpose, allowing them to get thoroughly ripe. The pods should then be allowed to get thoroughly dry, and, when practicable, the seed ought to be left in them till it is required for use. Seed should be sown in light rich soil, covering it to the depth of a quarter of an inch. It may be sown in the open ground, but the results will be more certain if a frame is used. When the young plants are about two inches high, they should be replanted into small beds, or potted, to remain till five or six inches in height, when they may be planted out permanently. They may be planted direct from the seed beds, but there will be less risk by transplanting previously as recommended. Cuttings of the young shoots, taken off three or four inches long, will strike freely if inserted about an inch deep in sand or light soil.

Species.

The following list includes the most desirable species in cultivation, and each of these has several varieties that differ more or less from their parents.

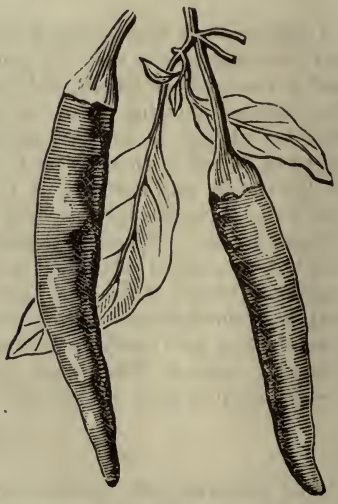
Capsicum annua (*Guinea Pepper*).—This is an annual species, indigenous to India, and was the first of the family known in Europe. It is stated to have been introduced to England over 300 years ago. This species grows about two feet high, and includes varieties with both red and yellow fruit, as also those with long slender pods, and others with round thick ones.

Bullock's Heart.



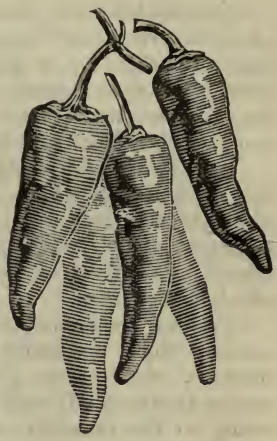
Bird Pepper.

Cherry Capsicum.

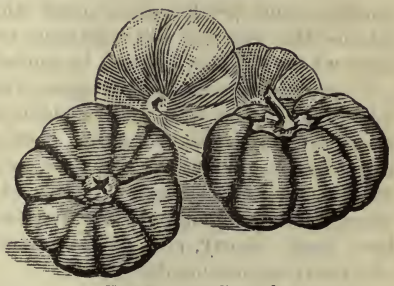


Chili Pepper.

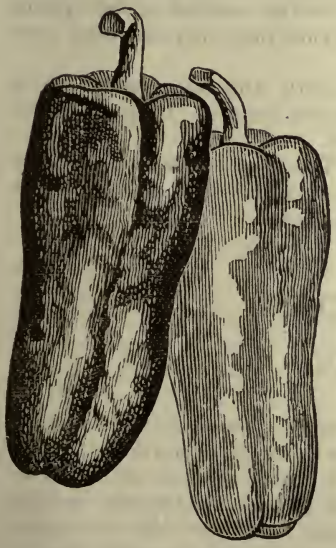
Mammoth.



Long Red.



Tomato or Squash.



Monstrous.

Long Cayenne.

Capsicum baccatum (*Bird Pepper*).—This is a shrubby perennial species, whose native country appears to be not known with certainty, though some authorities are of opinion that it originally came from Brazil. The plants grow from eighteen inches to two feet in height, and have slender branches and small leaves. There are varieties with both red and yellow fruit, which is small and intensely pungent.

Capsicum cerasiforme (*Cherry Capsicum*).—This is an annual species from the West Indies, which derives its name from the shape of the fruit, which, in size and form, resembles a Cherry. The plants grow to the height of about two feet, and are more spreading in habit than most other kinds. There are several varieties with both red and yellow fruit, which is very acrid.

Capsicum frutescens (*Shrubby Capsicum*).—This is a perennial shrubby species, which, according to some authorities, is indigenous to South America, while others give India as its native country. This is the species that is chiefly used for making the Cayenne pepper of commerce, owing to the durability of the plant, and its freedom in bearing. It includes varieties with both red and yellow fruit, which is small and very pungent, and produced in great abundance. Under favourable conditions this species will continue to bear freely for three or four years, after which the plant should be renewed.

Capsicum grossum (*Bell Pepper, Bullock's Heart, Bull Nose*).—This is a biennial species from India, which attains a height of two or three feet. There are several varieties with both red and yellow fruit, which is very large, being often three or four inches in diameter. The fruit is in flavour much milder than the other kinds, and is well adapted for pickles when great pungency is not required. As the varieties of this species have large, showy, and singular-looking fruit, they may be used very effectively as ornamental plants.

Capsicum longum.—This is an annual South American species, which is utilized to some extent in making Cayenne pepper. It grows about two feet high, and bears long pungent fruit.

Capsicum sinense (*Chinese Capsicum*).—This is an ornamental shrubby perennial species, which grows about two feet high. The fruit is bright yellow, ovate in shape, and moderately pungent.

CARAMBOLA.

History and Uses.

This name is applied to the fruit of *Averrhoa Carambola*, an evergreen tree belonging to the natural order Oxalidaceæ, or the Wood Sorrel family. It is a native of Ceylon and India, and attains a height of twenty or thirty feet. The flowers are a greenish-red, produced in racemes, and the fruit is oval, about the size of a hen's egg, with three ridges or angles. The pulp is soft, juicy, and refreshing, one kind being sweet and used as a table fruit, while the other is sharply acid and utilized for cooking and

preserving. The green fruit is also turned to account as a pickle. Very closely allied to the Carambola is the Blimbing, the Indian name for the fruit of *Averrhoa Bilimbi*, a beautiful evergreen tree. It is indigenous to India, grows to the height of twenty or thirty feet, and has winged leaves, which are slightly sensitive when touched or shook. The flowers are reddish-yellow, and the fruit is oblong and about the size of an Egg Plum. The Pulp is juicy and pleasantly acid. It is used in the same way as the Carambola. The mode of bearing is somewhat singular in both species, as the flowers and fruit are frequently produced upon the trunks below the leaves.

Cultivation and Propagation.

As the Carambola and Blimbing are so closely allied, and come from the same regions, they require precisely similar treatment. Though natives of warm countries they are not so tender as many other tropical plants, and are said to be able to stand light frosts with impunity. They may be cultivated successfully in any portion of Australia within the sub-tropical regions, and even further south in warm sheltered spots in the coast river districts of Northern New South Wales. Where the climatic conditions are favourable both trees are well worth cultivating for the sake of their fruit, which is greatly relished in India. The plants require a fairly good soil, and should be sheltered from strong winds. Propagation is mostly effected by seeds, which should be sown when fresh, covering them to the depth of an inch. Cuttings of the ripened wood will strike in sand under a glass.

CAROB.

History.

This is a handsome and useful evergreen tree belonging to the natural order Leguminosæ, known botanically as *Ceratonia siliqua*. It is most commonly known as the Carob, but also under the names of Locust, Algaroba, and St. John's Bread Tree. The latter name has originated from the tradition that the fruit of this tree supplied food to St. John the Baptist in the Wilderness. Throughout Palestine the most familiar name is "The Locust Tree." Carob is derived from *keras*, a horn, in allusion to the shape of the pods, or "beans," as they are most commonly called. Algaroba is a Spanish form of Carob, and is applied to other trees belonging to the order Leguminosæ that have sweet edible pods, The Carob is indigenous to Palestine and other regions along the eastern shores of the Mediterranean Sea, and under favourable conditions attains a height of forty to fifty feet. It is a compact growing tree, with dark green shining foliage. There are both male and female flowers, which usually are produced upon separate trees, but not invariably. Sometimes both classes of flowers are produced upon the one tree, and occasionally

the flowers are hermaphrodite, that is, furnished with stamens and pistils. The flowers are reddish, small, and produced in racemes. When the female flowers are fertilized they are succeeded by curved pods about an inch in width, and from five to ten in length.

Uses.

The Carob is used extensively in its native regions, as also in the South of Europe and Northern Africa as food for horses, cattle, sheep, and pigs. It is also frequently used as food by human beings. In Egypt, Italy, Spain, Turkey, and Syria, the ground pods are mixed with maize meal, and made into bread. In the first-named country and throughout Palestine, a sweet syrup or honey is extracted from the pods, and forms and important article of diet. All kinds of stock are very fond of Carob beans, and the flesh of cattle, sheep, and pigs is said to be greatly improved by their use. Dairy cows are said to yield more milk when supplied with Carob beans, while at the same time it will be richer in cream.Large quantities of the pods are imported to Great Britain every year from eastern Mediterranean countries, and they are used as horse feed, as also for cattle and sheep. They are very nourishing, as they contain about 66 per cent. of sugar and gum. Some of the patent mixtures sold as "cattle food" are largely composed of meal made from Carob beans. The pods are dried, ground, and used as a substitute for chocolate. With the addition of water and fermented, they are converted into a palatable beverage, and a good spirit may be obtained from them by distillation. A medicinal syrup is also extracted from the pods. While green, the pods contain a large percentage of tannic acid, and considerable quantities are used in the preparation of Morocco and other fine leathers. The fruit-bearing trees are usually very prolific, and in their native regions a plantation is considered to be of equal value with a vineyard or olive grove. According to Chambers, instances are on record of single trees yielding nearly half a ton of pods in a season. Under ordinary favourable conditions the Carob will attain a great age. Many trees are known to be over a hundred years old, and still in a flourishing condition. The Carob should be widely cultivated in Australia as a tree supplying food for stock. Being in a large measure able to resist drought, it is a tree deserving of special attention in the dry interior districts of Australia. Being a handsome tree, the Carob may also with advantage be planted for ornament, and large specimens afford a grateful shade in warm regions. This tree also makes an excellent breakwind for vineyards or orchards in hot dry districts when planted close, though it is somewhat slow in growth for a few years. The wood of the Carob is hard, heavy, fine-grained, and valuable to cabinet makers and turners.

Cultivation

The Carob will adapt itself to a wide range of climate and may be cultivated successfully throughout a considerable portion of Australasia. In fact it will thrive in any locality where the frosts are not severe. It

CAROB.

Raceme of Male Flowers.

Seeds.

Raceme of Female Flowers.

Pods or Beans.

is equally accommodating as regards soils, and will thrive in light sand, gravel, or rich alluvial ground. But it is more especially at home when planted in calcareous or limestone soils. As a matter of course, however, trees will grow faster and stronger in rich than in poor land. The land should be prepared by working it to the depth of at least fifteen inches, and, when necessary, drainage must be provided for, as the Carob cannot stand its roots being soddened. Planting should be done early in the autumn or spring, taking care not to expose the roots. If grown for their fruit alone, the trees should be planted at least twenty-four feet apart, in order to allow room for development. When planted as a breakwind, from ten to twelve feet apart will be a proper distance. As a matter of course, it is only the female and hermaphrodite trees that will bear fruit, and there must be to the former a proportion of male plants, say about one in ten. This will be a difficulty with cultivators when seedling trees are used, as their sex cannot be ascertained till they flower. It will not arise, however, when trees have been propagated by layers, cuttings, or grafting, as the plants will then be the same as their parents. In the early stages of growth it will be necessary to prune the trees so as to get compact, well-formed heads and clear stems for three or four feet above the ground at the least. The Carob is slow in growth for the first few years, and also in coming into bearing. Seedlings are nine or ten years old before they begin to bear, but trees from layers, cuttings, or grafts will generally begin to yield fruit in six or seven years. When from twelve to fifteen years old, the trees are usually in full bearing condition, and, as a rule, they yield regular and heavy crops. As soon as the pods are fully ripe they will begin to fall from the trees, and the common way of using them for live stock, in the countries where they are grown for the purpose, is to let the animals pick them up. If required for storing, however, the pods may be shaken from the trees, or beaten off with light poles, taking care to spread them out till they are thoroughly dry. If packed in heaps when taken direct from the trees, they are apt to ferment, turn colour, and deteriorate in quality.

Propagation.

The Carob may be propagated by seeds, layers, cuttings, grafting, and budding. Plants are easily obtained from seed, but the great drawback to this method of propagation is that the grower is always uncertain as to the sex of the trees. Seed may be sown at any period of the year, but themost favourable time is early in the spring. As the outer covering of theseeds is very hard, they should be prepared by pouring boiling water upon them, and must then be allowed to soak for about a week or ten days. They should then be sown in light free soil, covering them to the depth of half-an-inch, and pressing the earth firmly upon them. The young plants will be ready for putting out in the following season. Layers may be put down early in the autumn or spring, preparing them with a tongue or heel. Cuttings will strike readily in sand or light soil if put in towards the end of the summer or in autumn. They should be made from the ripened wood of the current season's growth, leaving them

about six inches long, shortening back the leaves, and inserting them about two inches deep. Grafting may be done just as growth is beginning to get active. Budding should be done after mid-summer, when the current season's growth has matured to some extent, and while the bark will rise freely from the wood. Both budding and grafting may be practised with advantage in the case of seedling trees, so as to insure the right proportion of male and female plants.

CASHEW NUT.

History and Uses.

The Cashew Nut is known botanically as *Anacardium occidentale*, and it is the type of the natural order Anacardiaceæ. It is a handsome evergreen tree, growing to the height of from fifteen to twenty feet, and a native of the West Indies. The leaves are somewhat like those of the Walnut, and have a similar smell. The sweet-scented reddish-green flowers are produced in corymbs, and the so-called fruit is formed by the enlargement of the foot stalks, or peduncles. This fleshy substance is as large as a moderately-sized orange, and possesses an agreeable sub-acid flavour, but is somewhat astringent. It is largely used in the East and West Indies, as also in tropical America. The true fruit is a heart-shaped nut that is formed at the end of the fleshy peduncle. This nut is an inch or more in length, and contains two shells, the outer one being smooth and ash-coloured. There is a space between the two shells that is filled with a thick, black, caustic juice, which is utilized in dying and for marking linen. Within the inner shell is the kernel, which contains a sweet milky juice, and is very palatable when eaten fresh. The kernels are eaten like Chestnuts, either raw or when roasted. They are said to be used to some extent to improve the flavour of chocolate. By pressure an oil equal to olive may be obtained, and the trunk and branches of the tree when wounded yield a material similar to gum arabic.

Cashew Nut.

Cultivation and Propagation.

As the Cashew Nut is a native of tropical regions, it can only be grown in those parts of Australia where the climate is congenial. Being a handsome evergreen tree of moderate growth. it is worthy of cultivation for ornamental purposes, independent of the value of its fruit. It will thrive in any ordinary good soil, but prefers a rich sandy loam of moderate depth. The trees for a year or two after planting will require some little attention in pruning to make them shapely, but afterwards the only care required is to keep the weeds down. Propagation is most usually effected by seeds, which should be sown in spring or autumn, covering them about two inches. Plants may also be readily obtained from cuttings of fairly ripened wood of the current season's growth, with the leaves left on, which will strike freely in sand under a glass.

CHERRY.

History.

Botanically the Cherry is now known as Cerasus, but a few years ago it was classed with the Prunus, or Plum family, from which, however, it differs materially. It belongs to the extensive natural order Rosaceæ, or Rose family, which embraces many of our cultivated fruits. The generic name is supposed to have originated from Cerasus, a town in Armenia, from whence the Cherry was introduced into Europe. The common or English name Cherry was originally Cherise, taken from the French term Cerise, which had its source in Cerasus.

This favourite and useful summer fruit is supposed to have originated in Asia Minor, and according to historical records, was introduced into Europe by the Roman general Lucullus about seventy years previous to the Christian era. Soon after its introduction to Italy it became a very popular fruit with the Romans, and was rapidly distributed through the European continent. Pliny mentions eight kinds of Cherries as being known to the Romans in his time, and he specially notices one variety that never appeared to be ripe, having a hue between green, red, and black. The same writer informs us that Cherries were carried to Britain before the Christian era. He also tells us that "if Cherries are eaten (swallowing the stones) from the tree while the dew is upon them in the morning it is a good cure for gout in the feet."

Though the Cherry is said to have been introduced to Britain by the Romans at a very early date, yet, if so, it must have been lost during the Saxon era, as it is not mentioned in the records of that period. Some old writers inform us that Cherries were commonly sold in the streets of London very early in the fifteenth century, while others assert this fruit was re-introduced in the beginning of Henry VIII.'s reign. According to the latter assertion, Cherry trees

were introduced from Flanders, and first planted at Sittingbourne in Kent, a county ever since famous for this fruit. Historical records inform us that in the year 1540, one season's fruit in a Kentish Cherry orchard, thirty-two acres in extent, sold for £1000—a very large sum at that period. Old records also inform us that early in the sixteenth century Cherries were commonly sold in the streets of London, and that it was usual to announce the commencement of the season by carrying boughs loaded with fruit through the principal thoroughfares.

Cherries vary considerably in their characteristics, and there are doubts as to the sources from which some of the classes have been derived. Attempts have been made by prominent writers upon the science of pomology to classify the different types of Cherries, but efforts have not been so successful as could be desired, and a more perfect system is required. The well-known English pomologist, Dr. Hogg, classes Cherries in two main divisions, one of which he calls Geans, and this includes the Heart and Bigarreau sections; the other division termed Griottes embraces the Duke and Morello sections. These divisions are subdivided again, the distinctions being based upon the shape of the fruit and the colour of the flesh and juice. Mr. Downing, the celebrated American pomologist, simply divides Cherries into two classes—one comprising the Heart and Bigarreau, and the other the Duke and Morello sections. Most of the names used to identify the divisions and sections are of French origin, some retaining their purity, while others have been corrupted. Gean is a corruption of the French word Guigne, which means a Heart Cherry. The pure name is, however, used by many in preferance to the word gean. The name Bigarreau is applied to a section having firm, fleshy fruit, though literally it means a white "Heart Cherry." Griotte means literally a "Black Cherry." but the name is now applied generally to the tender-fleshed Cherries. Duke is an abbreviation of "Mayduke," a prominent variety in its class, that name being a corruption of Medoc, a province in France, in which this kind is supposed to have originated. Morello comes from the French Morelle, the name of the Morel, on account of the original type being supposed to have a flavour somewhat similar to that esculent fungus.

Most of the Guigne or heart Cherries, have originated from *Cerasus avium*, the wild, black Cherry, which is common to the woods of the United Kingdom and many other parts of Europe. This is a very hardy and robust species, which attains a large size when growing under naturally favourable conditions. The other portion of the Guigne family comes from *Cerasus Juliana*, another robust species, which grows wild in many parts of Southern Europe. The Bigarreau family have originated from *Cerasus duracina* and *Cerasus caproniana* both species being common in the southern parts of Europe. The Duke and Morello sections have come from *Cerasus vulgaris*, the wild, red, sour cherry which is found growing naturally in the United Kingdom and in many other parts of Europe. *Cerasus Padus*, a small-growing species common to many parts of Great Britain, but more plentiful in Scotland than in England, is the Bird Cherry. This

name has been obtained through the fruit being largely consumed by birds. The fruit of this species is black, small, and austere, but though unpleasant to the taste it is used to some extent for flavouring whisky and other spirits. *Cerasus Mahaleb* is the Perfumed Cherry, a species indigenous to Austria and Hungary, and largely used as a dwarfing stock for the common varieties. The wood is highly perfumed, hence the common name, and much valued for cabinet work. The fruit is small, black, asd shining, and so hard before it is fully ripe that it is often pierced and used as a substitute for beads. *Cerasus emarginata* is a very robust American species, that attains a height of twenty to twenty-five feet. It bears abundantly small roundish fruit that has a very bitter and astringent flavour. Possibly this species if fairly tried, would be found to be a useful stock for ordinary Cherries. *Cerasus ilicifolia* is the Evergreen or Holly-leaved Cherry of California. It is a handsome small tree, with bright shining dark-green foliage, and is worthy of attention for ornamental purposes. The fruit is black or red, about half-an-inch in diameter, having a pleasant sub-acid flavour, but somewhat astringent, and the kernel has a rich almond flavour. *Cerasus serotina* the Black Cherry of North East America is a hardy species found mostly on poor land near the sea coast. It has pleasant vinous flavoured, but slightly bitter fruit. *Cerasus tomentosa* a Chinese species yields an edible fruit of fair quality. Both the English and the Portugal Laurels, though differing materially in appearance and in other ways from our edible Cherries, belong to the same family, the former being known as *Cerasus lauro-cerasus* and the latter as *Cerasus lusitanica*. Several species and varieties of the Cherry family in addition to those already mentioned are used solely for ornamental purposes. The more prominent of these are the Large Double-flowering Cherry, a strong-growing variety of *Cerasus avium*, which blooms profusely early in the spring and produces large pure-white flowers an inch and a-half in diameter. The Dwarf Double-flowering Cherry is a variety of *Cerasus vulgaris*, very dwarf and compact in habit, with flowers somewhat similar to the last mentioned kind but not quite so large. The Weeping Cherry is a fruit-bearing variety of *Cerasus vulgaris*, with slender weeping branches and myrtle-like foliage. The Chinese Double-flowering Cherry is *Cerasus serrulata*. This species is rather dwarf in habit, and produces in abundance white flowers slightly tinged with pink.

Uses.

The Cherry is a popular and excellent early summer dessert fruit, and is also largely used for culinary and other purposes. As table fruit the Heart and the Bigarreau sections possess the best qualities, and are most generally cultivated. The Duke and Morello sections are the best for culinary purposes and some other requirements. Large quantities of Cherries are now preserved by canning, the varieties best adapted for this purpose being those that are somewhat tough in fibre and rather tart in flavour. The fleshy sorts make an

excellent preserve when halved, stoned, and dried either by sun power or by artificial heat. An excellent wine can be made from Cherries, the Duke and Morello sections being most suitable for the purpose. In Europe the fresh fruit, and more especially that of the wild species, is used extensively for flavouring brandy. The favourite liqueurs, Noyau, Ratafia, Kirschwasser, and Maraschino, are either wholly or partially obtained from Cherries. Kirschwasser is made by distilling the juice of the common Black Heart Cherry after it has fermented, the stones being ground up and mixed with it. Maraschino, which is chiefly made in Italy, is distilled from the juice of Heart Cherries after it has slightly fermented, a portion of the leaves and kernels, dried and powdered, being added with honey. Ratafia and Noyau are flavoured to a considerable extent by the kernels of Cherries. Trees of all classes of edible Cherries yield gum in large quantities, which is highly nutritious and almost identical with gum arabic. Medicinally the bark is used as a tonic and astringent by the Scandinavian races, and liquor distilled from the fruit of the wild Cherry *Cerasus avium* is said to be used with advantage in cases of convulsions. *Cerasus Padus*, the Bird Cherry, yields a lage proportion of prussic acid from the leaves by distillation, and a decoction of the fruit has proved useful in cases of dysentery. The wood of the common Cherries is hard, tough, fine grained, and takes a good polish, which makes it valuable to cabinetmakers and turners. The wood of the Bird Cherry is beautifully veined, and though not attaining a large growth it is highly prized for fancy work by European cabinetmakers.

Cultivation

The Cherry thrives to the greatest perfection in a moderately cool climate, but it may be grown successfully in all but very warm regions. In the warmer districts, however, the trees are not likely to prove so durable and profitable as when grown in a more congenial climate. Any ordinary good soil is suitable to the Cherry, which will readily adapt itself to various classes. The most favourable soil, however, is a rich, deep, sandy or gravelly loam, with an open sub-soil. In preparing the land for planting let it be thoroughly worked and stirred to the depth of at least fifteen inches, and more especially if the soil is heavy and retentive. In the case of light, open land, with a free sub-soil, a deep ploughing may be a sufficient working, as the roots will be able to find their way down without much assistance. Perfect drainage is essential, as the trees will never do any good if their roots stand in soddened ground for lengthened periods. If the natural drainage is insufficient it should invariably be provided for when the land is prepared for planting. Trees may be planted at any time between the fall of the leaf and the starting of growth in the spring, but the most favourable time is from the beginning of July to the middle of August, according to the locality. Strong, straight-stemmed, young trees, with well-balanced heads, should be selected, and these ought to be taken up with as little injury to their

roots as possible. Do not expose the roots for any length of time to a drying atmosphere, and remove any that are broken or bruised. Care must also be taken not to plant too deeply; if the upper roots are just below the surface it will be sufficient. Trees when they attain their full growth, require to stand not less than eighteen feet apart; but many growers prefer them worked on dwarfing stocks, and plant closer. The Cherry is not a long-lived tree like the Apple, Pear, or Orange, and will seldom last in this part of the world more than twenty years, even under the most favourable conditions.

The ground should be kept as clean as possible, as an undergrowth of grass and weeds is injurious, and more especially in the spring or early summer, as it helps to exhaust the moisture in the soil. Clean the ground with the scarifier or hoe in preferance to ploughing or digging deeply, as the less the roots are disturbed the better. Before the hot weather sets in, it will be advisable to mulch the trees as far as their roots extend. Keep the trees in good heart if necessary by the use of manure, and do not let them become stunted or sickly through lack of proper nourishment.

Pruning and Training.

The Cherry must be pruned with judgement, as it is somewhat impatient of the knife. Young trees must have their branches reduced in number and shortened back when necessary, to promote a strong woody growth and get the plants into the proper shape. Mature trees require but little pruning as a rule—merely the removal of rank and misplaced shoots and shortening the branches when necessary—to preserve the compactness and symmetry of the trees. The Cherry produces its fruit on small spurs of two, three, or more years' growth. The necessity for winter pruning may be obviated to a large extent by rubbing off superfluous shoots early in the summer. Root pruning may be practised with advantage when trees are making an over-luxuriant growth of wood and producing but little fruit. Cherry trees should invariably be trained with low heads, as when grown in this way they suffer less from strong winds, afford a better shade for the stems, the fruit can be gathered with the least trouble, and the work of pruning more easily done.

Gathering and Packing.

Cherries must be gathered as soon as they are sufficiently ripe, taking care to pick with the stalks attached, and not to injure the buds,. The fruit should be picked when perfectly dry, and when not heated by the sun. Boxes holding about ten pounds are the most suitable packages as regards size, and these when sent long distances to market, should be arranged in crates that will hold twelve. The fruit should be closely, evenly, and neatly packed in the boxes, so that when opened it will show to the best advantage. Too frequently Cherries are merely thrown into the cases, to the

injury of the fruit, and causing it have a less attractive appearance than would be the case with careful packing.

Propagation.

Propagation is effected chiefly by budding, though grafting is sometimes practised; and trees may be raised from layers, suckers, and seeds. Seedlings, as a matter of course, are uncertain in character, and are seldom raised except for stocks. Budding may be done at any time when the bark of the current season's growth will separate freely from the wood, but as a rule the most favourable period is soon after mid-summer. Grafting can be done just before growth starts in the spring, but it does not offer such advantages as budding. Stocks are often obtained from layers or suckers, but these never make good trees, and therefore only seedlings should be used. Seedlings of any strong variety may be used as stocks, but those that have a tendency to throw up suckers freely should be avoided. The stock most generally used in this part of the world is the common Mazzard, which has given fair satisfaction. *Cerasus Padus*, the Bird Cherry, is sometimes used as a stock, especially for varieties belonging to the Duke class, for which it has proved suitable. Morello and Mahaleb stocks are frequently used for dwarfing trees, the last-mentioned kind being specially well adapted for shallow or poor soils.

Varieties.

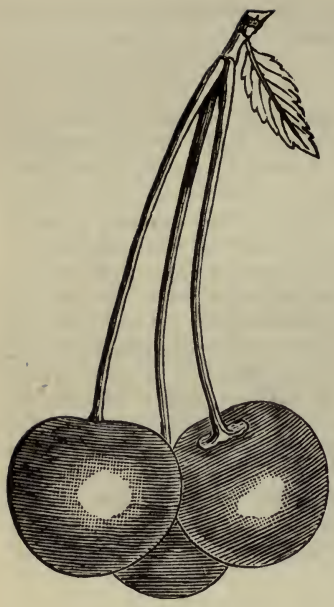
There are a great many varieties in cultivation, but a limited selection will be sufficient for cultivators as a rule. The following list embraces a large number of reputable varieties:—

Archduke.—A variety belonging to the Duke class, with large, roundish, heart-shaped fruit, which ripens late in the season. Skin thin, dark red to black. Flesh deep red, tender, juicy, sweet, and briskly flavoured. Tree vigorous and prolific.

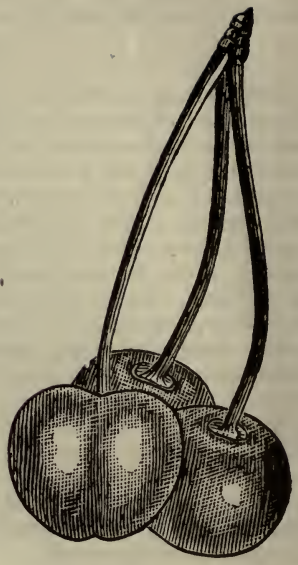
Autumn Bigarreau (*Belle Agathe*).—This is a useful variety, raised in Belgium, belonging to the Bigarreau section, with small, heart-shaped fruit produced in clusters, especially valuable as it comes to maturity very late in the season and will hang on the trees for a long time after it is ripe. Skin dark crimson, lightly mottled with yellow. Flesh yellowish, firm, sweet, and well flavoured.

Belle de Choisy.—A French variety, belonging to the Duke class, with large, round fruit, which ripens at mid-season. Skin pale amber, mottled lightly with red, very thin and transparent, showing the flesh beneath. Flesh amber coloured, melting juicy, rich, sugary with a slight sub-acid flavour. Tree hardy, vigorous, and a fairly good bearer.

Belle d'Orleans.—This is a very early variety, belonging to the Guigne class with medium-sized, roundish fruit. Skin pale yellow, tinged with red on the sunny side. Flesh yellowish white, very juicy, sweet, and well flavoured. Tree vigorous in habit, and generally bears well.

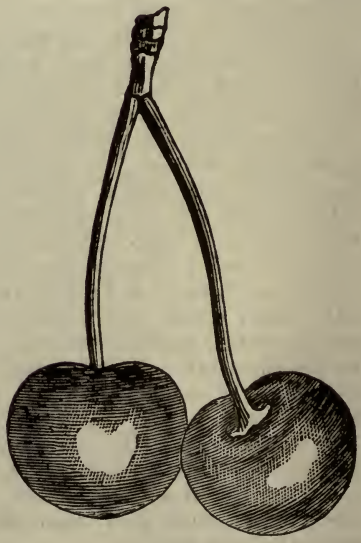


Archduke.

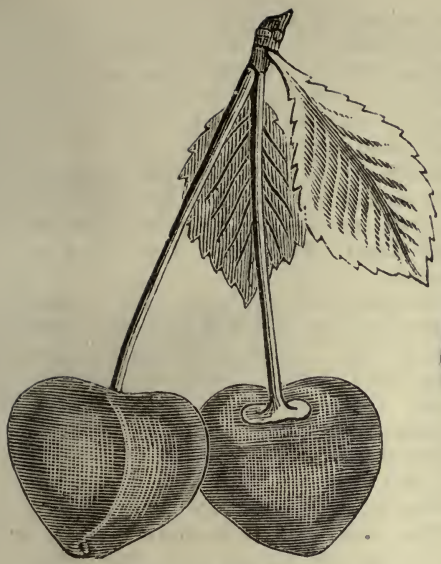


Belle d'Orleans.

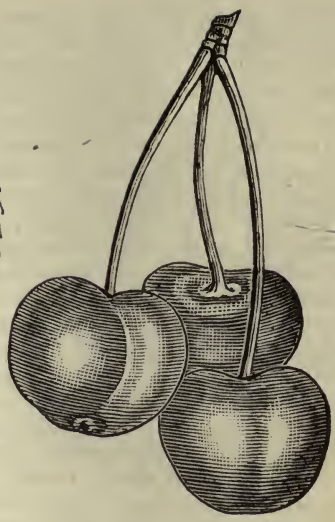
Autumn Bigarreau.



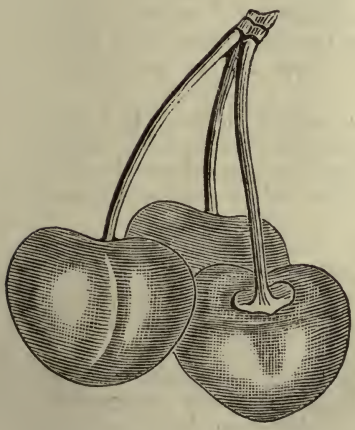
Belle de Choisy.



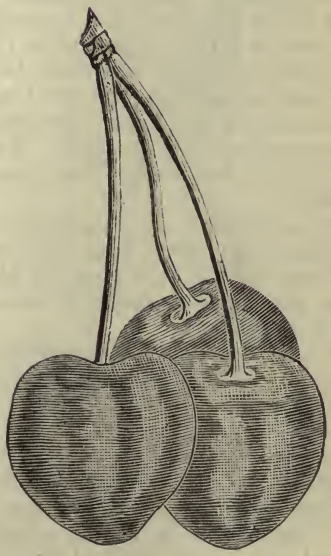
Belle Magnifique.



Bigarreau.



Bigarreau de Hildesheim



Bigarreau de Holland.

Belle Magnifique.—A French variety belonging to the Morello class, with large, roundish fruit, inclining to heart-shape, which ripens late in the season. Skin a uniform bright red when fully ripe. Flesh yellowish, tender, juicy, with a sprightly sub-acid flavour. Tree hardy, vigorous, and very productive. Fruit excellent for culinary purposes, and for dessert when fully ripe.

Bigarreau.—This fine old variety is the type of the Bigarreau section. The fruit is very large, obtuse heart-shaped, and ripens at mid-season. Skin pale yellow, waxy, spotted and marbled with red. Flesh pale yellow, firm, rich, and highly flavoured. Tree vigorous, spreading in habit, and a free bearer.

Bigarreau de Hildesheim,—A German variety, with medium-sized heart-shaped fruit, which ripens late in the season. Skin pale yellow, mottled with red next the sun. Flesh pale yellow, firm, sweet, and luscious. An excellent late Cherry.

Bigarreau de Holland (*Spotted Bigarreau*).—An excellent and popular variety, with large, regular, heart-shaped fruit, inclining to oblong, which ripens about mid-season. Skin pale amber yellow, with a light red cheek, dotted and marbled with crimson. Flesh yellowish white, firm, juicy, sweet, and highly flavoured. Largely used in America for canning. Tree robust and productive.

Bigarreau de Mezel (*Monstrous Heart*).—A variety with very large, obtuse heart-shaped fruit, which ripens at mid-season. Skin deep shining red, approaching to black at maturity. Flesh high coloured, firm, juicy, and well flavoured. Tree vigorous, wide-spreading and a free bearer. An excellent and profitable Cherry.

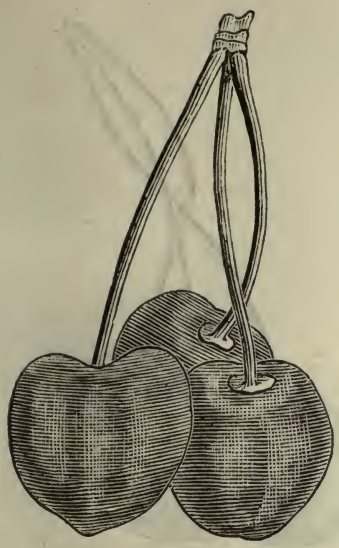
Bigarreau Napoleon.—Though marked in nurserymen's catalogues as a distinct variety, this is similar in every respect to *Bigarreau de Holland*, and they appear to be identical.

Black Eagle.—An excellent old English variety, said to be a cross between a Bigarreau and the Mayduke. The fruit is medium-sized, heart-shaped, and ripens immediately after the *Black Tartarian.* Skin deep purple to nearly black. Flesh deep purple, tender, very juicy, and highly flavoured. Tree vigorous, with large foliage, and a good bearer.

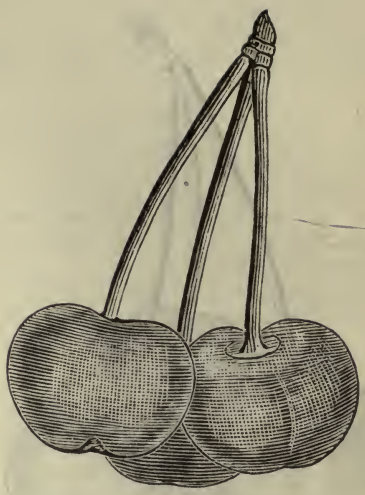
Black Hawk.—An American variety of repute, belonging to the Guigne class, with large, obtuse heart-shaped fruit, which ripens medium early. Skin purplish black. Flesh dark purple, moderately firm, juicy, sweet, and well flavoured. Tree robust, spreading, and fairly prolific.

Black Heart.—An old English variety, belonging to the Guigne section, with heart-shaped fruit, rather above the medium size, and ripens medium early. Skin dark purple to black. Flesh purple, tender, juicy, and sweet. Tree very robust, grows to a large size, and bears freely.

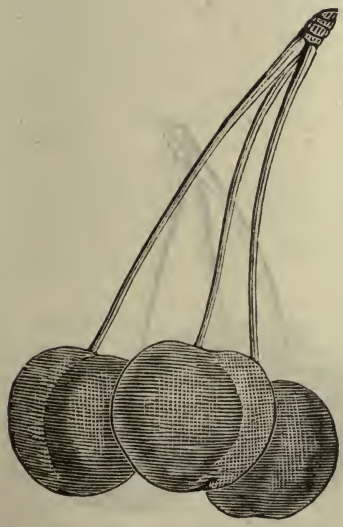
Black Tartarian (*Black Circassian, Black Russian*).—This excellent and well-known variety belongs to the Guigne class, is supposed to have originated in Russia or some part of Western Asia, and was introduced to England about a hundred years ago. Fruit large, obtuse heart-shaped, and ripening medium early. Skin bright



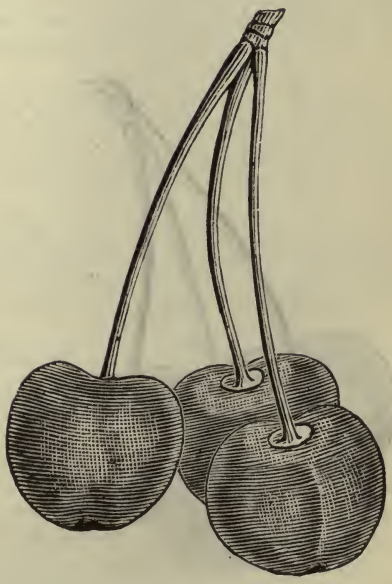
Bigarreau de Mezel.



Black Eagle.

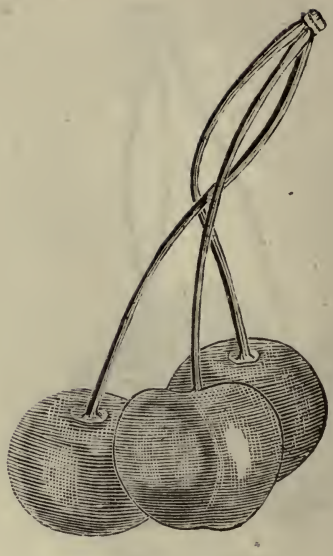


Black Heart.

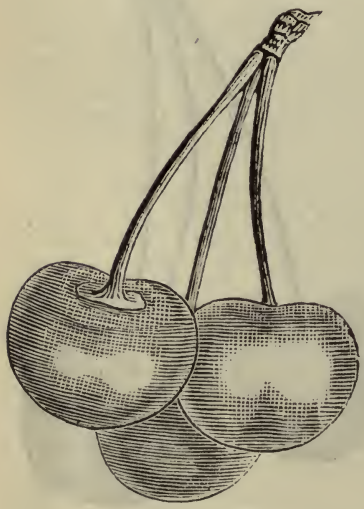


Black Hawk.

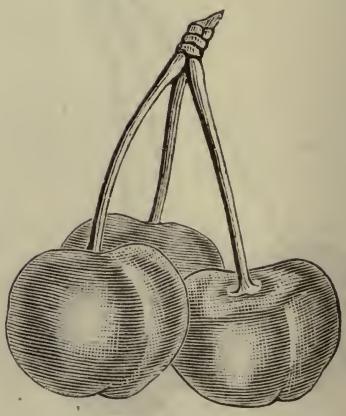
Cleveland Bigarreau.



Black Tartarian.



Downton.



Bohemian Black Bigarreau.

purplish black. Flesh purplish red, juicy, firm, and rich, with a small stone. Tree remarkably hardy and robust, erect in habit, with large foliage, and bears freely.

Bohemian Black Bigarreau.—A German variety with very large, roundish heart-shaped fruit, which ripens early. Skin black and shining. Flesh very dark, firm, juicy, and richly flavoured. Tree vigorous, hardy, and moderately productive. This is an excellent Cherry, and one of the earliest of the Bigarreau section.

Cleveland Bigarreau.—An excellent American variety, with large obtuse heart-shaped fruit, which ripens at mid-season. Skin pale yellow, with a deep red cheek. Flesh yellowish white, moderately firm, very juicy, sweet, and well flavoured. Tree very thrifty and productive.

Downton.—An old and reputable English variety, belonging to the Bigarreau class, with large, roundish heart-shaped fruit, which ripens a little after mid-season. Skin semi-transparent, pale yellow, stained with red dots and marbled with red on the sunny side. Flesh yellowish, tender, richly flavoured, and slightly adhering to the stone. Tree robust with a spreading head, and moderately productive.

Early Black Bigarreau.—A fine early variety, with large, distinctly heart-shaped fruit. Skin deep black. Flesh dark purple, firm, sweet and richly flavoured. Tree strong, and bears moderately well.

Early Purple Guigne (*Early Purple Griotte, German Mayduke*).—An excellent variety, of doubtful origin, and the earliest dark Cherry in cultivation. Fruit medium size, roundish heart-shape. Skin very dark purple black. Flesh purple, tender, juicy, with a rich, sweet flavour. Tree hardy, strong, spreading, and a good bearer. One of the best early black Cherries.

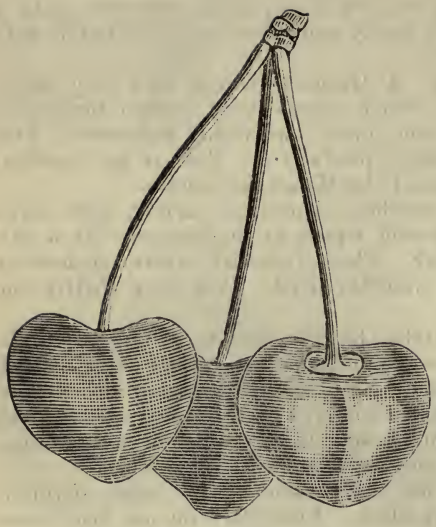
Early Lyons.—This is an excellent early black Cherry of the Guigne class, which ripens immediately after the *Early Purple Guigne.* Fruit large, obtuse heart-shaped. Skin very deep purple. Flesh stained with red, tender, juicy, sweet, and rich. Tree thrifty and prolific.

Early Red Bi arreau.—An excellent early Bigarreau, which ripens some days before others of its class. Fruit large, and decidedly heart shaped. Skin bright red, and transparent. Flesh yellowish white, very firm, sweet, and richly flavoured. Tree robust, spreading, and bears freely.

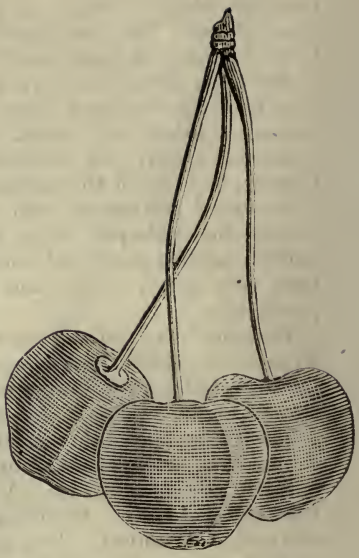
Early Rivers.—A variety belonging to the Guigne class, which ripens very early, and bears medium-sized, heart shaped fruit. Skin purple black. Flesh purple, tender, juicy, and sweet. Tree hardy and prolific.

Elton.—An old and popular English variety, belonging to the Bigarreau section. Fruit large, heart-shaped, rather pointed, and ripens at mid-season. Skin thin, pale yellow, tinged and mottled with red on the sunny side. Flesh yellowish white, moderately firm, juicy, sweet, with a very luscious flavour. Tree vigorous, and bears freely.

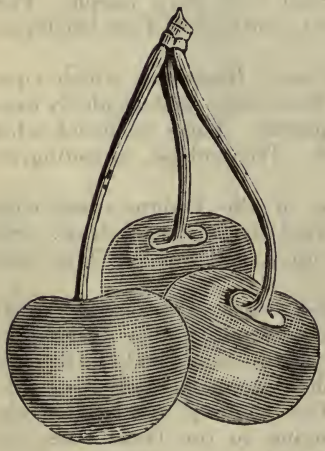
Empress Eugenia.—A variety belonging to the Duke class, with large roundish fruit, which ripens about mid-season. Skin deep bright



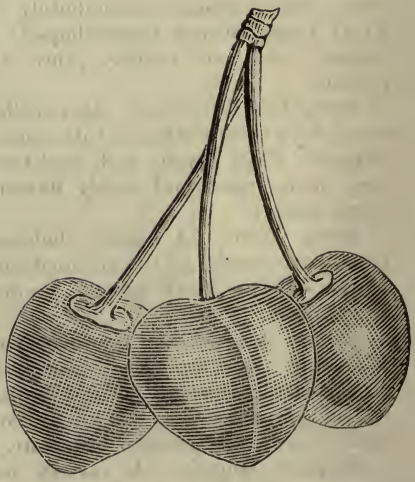
Early Black Bigarreau.



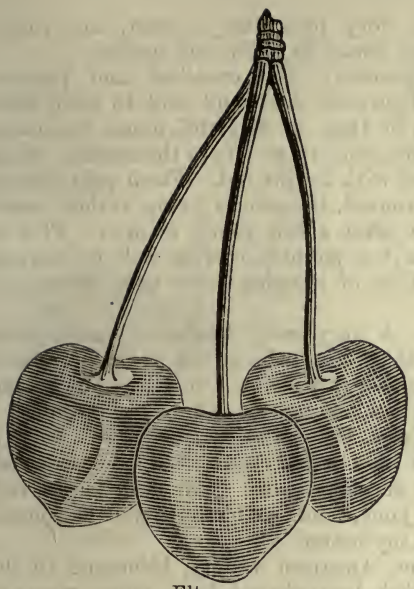
Early Purple Guigne.



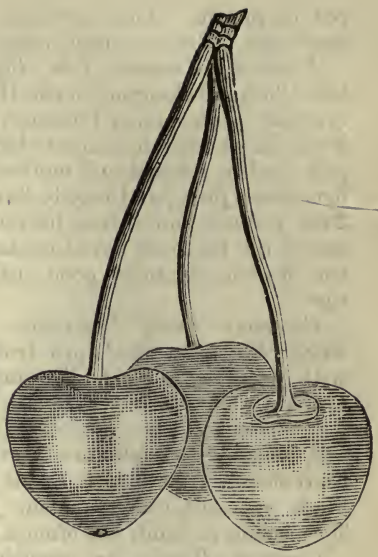
Early Lyons.



Early Red Bigarreau.

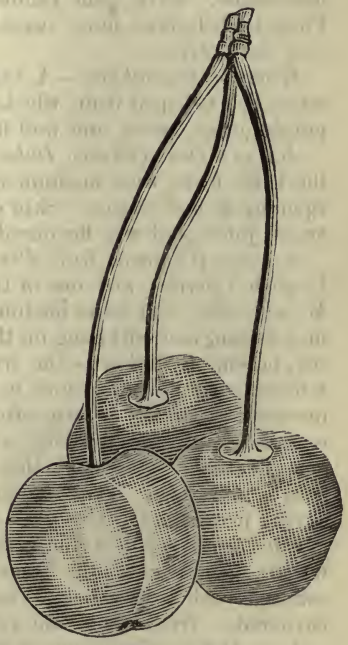


Elton.



Early Rivers.

Empress Eugenia.



Florence.

red to purple. Flesh reddish, very firm, juicy, sweet, and richly flavoured. Tree compact, rather dwarf in habit, and prolific.

Florence (*Knevett's Late Bigarreau*).—An excellent and popular late Cherry, belonging to the Bigarreau class, and said to have been originally taken from Florence, in Italy, to England, hence its name. Fruit large, roundish heart-shape, and ripens late in the season. Skin pale amber, flushed and mottled with bright red. Flesh pale amber, firm, very juicy, and highly flavoured, the stones being rather small. Tree robust, and a free bearer after a few years' growth. This is one of the best late varieties, as it is popular, carries well to market, and has the additional good quality of hanging some time after it is ripe.

Frogmore Early Bigarreau.—A very early English Cherry, with large, obtuse heart-shaped fruit. Skin pale waxen yellow, suffused with deep red. Flesh pale amber, very tender, melting, juicy, and pleasantly flavoured. Tree an abundant bearer, and strong in habit.

Gascoignes Heart (*Bleeding Heart, Herefordshire Heart, Red Heart*).—A very old English variety of the Guigne class, with medium-sized, heart-shaped fruit, which ripens at mid-season. Skin deep bright red. Flesh yellowish-white, tender, juicy, and moderately well flavoured. Tree strong in habit, but often a shy bearer.

Governor Wood.—An excellent American variety, belonging to the Bigarreau class, with large, roundish heart-shaped fruit, which ripens at mid-season. Skin pale yellow, marked and mottled with bright red. Flesh slightly firm, juicy, sweet, and highly flavoured. Tree vigorous and very productive.

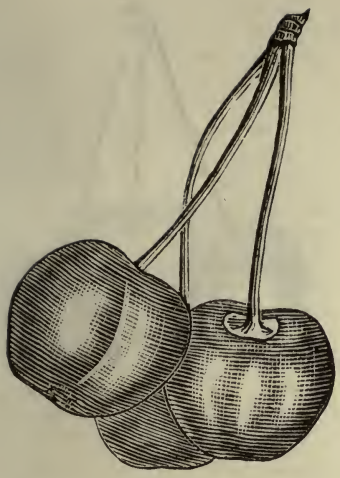
Heart of Midlothian.—A variety belonging to the Guigne class, with large, heart-shaped fruit, which ripens early. Skin nearly black. Flesh purple, juicy, sweet, and well flavoured. Tree prolific and hardy.

Jeffrey's Duke (*Cherry Duke, Jeffrey's Royal*).—A variety belonging to the Duke class, with medium-sized fruit, produced in thick clusters, and ripening at mid-season. Skin deep red to black. Flesh rather firm, very sweet, juicy, and well flavoured. Tree compact in habit, and bears freely.

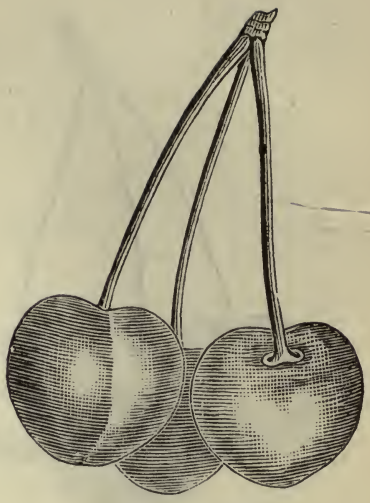
Kentish (*Common Red, Pie Cherry*).—This is one of the oldest of English Cherries, and one of the best for preserving. It belongs to the Morello class, and bears medium-sized roundish fruit, which ripens about mid-season, and will hang on the trees for some time. Skin at first pale red, becoming darker as the fruit matures. Flesh tender and juicy with a brisk, acid flavour, which is lessened as the fruit ripens. The fruit increases materially in size after it begins to colour. This kind is also remarkable for the tenacity with which the stone adheres to the stalk, and advantage is taken of this peculiarity to draw them out when the fruit is preserved. Tree vigorous, spreading in habit, matures early, and is very productive.

Late Bigarreau.—A fine variety, with large, obtuse heart-shaped fruit, which ripens about the same time as *Florence.* Skin deep yellow, suffused with bright red. Flesh yellowish, very firm, sweet, and highly flavoured. Tree strong, and very productive.

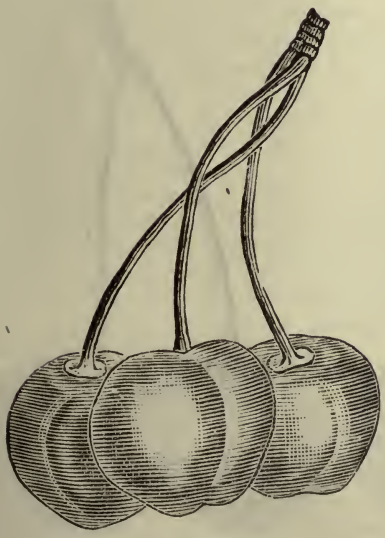
Lake Duke.—This is one of the best varieties of the Duke class. Fruit



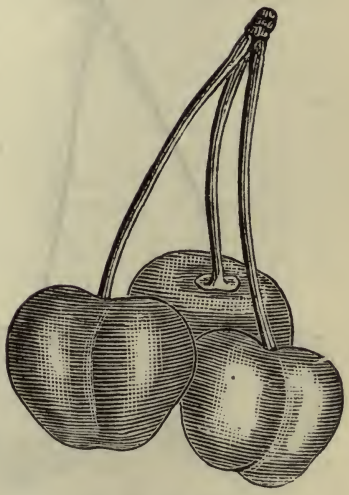
Frogmore Early Bigarreau.



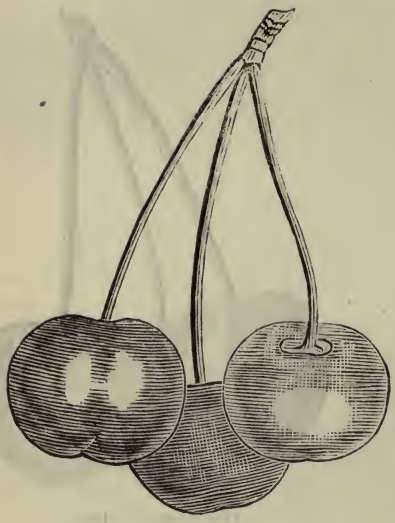
Gascoigne's Heart.



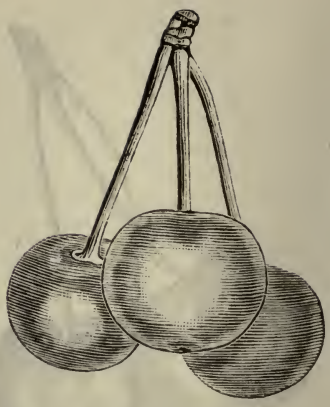
Governor Wood



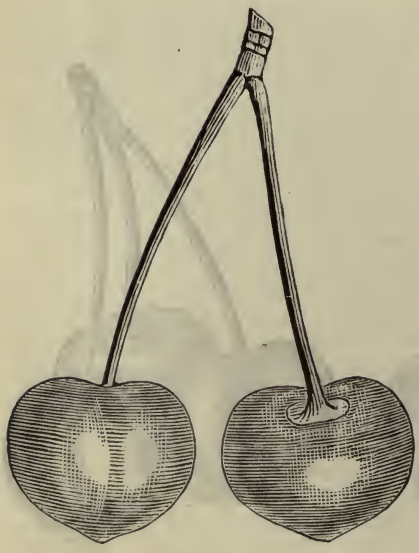
Heart of Midlothian.



Jeffrey's Duke.



Kentish.



Late Bigarreau.

Lake Duke

large, obtuse heart-shaped, ripens late and gradually, and hangs well after it has matured. Skin dark red when fully ripe. Flesh tender, juicy, with a pleasant sub-acid flavour. Tree vigorous for its class, and bears fairly well. An excellent Cherry for culinary purposes.

May Duke (*Early Duke*).—A very old and popular English Cherry, and the type of the class known as Dukes. Fruit large, roundish flattened at both ends, produced in thick clusters, and ripening early in the season. Skin bright red, changing to a darker tint as it matures. Flesh reddish, tender, juicy, and pleasantly flavoured when thoroughly ripe. Tree robust, upright, and bears freely. An excellent Cherry for preserving and culinary purposes.

Morello (*Milan*).—This is an old and well-known Cherry, and the type of the section known as Morellos. Fruit large, roundish, and ripening late in the season. Skin dark red to nearly black when fully ripe. Flesh reddish purple, tender, juicy, with a pleasant sub-acid flavour. Tree hardy and prolific. One of the best Cherries for culinary purposes, and it will hang on the trees a long while after it is ripe.

Ohio Beauty.—An American variety of repute, belonging to the Guigne section, with large, obtuse heart-shaped fruit, ripening early. Skin pale yellow, suffused with red. Flesh yellowish white, tender, juicy, and brisk flavoured. Tree vigorous, spreading in habit, and productive.

Ox Heart (*Bullock's Heart, Lions Heart*).—A variety belonging to the Guigne class, with large, obtuse heart-shaped fruit, which ripens at mid-season. Skin dark purplish red. Flesh reddish, somewhat firm, with a brisk flavour. Tree robust, and a fairly good bearer

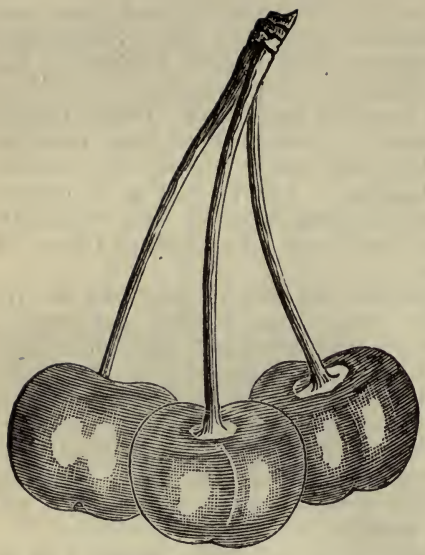
Rival.—An English variety, belonging to the Bigarreau class, with small, obtuse heart-shaped fruit, which ripens very late in the season. Skin purplish black. Flesh firm, sweet, and well flavoured. Tree vigorous, and very productive· Valuable for its lateness and the length of time the fruit will hang after it is ripe.

Rockport Bigarreau.—A fine American variety, with large, roundish heart-shaped fruit, which ripens early in the season. Skin pale amber, heavily suffused with bright red and mottled with carmine. Flesh yellowish-white, firm, juicy, sweet, and highly flavoured. Much used for canning in America. Tree strong, upright in habit, and a good bearer.

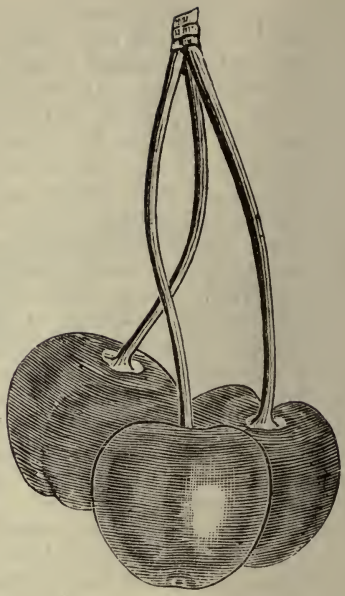
St. Margaret's (*Elkhorn, Large Black Bigarreau, Tradescant's Heart*). —This is a popular and valuable late Cherry belonging to the Bigarreau class, with very large, obtuse heart-shaped fruit, which ripens towards the end of the season. Skin deep purple to black. Flesh dark purple, firm, adhering to the stone, sweet, and pleasantly sub-acid. Tree of vigorous habit, and a good bearer.

Twyford Bigarreau.—A Victorian variety of great merit, raised by the late Mr. T. C. Cole, and very popular with many growers. Fruit large, obtuse heart-shaped and ripens medium early. Skin deep bright red. Flesh firm, juicy, and highly flavoured. Tree robust and prolific.

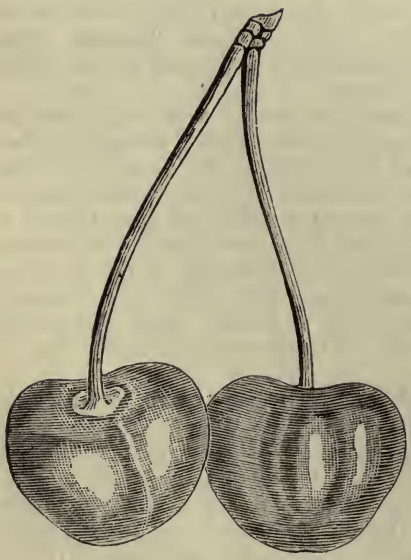
Waterloo.—An English variety, belonging to the Guigne class, with large, obtuse heart-shaped fruit, which ripens medium early. Skin dark purple to black. Flesh reddish purple, tender, juicy, and highly flavoured. Tree fairly vigorous, and a moderate bearer.



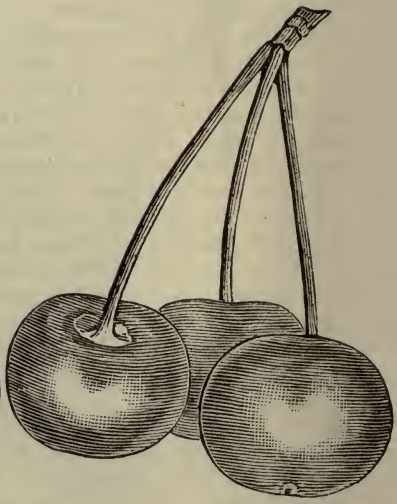
May Duke.



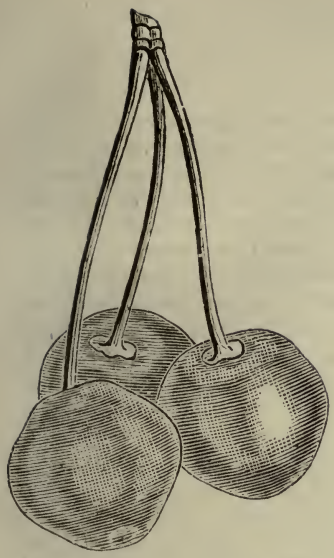
Ox Heart.



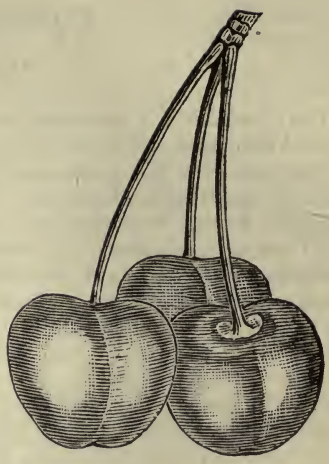
Ohio Beauty.



Morello.

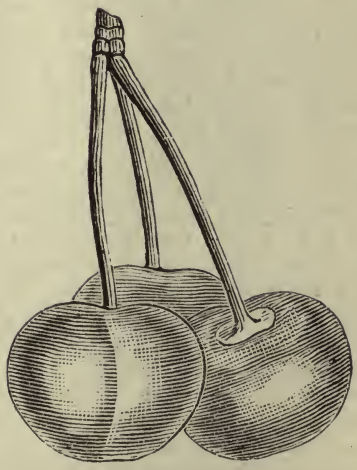


Rockport Bigarreau.



Rival.

Werder's Early Black.



Waterloo.

Werder's Early Black.—A German variety, belonging to the Guigne class, with large, obtuse heart-shaped fruit, which ripens immediately after *Early Purple Guigne.* Skin tough, shining, deep purple to black. Flesh purplish red, tender, juicy, sweet, and luscious. Tree vigorous, spreading in habit, and a good bearer.

CHESTNUT.

History.

The Chestnut is a handsome deciduous, tree belonging to the natural order Amentaceæ (Corylaceæ of some botanists). Botanically it is known as *Castanea vesca*, the generic name being taken from a town in Thessaly, where at one time the trees were very numerous. Formerly this tree was generally known as *Fagus castanea*, a name still used by some writers The Chestnut is supposed to be a native of Asia Minor, where it is to be generally met with. It is said to have been first taken to Europe by the Greeks at a very early period, and soon after its culture was taken up by the Romans. According to history, the Chestnut was very popular among the nations of antiquity, and the nuts were extensively used. Pliny informs us that in his time eight varieties were cultivated, and that the nuts, when ground into meal, furnished bread in large quantities for the poorest class of the Roman population. The nuts were not only considered to be very nutritious, this writer further informs us, but their use was also recommended to persons who were in the habit of spitting blood.

The chestnut is supposed to have been introduced to England at the time of the Roman invasion, but this is somewhat uncertain. That it has been long established in that country is, however, beyond doubt, as there are many trees recorded as having attained a great size and age. Ireland has also produced some notable specimens, and in Scotland some very large trees have existed. Formerly in the United Kingdom the Chestnut appears to have been more generally used and popular than it is now. As a material for bread the fruit was at one time used in considerable quantities. It was also generally used for thickening soups, as a stuffing for turkeys, and when stewed in cream it was a favourite dish. In the south of Europe, and more especially in Spain, the Chestnut is very widely cultivated, and generally used. In France and Italy the fruit is extensively used as food by the poorer classes. A very curious custom is said to have been formerly followed in some parts of Spain on All Souls' Day, when people would go from house to house to eat Chestnuts with their neighbours. Their reason for this practise was that they believed that every Chestnut eaten in this way would deliver a soul from purgatory.

The origin of the common name Chestnut is not known for a certainty. According to some authorities it originated through the nut being enclosed in a covering or chest. Others, however, consider that the name was given through the nut at one time having been regarded as a specific for chest diseases. The latter supposition is probably the most correct one, seeing that ancient nations attributed virtues to the nuts for pulmonary complaints. By many writers it is spelt Chesnut instead of Chestnut, and very good authorities favour this mode. The tree is often called the Sweet Chestnut to distinguish it from the Horse Chestnut, which belongs to quite a different family. It is also commonly known as the Spanish Chestnut, because it is extensively cultivated in Spain.

Under favourable conditions in Europe the Chestnut attains a great age and size. It is recorded that in Gloucestershire, England, a tree, supposed to be 1100 years old, measured fifty-two feet round the trunk.

A tree at Hitchen in Hertfordshire, is said to have had a circumferance of forty-two feet, five feet from the ground; and another at Great Crawford Park, Dorsetshire, measured thirty-seven feet round. But the most noteworthy specimen as regards size and age grew in Italy, and was known as the Chestnut of Mount Etna. This remarkable tree is by far the largest on record, as, according to report, its trunk was over 200 feet in circumference. A common name for this tree was the Chestnut of the Hundred Horses, from the tradition that Jean of Arragon, attended by a hundred cavaliers, took shelter under its immense branches during a heavy thunderstorm. It may be interesting to some to learn that the town of Cheshunt, in Hertfordshire, England, is supposed to have obtained its name through the large number of Chestnut trees that formerly grew in the locality.

Uses.

The fruit of the Chestnut is farinaceous to a very large extent and less oily than any other uut. In its raw state it is very indigestible, and when used it is generally roasted and eaten with salt. The demand for the nuts in this part of the world will probably always be limited, as, though they are largely used in France, Spain, and in other parts of Europe as a bread material when mixed with flour or meal, the people of Australasia are not likely to adopt the same practise. As a timber or shade tree the Chestnut is worthy of being generally cultivated. The wood is light, cross-grained, durable, and will stand well in water or under ground. It contains but comparatively little sap wood, and consequently yields a greater proportion of hard timber than the oak and many other trees. Many well authenticated instances are recorded in Europe of the durability of Chestnut timber. In one instance a post, upon which a gate had swung for fifty-two years, was taken up and found to be nearly as sound as when placed in the ground. In another case a barn constructed of Chestnut wood was thirty nine years afterwards found to be sound in every part. Formerly in England Chestnut wood mixed with oak was extensively used in the construction of buildings and in making furniture. It was also utilized to a large extent in making wine and beer casks. The bark of the Chestnut is astringent and is sometimes used by tanners and dyers. The Chestnut makes an excellent shade tree, and is well adapted for street planting in some districts. It has been used very successfully for this purpose in the town of Heathcote, Victoria, whose main street is adorned with some noble specimens.

Cultivation.

The Chestnut may be grown successfully is many parts of Australasia, and seems to be perfectly at home in either the cool or medium warm districts. It will grow in any ordinary good soil, but thrives to perfection in a deep sandy loam, with a moderately dry subsoil. Calcarous soils are those that are the least suitable for the purpose. The land should be worked deeply, if it is heavy more especially, as the trees require freedom for their roots. In light, open soils the necessity for deep culture is not so great, but it is better to work the ground well. Drainage must be provided for when necessary, as the

trees will not stand their roots being in saturated ground for any length of time. In selecting young trees choose those with clean, straight stems and a fair proportion of roots. Under favourable conditions the trees will attain a large size in time, and they consequently require plenty of room for their developement. From thirty to thirty-five feet apart will not be too great a distance for Chestnut trees. As a matter of course, many years will pass before the trees will require all the space, and in the meantime it may be utilized for Peaches and other comparatively short-lived trees or cultivated for vegetable crops. But little attention in the way of pruning is required by the Chestnut, except in the case of young trees, which must have their growth regulated so as to get large and symmetrical specimens in as short a time as possible. In the case of mature trees all that is necessary is the removal of rank or misplaced shoots, slightly thinning the branches when too numerous, and shortening back growth that is straggling. Sometimes trees will have a tendency to over luxuriance and yield but little fruit, when root pruning may prove beneficial. This operation should be performed in the winter, before active growth commences. The fruit is borne upon the wood of the previous season, and is generally allowed to fall from the tree when fully ripe. If the nuts are required to be kept for any length of time they will retain their freshness for a considerable period if packed in dry sand or soil.

Clean cultivation is quite as necessary for the Chestnut as for any other fruit tree. An undergrowth of herbage is particularly injurious during the early summer months. Light and frequent stirrings with the scarifier or hoe are better for keeping down weeds than deep ploughing or digging. The less the roots are disturbed by the cultivating implements the better. Before the hot weather sets in the trees should be mulched to the depth of four or five inches as far as their roots extend. Old trees must be kept in good condition, by the use of manure occasionally if necessary. As to when manure is required, the cultivator must necessarily judge for himself from the appearance of his trees.

Propagation.

Propagation is effected by seeds, cuttings, layering, grafting and budding. Plants are easily raised from seeds, which should be sown late in the winter or early in the spring and covered to the depth of about three inches. The following season the young trees should be planted out in rows about thirty inches apart, leaving a foot of space between in the lines. In another year the young trees will be ready for planting out permanently. Cuttings strike freely, and may be put in at any time between the fall of the leaf and early spring. Plants are readily obtained from layers, which should be put down at the same period as recommended for cuttings. Grafting is generally practised, as it brings trees into bearing earlier than those raised from seed. The operation should be performed just before the sap commences to rise, and the scions must be taken from well ripened wood. Budding is sometimes practised for the same reason as grafting. It should be performed in the summer, when the bark will rise freely upon the wood; and mature, plump, and well-formed buds should invariably be used.

VARIETIES.

The Chestnut is limited to a few cultivated varieties, of which the most popular are as follows :—

Banks' Prolific.—A very free-bearing variety, and nuts of good size.

Devonshire (*New Prolific*).—This variety is generally a free bearer, has fair sized nuts, and ripens a little earlier than other sorts. Tree vigorous.

Downton (*Knight's Prolific*).—An old and reputable variety, which is distinguished by shorter spines on the husks than the *Devonshire.* Tree strong in growth, and a fairly good bearer.

Mammoth.—A newly introduced variety, with very large nuts, and said to be strong in growth and prolific.

CHILIAN HAZEL.

This is a beautiful evergreen tree known botanically as *Guevina avellana*, belonging to the natural order Proteaceæ. It is a native of Chili and other parts of South America, and attains a height of thirty or forty feet The foliage is bright green, and the snowy-white flowers which grow in spikes, are produced simultaneously with the ripening of the fruit of the previous season. When grown for ornamental purposes, the contrast between the flowers, foliage, and coral red fruit is very effective. The nuts are known in Chili under the name of Avellano. They are about the size of large Hazel Nuts and have a very pleasant flavour. The wood is tough and elastic, and is said to be useful for many purposes, and more particularly boat building. The Chilian Hazel may be grown with success in the Southern Colonies of Australia, as also in Tasmania and New Zealand. It is a very desirable ornamental tree, independent of the value of its fruit which is produced freely. Any fairly good soil is suitable, but a well drained sandy loam is most favourable. Propagation is effected by seeds, layers, and ripened cuttings of the current season's growth, which strike readily in sand or light soil.

CHINESE OLIVE.

This name is applied to the fruit of *Canarium commune*, a shrub belonging to the natural order Burseraceæ. It is indigenous to Java and the islands of the Indian Archipelago. The fruit is a three-sided drupe the size of a small Plum, which contains a large proportion of oil that is of commercial value. From the stem a gum is obtained which contains a considerable quantity of a stimulant volatile oil utilised for various purposes. The Chinese Olive can only be grown successfully in moist tropical regions, but as an oil yielding plant is not so valuable as many others. Propagation may be readily effected by seeds, layers, and cuttings of the ripened shoots of the current season's growth.

CHINESE RAISIN.

The plant known under this name is *Hovenia dulcis*, a small tree from Japan, belonging to the order Rhamnaceæ or the Buckthorn family. It

grows to the height of from fifteen to twenty feet, and though classed as an evergreen is not absolutely one. The fruit is of no value, but the fleshy flower stalks are edible, and have, when fresh, a sweet and somewhat luscious flavour. When dried, these stalks taste somewhat like raisins, hence the common name. The Chinese Raisin may be grown with success in the semi-tropical parts of Australia, and in other regions where the winters are mild and frosts not troublesome. It will adapt itself to any ordinary good soil, and requires but little care after it has become fairly established, In congenial climates, this tree makes a good ornamental plant, and may be used with advantage for that purpose. Plants may be obtained from layers which should be put down in the spring, or cuttings of the ripened wood, which strike readily in sand under a glass.

CHOCO.

History and Uses.

This is the native name for a perennial trailing plant belonging to the order Cucurbitaceæ, or the Cucumber family, which is indigenous to Central America. It is also known as Chayota, and Portuguese Squash. Botanically it is known as *Sechium edule.* In growth it is similar to the Vegetable Marrow, bears a yellow flower, and fruit in appearance somewhat like a Quince, but much larger. The plant is very prolific, and one will yield over one hundred fruits in a season. The fruit has but a single seed, which often germinates before the former has fully matured. The fruit is turned to account for both man and beast, but the plant is cultivated chiefly for its large fleshy roots which often weigh over twenty pounds. They contain a large proportion of starch, and have a flavour somewhat similar to the Chestnut. These roots are used extensively by the negroes in the West Indies, also as food for stock, and more especially to fatten hogs.

Cultivaton and Propagation.

The Choco can only be cultivated successfully in the warmer parts of Australia, but it is well worthy of attention in congenial localities, as a valuable economical plant for stock. Like other plants of the Cucumber family it requires a rich soil, as strong and rapid growth is essential. As regards planting, and after cultivation, the treatment in every respect is required as for the Vegetable Marrow. In localities where there are slight frosts the stems will die back, but they will shoot from the roots again. Propagation is most usually effected by seeds or young plants that have started in the fruits, but cuttings of the current season's growth will strike in sand under a glass or in a frame.

CHUPA.

Chupa is the native name of the fruit of *Matisia cordata,* an evergreen

tree indigenous to Peru and other parts of South America, belonging to the order Sterculiaceæ. It is a handsome tree, attaining a height of fifty or sixty feet, with broad cordate leaves and Mallow-like flowers borne upon the trunks and branches. The fruit is oval in shape, four or five inches in length, and from two and a half to three in diameter. It contains five cells, each one enclosing an angular seed about an inch in length. The fruit is highly appreciated in its native countries, where it is generally used. Its flesh has a flavour somewhat similar to an Apricot, but has a rather stringy fibre. The Chupa may be cultivated successfully in either of the Australian Colonies, as also in New Zealand. As it is a handsome evergreen tree it may be used with advantage for ornamental purposes, independant of any value possessed by its fruit. It may be grown successfully in any average good soil, and should be treated as an ordinary evergreen tree. Propagation may be effected by seeds, which should be planted three inches deep, or ripened cuttings of the current season's growth, which will strike in sand or light soil.

COCOA NUT.

History and Uses

This is a well-known fruit that is extensively cultivated in the coast regions of tropical countries, and it is generally admitted to be one of the most useful plants grown for the service of mankind. There is a saying that it has as many uses as there are days in the year. This plant supplies food and drink with its fruit, the shells are converted into domestic utensils, the stems and leaves afford materials for building and thatching houses, the fibres are used for cordage and other purposes, while the juice from the stems yield sugar, wine, and spirits. The Cocoa Nut is a Palm known botanically as *Cocos nucifera.* It is supposed to be a native of the South East coast of Asia, but is now found growing naturally in regions not far from the sea in India, tropical Africa, and numerous islands in the Indian and Pacific Oceans. The Cocoa Nut Palm attains a height of from fifty to a hundred feet, and when growing under favourable conditions will live from eighty to a hundred years or more. There are no branches and the flowers are produced at the top of the trunk. The nuts are produced in bunches of from ten to twenty or more. They are about a foot in length, triangular in shape, and covered with a thick coating of fibre which encloses the familiar hard shelled nut. While the nut is green it is filled with a sweetish refreshing liquor, but as it ripens, a formation of albumen takes place upon the inner side of the shell, producing that white, firm, pleasant flavoured, but very indigestible substance, which is known as the kernel. The Cocoa Nut is very nutritious owing to the large proportion of fixed oil that it contains. This large per centage of oil however is the cause of the nuts being so indigestible. The dried kernels are exported from many of the South Sea Islands, under the name of Copra, for the sake of the oil,

which is extracted by pressure. The oil when purified, is largely used in cookery, and for other purposes. The coarser or thicker part of the oil is utilised in the manufacture of stearine candles. In the process of purifying, glycerine is obtained in quantity. The fibrous covering of the nut, known as Coir, is extensively used for making mats and various other purposes. From the sap of the Cocoa Nut Palm a liquor is obtained which yields by evaporation a large proportion of sugar, which n India is called Jagery. When fermented this liquor passes under the name of Toddy, and by distillation the spirit known as Arrack is obtained. The juice is obtained by boring holes in the stems and collecting the material in jars. When plants are used for this purpose, they are not allowed as a rule, to bear fruit. The stems of the Cocoa Nut Palm are tough and durable, and yield what is known as Porcupine Wood.

Cultivation and Propagation.

The Cocoa Nut Palm can only be grown with success in the tropical coast regions of Australia and the South Sea Islands· It delights in a rich open sandy loamy soil near to the sea shore. The plants should stand about twenty feet apart, taking care not to place them too deep in the ground. In rich soil the plants will come into bearing in five or six years from the time they are planted, but in poorer land development will be slower, and eight or ten years may pass before fruit is produced. After the plants commence to bear they yield crops with great regularity, and seldom fail. They are also very prolific, and mature trees yield a large number of nuts. Propagation is invariably effected by seeds, and the nuts should be planted about six inches deep. They are commonly planted where the nuts are to remain, but a surer method is to raise them in a nursery, and transplant when they are large enough. A good way of raising plants is, get some large bamboo stems, cut them in pieces about nine inches in length, place the nuts in them and plant. By adopting this plan the pieces of Bamboo will serve as pots, and the young Palms can be lifted and planted out without their roots being materially disturbed.

DOUBLE COCOA NUT.

This is quite distinct from the ordinary Cocoa Nut, being produced by *Lodoicea sechellarum*, a handsome Palm indigenous to the small group of islands known as the Sechelles. This is considered to be the largest and most remarkable of all Palms as it often attains a height of more than a hundred feet, the stem being from eighteen inches to two feet in diameter, and the summit crowned with very large fan shaped leaves. The fruit is very large, oblong, and covered with a thin skin or rind. This covering encloses two very large oblong nuts firmly united together, the pair generally weighing from thirty to forty pounds. The fruit is produced in bunches of from eight to ten. As the nuts hang for a long

while and take several years to ripen, they are not much used as food, though edible. The large shells are however used by the Sechelle islanders for making various useful domestic articles, and the wood and leaves are turned to account in the erection of dwellings, and for other purposes. The Double Cocoa Nut may be grown under the same conditions as *Cocos nucifera*, and requires similar treatment as regards cultivation and propagation.

COCOA PLUM.

This name is applied to the fruit of *Chrysobalanus Icaco*, an evergreen shrub or small tree indigenous to the West Indies. The genus is the type of the order Chrysobalanaceæ, which formerly was classed as a sub-order of Rosaceæ. The flowers are white, and the small pulpy Plum-like fruit is palatable and largely used in its native regions. Being a native of tropical countries, the Cocoa Plum can only be cultivated successfully in the warmer regions of Australia, where it may be utilised as an ornamental plant, as also for its fruit which makes an excellent preserve. Any ordinary good soil is favourable, but the plant thrives in a sandy loam. Propagation is easily effected by seeds, which should be planted about three inches deep, layers, or cuttings of the ripened shoots.

CORNEL.

History and Uses.

The Cornel is a deciduous small tree indigenous to the North of Europe and Asia, known to botanists as *Cornus mascula*, and the type of the order Cornaceæ or the Dogwood family. The fruit is also known as the Cornelian Cherry and Cornel Plum. The generic name comes from *Cornu* a horn, from the hardness and durability of the wood. The specific name *mascula*, or *mas* as it is is often called, owes its origin to the singular circumstance that trees from seed invariably bear only staminate or male flowers for years. Afterwards they bear flowers of both sexes, and fruit. The common family name Dogwood is said to have originated through the wild tree being formerly in England called Dogberry Tree and Hounds Tree. The flowers are small, yellow, arranged in clusters, and make their appearance before the leaves. The fruit is oval, about an inch in length, and in colour a reddish scarlet. There is also a variety with yellow fruit. In flavour the fruit is acid and austere, but it makes a very good preserve. Formerly, when better fruits were less plentiful than they are now, the Cornel was more generally used in Europe. It was formerly commonly mixed with Apples and Pears in making cider or perry. The wood of the Cornel is very hard and durable and was formerly in great repute for making arrows and javelins. Cornel trees when growing under favourable conditions will

attain a great age, and instances are on record of specimens over two hundred years old.

Cornel

Cultivation and Propagation.

The Cornel may be cultivated successfully in the cooler regions of Australia, as also in Tasmania and New Zealand. It is however, scarcely worth cultivating for its fruit which is vastly inferior to many other kinds. As an ornamental plant it is worthy of a place in a garden or shrubbery, as its bright coloured fruit which hangs on the trees for a long period, has a pleasing effect. The tree is very hardy, will adapt itself to any soil or situation, and requires but little care. Propagation may be effected by seeds, layers, cuttings, budding and grafting. Seeds produce the most vigorous trees, but for the reason already named they take a long time to fruit. As stocks for grafting or budding, seedlings are very serviceable. The seed should be planted two inches deep in the autumn. Layering is the most general means of propagation, and branches put down in the spring will yield strong plants the following season. Cuttings as a rule strike slowly and should be taken

from the last season's shoots. Grafting should be done in the spring when the sap is beginning to move and budding after mid-summer, as soon as the wood has matured sufficiently for the bark to rise freely.

CRANBERRY.

History and Uses.

Cranberries are Alpine fruits indigenous to the northern regions of Europe, Asia, and America, where they are found growing in peat bogs or other situations where there is permanent moisture. There are several kinds, which are obtained from various species of Vaccinium, a family that is the type of the natural order Vaccinaceæ. The botanic name comes from the Latin language, but to what plant it was originally applied is doubtful. Formerly the family was known under the name of Oxycoccus, which is at the present more generally used than Vaccinium. This word comes from "*Oxys*" (sharp) and "*kokkos*" (a berry), in allusion to the sharp acid flavour of the fruit, and is a very suitable name. The English name is supposed to have originated from the appearance of the flower bud just before it expands, which has a fancied resemblance to the head of a crane, hence the term "Craneberry" or "Cranberry." The British Cranberry is obtained from *Vaccinium Oxycoccus* (*Oxycoccus palustris*), a trailing, evergreen shrub, growing naturally in many parts of Europe, Middle and Northern Asia, and also found in North America. It bears in abundance scarlet berries like Currants, which are used to some extent in tarts, or preserved, and are considered to be wholesome and cooling to the blood. The American Cranberry is the product of *Vaccinium macrocarpon* (*Oxycoccus macrocarpus*), a trailing, evergreen bush growing about three feet high, and bearing in large quantities bright scarlet berries. The fruit is much larger than the British Cranberry, and more valuable for cultivation. Enormous quantities are obtained from natural and artificial plantations in the eastern United States and Canada where the fruit is highly prized and generally used. Besides the demand for home consumption there is also an extensive trade in Cranberries between America and Europe. *Vaccinium Vitis Idœa* (a dwarf, evergreen, shrubby species) also yields a Cranberry, bearing purplish-red fruit, which is utilized to a large extent. This species is widely distributed, being found in Europe, Northern and Middle Asia and North America. Possibly other species of Vaccinium might be worth cultivating as Cranberries, and investigations in this direction are desirable. Some Species yield useful fruits known by other names—such as the Bilberry, or Whortleberry of the United Kingdom, and the Blueberry, or Huckleberry, of America.

Cranberries are utilized in a variety of ways. In the first place they are largely used in a fresh state for tarts and puddings, and are considered to be very wholesome when eaten in this way. They are also largely used to accompany pork and other luscious meats, as their acidity counteracts the richness of these materials. Cranberries make a palatable

Bugle.

Bell

sauce that is generally relished. It is made by dissolving one pound of loaf sugar in a pint of water, bring to a boil, and pour the liquid over a quart of fruit. Boil for a quarter of an hour and cool slowly. Cranberries are a serviceable fruit when canned or bottled. The fruit should be stewed for about a quarter of an hour, place while hot in the cans or bottles, and make air-tight. Cranberry jelly is made by adding water to the berries in the proportion of half-a-pint of the former to a quart of fruit, and stew slowly till they are soft. Then mash the berries, strain the juice through a jelly bag, and to each pint add one pound of pulverised white sugar. sugar. Boil slowly till the jelly forms, taking care to skim the surface from time to time to remove impurities.

Cultivation

Though the Cranberry has received but little or no attention in the Australasian Colonies, there is no reason why it should not be profitably cultivated in some localities. It would thrive in the cool moist mountain regions of New South Wales and Victoria, and is suitable for many localities in Tasmania and New Zealand. In its native regions the Cranberry is found growing in wet peaty swamps, but it may be grown in open sandy loam that can be kept moderately moist. This plant however, is somewhat peculiar in its requirements and will only thrive in a loose soil that will not pack. The Cranberry flourishes to the greatest perfection in equal proportions of well decayed vegetable matter and coarse sand. But though the Cranberry requires a soil that will be always moist, yet it does not like stagnant water, and consequently in preparing the ground due provision must be made for drainage. The command of a running stream of water will be a great advantage in cultivating this fruit. In preparing for a plantation the first thing to be done is to cut drains sufficientiy large, deep, and numerous to carry off quickly any excess of water. The ground, as a rule, should be worked deeply. It is customary with American growers in preparing swamp land, to cover the surface with a layer of sand which serves a twofold purpose, as it improves the soil and gives a clean surface for the plants. These layers of sand vary in thickness from three to six inches, according to the nature of the under soil. Planting may be done at any time between the autumn and early spring, the most usual method being to plant in rows three or four feet apart. The plants should stand about eighteen inches apart in the lines, and ought to be put in with a horizontal inclination, each row sloping the same way, so as to facilitate the rooting of the stems. A plantation of Cranberries when growing under favourable conditions, will last for many years. If the plants show signs of failing vigour, a winter top dressing of vegetable mould, wood ashes, or thoroughly decayed manure will be serviceable. A Cranberry plantation will begin to yield a full return in three years, by which time the plants will have covered the surface of the ground. The plants are very prolific and yield large and profitable crops. In America a hundred bushels per acre is considered to be only a fair ordinary yield. Returns of three and four hundred bushels per acre are not uncommon,

Showing the proper way to Plant.

Usual way of arranging the rows.

VARIETIES.

Cherry.

and according to J. J. White an American writer upon Cranberry culture, in one instance a return of nine hundred and seventy bushels per acre was obtained. Formerly it was customary in America to gather the crops with implements called Cranberry rakes, but it has since been

found more profitable to revert to picking. The work of picking is, in America, done principally by women and children, at a cost of about two shillings per bushel.

Propagation.

Propagation may be effected by seeds, cuttings, or the rooted plants from the trailing stems. Seeds germinate freely if sown in beds as soon as they are ripe, but this mode of increase is slow, and therefore not to be commended. Cuttings root freely, and even small pieces of the stems that have passed through a chaffcutter, set wide, will grow. This method is commonly practised by American growers. If, however, rooted plants can be obtained readily; as will always be the case where there are established plantations, they will be better than cuttings.

Varieties

There are several varieties cultivated by American growers which differ in the size, shape and colour of the fruit, but not in other respects. In fact the varieties can only be determined when the plants are fruiting. Size and colour are the principal consideration with growers. Large dark red berries are always more saleable than others. The varieties chiefly cultivated in America are as follows.

Bell.—So named from the fruit resembling a bell in shape.

Bugle.—This is a long-fruited variety, and derives its name from a fancied resemblance to the beads known as bugles.

Cherry.—A round-berried variety having the shape and colour of a red Cherry; hence the name.

CREAM FRUIT.

This name is applied to the fruit of *Roupellia grata* an evergreen shrub indigenous to Western Africa, belonging to the order Apocynaceæ. Occasionally the plant will assume a climbing habit, but it more commonly retains its shrubby form. The flowers are white with a pink tint, and are freely produced. The fruit when wounded yields a whitish thick palatable juice, like cream in appearance, hence the common name. The negroes are very partial to this juice, which is generally used by them when it can be obtained. It is considered to be wholesome and excellent for allaying thirst. Being a native of a hot region, the Cream Fruit can only be cultivated with success in the tropical parts of Australia, where it would probably be worth cultivating for its fruit, and also as an ornamental shrub. It requires a moderately rich sandy loamy soil, and must be sheltered from strong winds. Propagation may be readily effected by layers, and ripened cuttings of the current season's growth will strike in sand.

CUCUMBER.

History.

The Cucumber is a well-known annual trailing plant known to botanists as *Cucumis sativus* and belonging to the natural order Cucurbitaceæ. The generic name is derived from *curvus* crooked, in allusion to the form the fruit generally assumes. It is generally supposed to be a native of the East Indies, but, as with many other economic plants, there is no certainty as to where it came from originally. Cucumbers appear to have been well known to the nations of antiquity, and according to their writers they were generally cultivated. Records are in existence that show this plant was cultivated in Egypt, Persia, and Syria over three thousand years ago. The Hebrews also appear to have been well acquainted with this plant from a very early period, and tradition says that one of the complaints made by the Israelites to Moses in the wilderness was the want of Cucumbers, to which they had become accustomed to during their stay in Egypt. The Cucumber was probably introduced to Europe by the Romans, as it is certain that that nation cultivated this plant as early as the first century, if not sooner. Cucumbers were greatly prized by the Roman patricians, and the Emperor Tiberius is said to have been so partial to them that his table was supplied throughout the year, and for the greater portion they were grown by artificial means.

The mode of artificial cultivation as practised by the ancient Romans, appears to have been essentially the same as that which is adopted by modern gardeners. They were well aware that a rich soil, warmth and moisture, were essentials to the successful culture of Cucumbers and that growth could be stimulated by the application of artificial heat. It was a common practice with the Romans to grow them in large baskets filled with horse dung and rich soil. Thin plates of *Lapis specularis* or *talc* were placed over the baskets, and this material admitted light nearly as freely as our modern glass. At night these baskets were placed under shelter. Pliny informs us that Cucumbers were also commonly grown in large boxes arranged on wheels which were moved about at pleasure. Several other ancient writers speak of Cucumbers and the practices adapted in their culture. Palladius writing in the year 151, directs the seed to be macerated in water before it is sown, and the fruit to be grown in tubes to increase their length. Quintillius and Columella give similar directions, and add, that as the fruit increases in length when near water, therefore dishes filled with water should be placed within a few inches of the points of the Cucumbers. Some of the early Greek writers recommended that previous to sowing the seed should be steeped in milk and honey in order to prevent bitterness in the fruit. Though to us this may appear to be an absurd practice, yet strange to say it was believed in, and followed by the celebrated English philosopher Lord Bacon.

From historical records Cucumbers appear to have been grown in England from about the middle of the fourteenth century. Owing

however, to the unsettled state of affairs that afterwards occurred the plant appears to have been lost, but was re-introduced in the time of Henry VIII. In a book called *The Gardeners Labyrinth* published in 1577, it is recommended that Cucumbers should be trained upon trellises, as the fruit is liable to injury when left lying upon the ground. Instructions are also given in this book for keeping the plants supplied with moisture by means of pieces of worsted, an end of each being buried in the soil close to the plants, while the other extremeties are placed in water which was supposed to filter through them. Gerard writing in 1597, mentions two sorts as being known in his time, one of these he calls *Cucumis vulgaris*, which is supposed to be identical with what is now called the Short Prickly. The other sort Gerard terms *Cucumis ex Hispanica* or the Spanish Cucumber, which appears to have been an improved kind, as the fruit is described as being a foot long. Some curious ideas appear to have formerly existed regarding Cucumbers, and the effects produced by eating them. Gerard in his book quaintly says that "If they are eaten as a potage with mutton and oatmeal for breakfast, dinner and supper, without intermission for three weeks, it doth perfectly cure all manner of sauce phleghm or copper faces, red and shining fiery noses, (as red as red roses) with pimples, pumples, and such like precious faces."

The forcing of Cucumbers was commonly practised in England in the latter part of the sixteenth century and Gerard gives full directions for making hot-beds with stable manure. The system was very similar to that practised by modern gardeners, with the exception that the beds had hoops or poles fixed over them upon which were spread mats, straw, painted cloth or other contrivances to afford protection from the weather, glass being then unknown. Parkinson writing in 1627, describes six varieties (Cowcumbers he calls them) and makes the first mention of glass being used in growing them artificially. In 1717 the first treatise written upon the Cucumber, by Samuel Collins, appeared in a work called *Paradise Retrieved.* Switzer an English horticulturist of repute in his day, writing in 1727, boasts of the great advance made in the cultivation of Cucumbers in the few preceding years. "Formerly" he says "they could not be obtained for the table previous to the latter end of May, but now they are to be had early in March or sooner." It is recorded that in 1721 a brace of fine Cucumbers were presented to George I. on New Years Day, they being the first ever raised in midwinter. They were grown by Sir Nathaniel Head's gardener at Stoke Newington, near London. As a matter of course readers must bear in mind that in Europe the season's are the opposite of those in Australasia.

Uses.

Cucumbers are agreeable and refreshing when used as salads or otherwise, and more especially in warm weather, but they contain but little nourishment, as the percentage of water in the fruit is about ninety-seven per cent. Owing to their cool and watery nature they are somewhat difficult to digest, and should be used with great caution by delicate

people or those that are subject to dyspepsia. Robust persons however, may eat them without ill effects, if taken in moderation with the addition of salt, pepper, vinegar or oil. During warm weather they are not only refreshing but they are also supposed to stimulate the appetite for food. Cucumbers are extensively used for pickling and they are often grown specially for the purpose. They are also preserved for winter use by steeping them in brine and packing in casks. When preserved in this way they are very tasty and serviceable for winter or ship use, as they are available when they cannot be obtained in the ordinary way.

Cultivation.

Cucumbers are strong feeding plants and require a rich soil and an ample and regular supply of moisture to bring them to perfection, therefore water must be used freely in dry weather. When grown in the open ground the most generally adopted plan is to make holes three or four feet in diameter, and place in each a barrow-full of well rotted manure, then filling up with soil. But the better plan is to thoroughly work the whole of the ground so as to allow the roots a wider range, and avoid the risk of an excess of water, which is very likely to occur if the hole system is adopted, as when the ground is retentive each one becomes after heavy rains, simply a tank for a time. When seeds are sown, the usual plan is to put in seven or eight where each set of plants are required, placing them two or three inches apart, and about an inch deep. The distance between each set of plants should be from nine to ten feet. Some growers prefer the plants to stand singly instead of in sets of three, and if this plan is adopted they should be arranged about three feet apart in the lines. The seeds will quickly germinate, and as soon as the young plants have made their first pair of leaves, they should be thinned out to the three strongest, leaving a space of from six to nine inches between. The spare plants may be taken up and transplanted if wanted, as they bear the operation well if they are removed carefully. Some people prefer to raise the plants in a frame and transfer them to the open ground when large enough. This plan offers some advantages, as primary growth will be more under the control of the cultivator, and the plants will be earlier. As the Cucumber is a very tender plant it is useless to sow or plant in the open ground till all danger from frosts is passed. The time for a first sowing or planting will necessarily vary considerably in different parts of Australasia, and cultivators will have to use their judgment. In sowing or planting early there will always be some risk from frosts or bleak winds, and as a safeguard it will be advisable to place casks, boxes, sugar baskets with the bottoms removed, or even a few bushes round each plant or set. Hand glasses however, will be a still better safeguard, but they are too expensive for general use. In order to keep up a regular supply of fruit throughout the summer, it will be necessary to put in succession, crops at intervals of a month or six weeks up to February.

When the vines begin to run it will be advisable to stop them after they have made five or six joints, by pinching off the points of the shoots.

The object of this is to induce the formation of lateral shoots and get the ground covered regularly. As a rule not more than two or three main branches are required for each plant. The lateral branches should be pinched back at one joint above a fruit, and they will form other shoots which in their turn must be treated the same. As the plants progress in growth the surface soil should be loosened and covered with a layer of stable manure or some other suitable material as a mulching. This will not only check excessive evaporation, but also afford the plants an extra supply of nourishment. If the branches are trained regularly over the mulched ground, and pegged down, they will throw out roots at the joints and by this means enable the parent plants to obtain extra nourishment. When the branches become too crowded they should be thinned out or otherwise they will become too weakly to produce fine fruit. As soon as the fruit is fit for use it should be removed, whether it is required or not, as if allowed to ripen the productiveness of the plant will be checked. Cucumber plants are often attacked by a mildew, and more especially towards the end of the summer or in damp weather. Whenever there are any signs of this mildew the affected plants should be dusted with powdered sulphur and a little caustic lime sprinkled over the ground around them. They should also be watered about once a week with a solution of common salt, in the proportion of two ounces to a gallon of water.

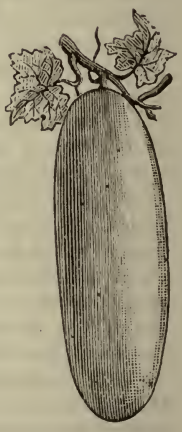
In order to obtain Cucumbers out of the regular season it is usual to grow them with the aid of artificial heat, either in glass houses or frames fitted with hot water pipes, or by the aid of stable manure, tan, and other fermenting materials, in hot beds. As a matter of course a regularly heated house or frame is the least troublesome means, but a hot bed is more suitable for the greater number of cultivators, for economical reasons. In preparing a hot-bed the dimensions of the frame that is to stand upon it should be first taken, and the ground marked in accordance. Four stout stakes should then be driven into the ground at the corners, but *a foot further out than the space that has been marked.* When stable manure is used it should be previously prepared by turning and mixing two or three times, using water if it is too dry. If tan is used it should be fresh. The prepared material should be built up within the stakes as solidly as possible, to the height of three or four feet. In three or four days it will have sunk considerably and another twelve or eighteen inches of the material may be added. The frame should then be lifted on, keeping it level and square so that about a foot of the bed will project all round. The frame should be left uncovered for four or five days to allow the rank vapours to escape, and then a layer of rich soil about six inches deep should be spread over the manure. In the centre, or where the plants are to be fixed, raised mounds several inches above the surface should be made. Seeds or plants may then be put in, and should receive the same treatment as recommended for outdoor culture. As growth progresses fresh soil should be placed round the mounds till the bed becomes level or nearly so. When the heat of the beds begins to decline the projecting sides should be removed and replaced with fresh material in an active state of fermentation. This operation must be

Large White.

Rollison's Telegraph.

TYPES OF CUCUMBER.

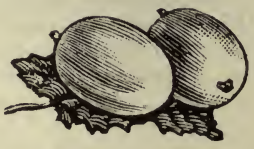
Gherkin.



Yellow Dutch.

Duke of Edinburgh.

Large Netted Russian.



Small Russian.

repeated as often as it is necessary, as a steady heat is essential to success. Though Cucumbers when grown by artificial heat can be obtained at any time of the year, yet, as a rule, they are only cultivated in this way in order to have them a few weeks earlier than from the open ground. Very few people care for Cucumbers till the warm weather sets in, and July or August will be sufficiently early to start the plants in heat. Early plants for the open ground may be obtained by starting the seeds in a hot-bed, putting the young plants into small pots and keeping them growing steadily till they can be safely placed in the open ground.

Propagation.

Cucumbers are generally raised from seed and this is the most easy method. Propagation, however, may be readily effected by cuttings of the young shoots taken off just below a joint and inserted an inch deep in light rich soil. Plants raised by this means are, as a rule more prolific than seedlings, but the fruit is usually smaller, and the practice is not worth following, except in the case of new and choice varieties that are wanted to increase quickly. Seed should invariably be saved from the finest and best shaped fruit, and these as a rule are those that are first produced by the plants. The fruit should be allowed to ripen before it is removed from the vines, and care must be taken that no other species of the family are growing near. No plants are more easily crossed than

those belonging to the Cucumber family, and it is impossible to obtain seed that will come true if two or more kinds are growing near to each other. Seeds will retain their vitality for eight or ten years, and if there are any doubts as to their soundness, they may be readily tested by placing them in water, when all that float should be discarded as worthless.

Varieties

There are a great many varieties of the Cucumber in cultivation, but as regards many of them the differences are but slight, and it is somewhat difficult to distinguish one from another. This confusion is intensified by by the fact that local circumstances, such as climate, the nature of the soil, and slow growth will often materially affect the size, shape and quality of the fruit. The Cucumbers that are most esteemed are those that are long and straight, though there are really no sound reasons for this preference. Long Cucumbers are no better in flavour than short or medium ones, and the plants that yield them are generally not so prolific as others. Rapid growth is essential to a first-class Cucumber, as when development is slow the fruit is apt to have a bitter and somewhat disagreeable flavour.

CURRANT.

History.

The Currant belongs to the natural order Grossulaceæ, and is closely related to the Gooseberry. It was formerly supposed to be identical with the Corinthian Grape, and from this idea the common English name has originated. At one time in England this fruit was known as Corans, this name being afterwards changed to Currans and again within a comparatively recent period to Currant. Botanically the Currant is known under the name of *Ribes*, from two species of which the ordinary cultivated edible varieties have originated. The Black Currant comes from *Ribes nigrum*, a species indigenous to many parts of Northern Europe and more especially Russia. The source of the Red Currant is *Ribes rubrum*, which is also indigenous to many parts of Northern Europe. The White Currant is merely a form of the red, *Ribes rubrum* Both species are to be found growing wild in some parts of England and Scotland, mostly in moist, deep soils on the outskirts of woods.

Several other species of Ribes yield edible Currants which are utilized more or less in their native regions. The more noteworthy are *Ribes aureum*, a species widely dispersed in East America, which embraces several varieties, with fruits varying in colour from yellow to brown and black. The berries are somewhat larger than those of the common Black Currant which they resemble in colour and taste. *Ribes bracteatum* a Californian species yields a fruit which in appearance and flavour is

somewhat like the Black Currant. *Ribes cereum* an American species yields red sweetish berries. *Ribes floridum* is the Black Currant of North East America. In colour and flavour the fruit is similar to the common Black Currant. *Ribes tenniflorum*, a species found chiefly in the mountain regions of America, yields palatable yellow fruit. *Ribes Griffithi* a species indigenous to the Himalayas, and found growing at an altitude of from ten to three thousand feet, has fruit similar in colour to the Red Currant, but larger and having an austere flavour. Other Indian Mountain species may also prove useful for their fruits.

The Currant does not appear to have been known to the nations of antiquity, as no mention has been made of it by their writers. There is no account of its being cultivated in Great Britain previous to the reign of Queen Elizabeth. Gerard, who wrote towards the close of this period, describes this fruit as a sort of Gooseberry, Soon after this, however, the Currant appears to have become a popular British fruit, and ever since finds a place in every garden of the United Kingdom. Black Currants were formerly known in some parts of England as Squinancy Berries, from their supposed efficacy when taken as a remedy for quinsy. The inner bark of the wood was formerly very popular as a remedy for jaundice and dropsy.

Uses.

The Currant is an excellent dessert fruit, and is also valuable for culinary purposes. Both red and white Currants contain a large proportion of malic acid, and medicinally they are cooling and grateful to the stomach. The fruit is mildly aperient, lessens the secretion of bile, and is benefical in scorbutic complaints. With some temperaments the too free use of the fruit causes a tendency to flatulence and indigestion. As regards the Black Currant, the fruit, leaves and wood each contain tonic and stimulating properties. The jelly and juice are medicinally valuable for various complaints, more especially for catarrh. The leaves have a strong and peculiar flavour, particularly when young, and were formerly much used in adulterating tea. When carefully dried they make a very fair substitute for genuine tea. In Russia a drink made from dried Black Currant leaves is a common beverage with the poorer classes of the people. The roots of both species contain a peculiar astringent property, and are sometimes utilized in medicine. Currants, both red and black, are very largely used for jams and jellies, for which there is an extensive and increasing demand The fruit may be preserved fresh for a long time in bottles of water or canned in the ordinary way. To preserve in this way, the bottles or cans should be filled nearly to the top with fruit and water, and then placed two or three minutes in boiling water, after which they must be tightly corked or sealed to prevent the admission of air. An excellent wine can be made from either black or red Currants, fermenting it either with sugar or without according to requirements. After fermentation, the wine should stand in the casks five or six months before it is used. If carefully made, Currant wine will keep for years, and it is a very pleasant beverage.

Cultivation.

Currants, both black and red, will only thrive well in the cooler and more elevated districts, and cannot be grown successfully in the warmer portions of Australasia. These fruits are specially suitable for culture in the vicinity of mountain ranges, where the rainfall is above the average. Any ordinary good land is suitable for Currants, but the most favourable soil is a deep, rich, sandy loam, that does not get very dry in the summer. If the soil is of a poor character, the deficiencies should be made good by manure when the ground is prepared. As with fruit trees, when the ground is deeply worked, it offers the most favourable conditions for growth. When the land is of a heavy nature it should invariably be loosened to the depth of at least fifteen inches. Deep working is not so essential in light soils having free subsoils. Care must be taken when the ground is deeply worked not to turn up more than a couple of inches of a bad subsoil to the surface. Many people have made this mistake to their cost. Drainage must be provided for when necessary, as, though Currants like a fairly moist soil, they will not thrive with water stagnating at their roots for any length of time. Heavy land generally wants assistance in the way of draining, but in lighter soils resting upon open gravel or sand there is often sufficient natural outlet for the water.

The plants should stand in rows, six or eight feet apart each way, so as to allow plenty of room for development. From the middle of July to the first week in August is the most favourable period for planting, though it may be done at any time between the fall of the leaves and the starting of spring growth. In choosing plants, give a preference to young ones that are of strong growth and well shaped. The after treatment required will be keeping the ground free from weeds (and more especially in the spring and early summer) and stimulating the vigour of the plants by the use of manure when necessary. In destroying weeds the surface should be lightly stirred frequently in preference to deeply ploughing or digging, which often injure the roots materially. Before the warm weather sets in it will be advisable to mulch the surface soil, to prevent rapid and excessive evaporation. Mulching is good for all fruits, but more especially for Currants and others that are partial to cool and moist regions. Currants will often retain their vigour for a dozen or more years, but it will be advisable, as a rule, to renew plantations in about six or seven years.

Pruning.

As regards pruning there is some difference in the repuirements of the red and black fruited species. The red and white varieties bear their fruit upon one, two, and three year old shoots, as also on spurs from older wood. The greater portion of the fruit is, however, usually borne upon the wood of the previous season. In pruning, the system generally adopted is to cut back the main previous season's shoots to from four to six buds, thinning out the branches when too numerous so that growth will not be crowded, and shorten close the lateral shoots. As a rule the

white varieties are less robust than the red ones, and do not require quite so much pruning. The Black Currant bears its fruit chiefly upon the wood of the preceding season, and, though far less abundantly, upon older spurs. Less pruning is required than for the Red Currant; all that is necessary is the removal of superflous shoots, and preventing a crowded growth, as also the shortening back occasionally of branches to keep the plants shapely. Summer pruning may be practised with advantage in the case of either class, as it prevents a waste of energy. Rub off the surplus young shoots as soon as they have fairly started, but leave sufficient to provide ample foliage for shade, which is very essential to Currants.

Propagation.

Propagation may be effected by seeds, layers or cuttings, the latter being the method most usually practised. Seed is only used when new varieties are required, and ordinary cultivators seldom adopt this mode of raising plants. Seedling plants will bear the second or third year from the time of sowing, and their qualities are therefore soon ascertained. As a rule seedling Currants vary but little from their parents, though, as a matter of course, they differ occasionally. Plants can be readily obtained from layers, but this method of propagation is not practised to any large extent. The most general method is by cuttings, which should be selected from well ripened wood of the previous season's growth. The cuttings should be about twelve inches long, and these ought to be planted four eyes below ground, in rows about two feet apart, leaving a space of nine or ten inches between in the lines. Keep the ground free from weeds, mulch the surface, and if necessary, supply water. The following season the plants will be ready for the permanent plantation, or they can be allowed to remain for another year if necessary, in which case the shoots must be shortened back and thinned out according to requirements.

Varieties.

There are many varieties in cultivation, but a limited selection will serve all practical purposes. The following list embraces most of the best sorts in each class :—

Black Currants.

Black Naples.—This is one of the finest and best in its class. Bunches short, and berries very large. Flavour good, and superior to most other varieties. Plant vigorous, hardy, and very prolific.

Carter's Black Champion.—This is a comparatively new English variety, which has become popular in Europe. Bunches and berries large, and fruit well flavoured. Strong in growth, and bears profusely.

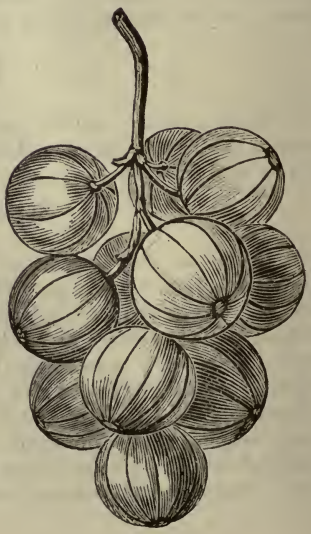
Kentish Hero.—A hardy and prolific variety. Bunches a good size. Berries large and well flavoured.

Lee's Prolific.—A robust, very free-bearing variety. Bunches medium-sized. Berries large, uniform, and possessing a sweet, rich flavour.

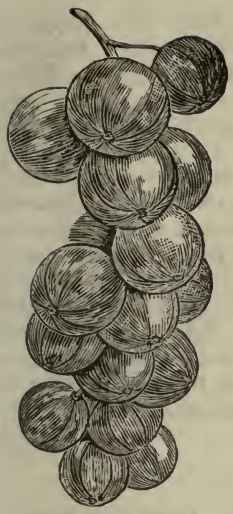
Long-bunched Red.

La Versaillaise

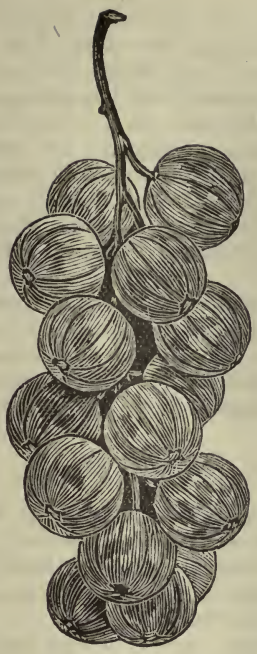
Red Dutch.



Cherry.



La Fertile.



White Imperial.

Victoria.

Ogden's Black (*Black Grape*).—This variety is somewhat more hardy than the *Black Naples*, but not quite equal to it in quality. Bunches a fair size. Berries large, and of good quality. Plant very prolific.

Red Currants.

Champagne (*Pheasant's Eye*).—This variety is remarkable for its large bunches of pale pink fruit, which appear to be intermediate between the *Red* and *White Dutch*. Berries medium-sized, and very acid.

Cherry.—A robust, hardy variety, bearing short, thick bunches, and ipening earlier than most other kinds. Berries very large, deep red in colour, and rather acid in flavour. An excellent and prolific market variety.

La Fertile.—A French variety, of vigorous, upright habit, and a very free bearer. Bunches long. Berries large, dark red, and similar in flavour to the *Red Dutch*.

La Hâtive.—This is a vigorous and prolific French variety, which matures early in the season. Bunches medium-sized. Berries large, dark red, and well flavoured.

La Versaillaise (*Fertile d'Angers, Imperial Red*).—An excellent variety, of French origin, and one of the best Red Currants. Bunches long and heavy. Berries of the largest size, and well flavoured. Plant very prolific, vigorous in habit, with large foliage.

Long-bunched Red (*Wilmot's Red*).—This is very hardy, robust, and productive variety, bearing bunches that are often six inches in length. Berries large, deep red, well flavoured, and mature rather late.

Red Dutch (*Morgan's Red, Red Grape*).—An old and well-known variety, producing medium.sized bunches. Berries deep red, large, with a pleasant, subdued acid flavour. Plant hardy, upright in habit, and very productive.

Victoria (*Goliath, Houghton Castle, Raby Castle*).—This is an excellent and useful late variety, with very long bunches. Berries large, bright red, and somewhat more acid in flavour than the Red Dutch and most other kinds. An abundant bearer, and the fruit will hang longer after it is ripe than most other sorts. Plant hardy, and spreading in habit.

White Currants.

White Dutch (*White Cyrstal, White Grape White Leghorn*).—This is decidedly one of the best of the white varieties. In habit, productivenes, and size of bunches it is similar to the Red Dutch, but the fruit is somewhat sweeter and ripens a little earlier. The berries are large yellowish white, transparent, and pleasantly flavoured.

White Imperial.—A new variety, of high character, which has proved a useful acquisition. Bunches long and regularly set. Berries large, very transparent, and well flavoured. Plant hardy, upright in habit, and very productive.

CUSTARD APPLE.

This name is applied to the fruit of various species of *Anona*, a genus that is the type of the order Anonaceæ, or the Custard Apple family. They are evergreen shrubs or small trees, and most of them are natives of the West Indies. The name Custard Apple is most generally applied to *Anona reticulata* which attains a height of twelve to fifteen feet, and bears large rough-skinned fruit which has a consistance and flavour somewhat similar to a custard, hence the name. *Anona squamosa* yields a fruit somewhat similar in appearance to the globe Artichoke, which is known as the Sweet Sop. It has a scaly rind and a rich luscious pulp that has been compared to clotted cream and sugar, with a flavour of cinnamon. *Anona muricata*, a small tree, is known as the Sour Sop. It has a large oval heart-shaped fruit with a greenish yellow skin and a whitish pulp, which in flavour is pleasantly compounded of sweetness and acidity. The whole plant has a flavour somewhat similar to that of the Black Currant. These species are extensively grown in India, the West Indies, and other tropical countries, their fruit being considered very wholesome and refreshing. *Anona palustris*, a medium-sized shrub, is the

Alligator Apple of the West Indies. It has shining, smooth, heart-shaped fruit, which in flavour is vastly inferior to the other kinds, though it is sweetish and not unpleasant, but is strongly narcotic. The wood of this species is very soft and compressible, and is largely used as corks in the West Indies and South America. *Anona cherimolia* a Peruvian species yields the fruit known as the Cherimoyer. It is the hardiest of all the species, grows to the height of twelve to fifteen feet, has cheerful light green foliage, and highly fragrant flowers. The fruit when ripe is purple, with a rough skin, somewhat heart-shaped and has a sweet pleasant flavour. It is necessary that the fruit of any the species should be fully ripe or nearly so when gathered as taken off the trees too soon it lacks the proper flavours. A large proportion of Custard Apples sent from Queensland to the other colonies are gathered before they are sufficiently ripe, and they suffer materially in quality from this cause. Riper fruit, as a matter of course, will require greater care in packing, but it will obtain better prices, and cause many to become partial to Custard Apples who would not otherwise care for them.

Cultivation and Propagation.

The true Custard Apple, as also the Sweet Sop, Sour Sop and Alligator Apple can only be cultivated in those parts of Australia where the climate is warm and moist. They are specially well adapted for the rich soils to be found in the Northern coast river districts. Shelter from strong winds is also essential to success. The Cherimoyer, being more hardy, can be cultivated successfully in sub-tropical regions, as also in New South Wales, South and West Australia, in mild localities where the frosts are very slight. All the species require a rich deeply worked soil that can at all times be kept moderately moist, as the trees cannot withstand drought. In making a plantation the trees should be arranged in rows, leaving a space of about twenty feet between them. Care should be taken not to plant too deeply and it will be sufficient if the upper roots are merely an inch or so below the surface. Young trees should have their growth regulated from time to time, to get them into shape, but when they reach maturity they require but little pruning. It is a good plan to mulch the surface soil before the hot weather sets in, to conserve the moisture. Propagation is effected by seeds, which should be put in when fresh and covered about an inch deep, and layers which if put down in the autumn or early spring, soon make strong plants. Plants may be obtained from ripened cuttings of the current season's wood, which will strike in sand under a glass

Custard Apple.

1.—Sour Sop. 2.—Sweet Sop.

DATE.

History.

The Date is one of the most useful plants to mankind in the warm arid regions of Africa and Asia, as it will thrive in localities where no other serviceable tree can grow. It is the only useful tree found upon the margins of the great African and other deserts, and it occupies large tracts of country exclusively. This plant also occupies the oasis or fertile spots in these deserts, and affords the only vegetation that is to be found in many of those localities. It also furnishes the only food plant that is to be met with in these arid regions. Dates are the fruit of a Palm known to botanists as *Phœnix dactylifera* which is indigenous to North Africa, Arabia, Egypt, Persia, Palestine and other parts of Asia. It attains a height of from sixty to eighty feet, and exceptionally over one hundred. There are no branches, and the stems are surmounted with a crown of leaves. The Date Palm is diœcious, which means that there are both male and female plants, the flowers of the former being somewhat ths larger. The flower branches or spikes spring from the base of the leaves and are at first enclosed in sheaths or spathes. A full-grown tree bears annually from six to ten bunches of fruit, each weighing from twelve to twenty pounds. Sometimes a single bunch will consist of over two hundred Dates, and yields up to four hundred weight are recorded, from a single tree. The Date Palm attains a great age, and it is said that plantations two hundred years old have yielded heavy crops.

Uses.

The Date Palm is utilised in a variety of ways in those countries where its cultivation is general. In Barbery, Egypt, Turkey, Arabia and Persia, Dates are the principal article of food for the bulk of the people. In fact the Date crops are of as much importance to the inhabitants of these countries as the grain harvest in other regions. When the Date harvest is secured there is great rejoicing and it is the principal operation from an agricultural point of view. The fruit is eaten fresh when in season, and dried for the remainder of the year. It is very nourishing as it contains about 58 per cent of saccharine matter. Drying is effected by spreading the fruit upon mats and exposing it to the sun. For full details as to the process of drying, see special remarks upon the subject page 69. The fruit by pressure yields a rich syrup, which when mixed with water and fermented makes an intoxicating liquor, and from this a strong spirit is obtained by distillation. But not only does the Date Palm prove serviceable by means of its fruit, as its sap can also be utilized. This sap when dried yields sugar, by fermentation an intoxicating liquor, and when distilled a spirit known as arrack in India. The extraction of the sap however, is destructive to the trees, and is usually only practised with those that are unfruitful, or to reduce the number when they are growing too thickly. In extracting the sap the most usual method is to cut off the crowns when the plants are in

full growth. From a mature tree the sap will flow at the rate of about a gallon per day for the first fortnight, and at a gradually falling rate up to six weeks or two months. Arrangements are made for the reception of the sap as it exudes from the trees, and the receiving vessels should be emptied daily. The Date Palm is utilized in various other ways, as the fibrous parts of the stems are made into coarse ropes, mats and baskets, and the leaves are turned to account for similar purposes. From the medullary portion of the stems a farinaceous substance resembling sago is obtained, though in small quantities.

Cultivation.

The Date Palm is specially suitable for cultivation in the dry interior districts of Australia included within the tropical or sub-tropical regions. It may also be grown successfully in warm districts outside of those regions, provided the winter temperature is not too low, and frosts are not troublesome. As an ornamental plant only the Date Palm may be cultivated successfully as far south as Victoria, but a higher winter temperature is necessary for the production of fruit. It is however well worthy of cultivation for ornament, as it is a very handsome plant. As an avenue tree in the hot dry districts it is to be commended, as its leaves afford a dense and grateful shade. This tree is not particular as to soil, and will thrive in poor sandy land where most other plants will refuse to grow. As a fruit-bearing tree it thrives best in regions where there is great heat and dryness in the atmosphere, but at the same time it likes a steady supply of moisture at the roots. It is a tree that is specially suitable for planting near to rivers, lakes and dams in the interior, and also alongside irrigation channels. The Date Palm will also thrive in land that contains a large proportion of salt, and in which few other trees can be grown In making a plantation the trees should stand not less than twenty feet apart, and ought to be arranged in regular rows. If plants from offsets or suckers are used they will begin to bear in five years, and yield full crops in ten years. When the plants are from seedlings it will be seven or eight years before they begin to bear. They are many varieties of Dates which differ considerably in the size, shape and colour of their fruit, as also the times of ripening. As yet, however, we have no reliable *data* as to the respective merits of the different varieties, as but a limited number have as yet been introduced to Australia, and these have not had a thorough trial. As there are both male and female plants, there must, as a matter of course, be a proportion of the former in each plantation, in order to obtain fruit. Opinions vary somewhat upon this subject, but the writer would recommend one male tree to twenty. In order to ensure fruitfulness it is necessary to artificially fertilize the female flowers with the pollen from the male ones. This is done by cutting the spathes of the male flowers before they open, and placing pieces in the spathes of the fruit-bearing plants.

Propagation.

The Date Palm may be easily propagated either by seed or suckers.

Seedlings are, however, uncertain as to whether the plants will be male or female, and it is impossible to tell the difference till they flower. Seeds should be planted an inch deep in light sandy soil. They may be sown at any time, but the most favourable periods are at the end of summer or in the spring. When three or four inches above ground the young plants should either be placed singly in small pots or transplanted into beds. The following season they will be ready for planting out permanently. The more reliable and most generally adopted means of propagation is by suckers that are freely produced at the base of the stems of old plants. These should be taken up carefully with as large a proportion of roots as possible, avoiding exposure to sun and wind. These sucker plants will be of the same sex as the trees they are taken from, and consequently planters can make sure of having them in due proportion.

DATE PLUM.

History and Uses.

This fruit is obtained from a tree known botanically under the name of *Diospyros kaki*, and belonging to the natural order Ebenaceæ, or the Ebony family, most of the species of which are remarkable for the hardness and dark colour of their wood. The name is derived from *dios* (divine) and *pyrus* (a Pear) in allusion to the rich flavour of the fruit and the shape of some of the varieties. The common name Date Plum has originated from the adaptibility of the fruit for drying and packing in the same way as the Date. Very commonly the fruit are called Persimmons, but that name more properly applies to the American species of the family, which differ widely from *Diospyros kaki* in appearance and uses. The Date Plum is peculiar to China and Japan, and is highly esteemed for its fruit in both these countries, where several varieties are cultivated extensively. Large quantities of the fruit are dried and preserved in the same way as Figs, and in this form the Date Plum is very popular. In fact many consider it to be greatly superior to the Fig. Several other species of Diospyros yield edible fruits, yet all of them are vastly inferior to the Date Plum. *Diospyros decandra*, found in Cochin China, bears a yellow fruit that is largely eaten by the natives. *Diospyros edulis* yields an edible fruit, used in some parts of China and India. *Diospyros lotus*, a species common to the south of Europe and indigenous to the greater part of Asia, yields the ordinary Date Plum or Lotus, that famous fruit which, according to the traditions of the ancients, had the power of causing oblivion. The fruit in appearance is somewhat similar to black Cherries, is edible, and used both fresh and preserved. *Diospyros Mabola*, an evergreen, shrubby species, yields the Mabola Plum of the Philippine Islands. The fruit of *Diospyros melanoxylon* is eaten in some parts of India, though inferior to other kinds. An American species (*Diospyros*

texana), indigenous to Mexico and Texas—a rather strong-growing tree—is said to yield a very palatable fruit when fully ripe. Another American species (*Diospyros virginiana*)—a strong-growing tree—which attains a height of sixty or seventy feet, is the true American Persimmon. The fruit is in appearance something like a Medlar, and about the size of a Greengage Plum. It is not nearly equal to that of the Chinese Date Plum, but has a rich, sweet flavour when dead ripe. The wood of this and other species is valuable, and utilized for many purposes under the name of ebony or ironwood.

Though the fruit of various species is utilized in different parts of the world, yet all are vastly inferior to the Chinese or Japanese Date Plum, the produce of *Diospyros kaki*. This species embraces a number of varieties, which vary considerably in size, shape, and depth of colour, as also in flavour. As this fruit has not been generally cultivated in Australia the experience as to the relative merits of the varieties introduced is too limited to arrive at positive conclusions at the present time. Some certainly appear to be vastly superior to others, but further experience regarding this fruit is necessary. It must also be remembered by cultivators that the fruit wants keeping for some days after it is gathered before it is eaten, to obtain it in perfection. If eaten direct from the tree, though apparently the fruit may be fully ripe, yet the flavour will be comparatively poor, if not quite insipid. Many growers have made this mistake, and as a consequence the fruit has been condemned as being inferior to what it was expected to be. Though some varieties will doubtless be found inferior to others, yet before discarding them the fruit should be tested when in the best possible condition, that is in about ten days or a fortnight after it is gathered. Then again, the fruit should not be taken from the trees till it is well ripened. The full richness and sweetness of flavour seems to depend upon chemical decomposition in the fruit. If wanted for drying the fruit must be treated the same, in order to fully develop its sweetness and flavour. Drying is easily affected by spreading the fruit upon trays and exposing to the sun, turning it several times, previously removing the skins, which are intensely astringent. For the same reason when the fruit is eaten fresh care should be taken that the inner part of the skin does not come into contact with the mouth. The dried fruit makes an excellent sweetmeat, and will doubtless become popular when it is more generally known.

Cultivation and Propagation.

The Date Plum may be grown successfully in most parts of Australasia, but it will probably give the largest returns in the medium warm districts. It is a deciduous tree, is somewhat slow in growth, does not attain a very large size, and commences to bear when four or five years old. As the trees increase in age they bear more freely up to a certain limit, and as a rule, are fairly prolific. The ground should be deeply worked, and when necessary drainage must be provided for, as the trees cannot thrive with an excess of water at

their roots. Planting may be done at any time during the winter, but the most favourable period is July or up to the middle of August, according to the locality. The distance apart should be from twenty-one to twenty-four feet, and care must be taken not to plant too deeply. Young trees should have their growth regulated so as to to obtain strong and well-formed specimens as soon as possible. Summer pruning may be practised with advantage with young trees. Older trees must have their growth regulated according to their requirements; and, as the fruit is chiefly produced on the young growth, the last season's shoots should be shortened back and thinned out every winter. Keep the ground as free from weeds as possible by frequent light tillage, and before the hot weather sets in mulch the surface soil as far as the roots extend. Propagation is effected by seeds, layers, grafting, or budding. Seedlings will often come fairly true, but still there is a doubt about them, and they are mostly raised for stocks. They should be sown in shallow drills as soon as the fruit is ripe, covering them an inch deep. The next season the young trees should be planted in rows, leaving them nine or ten inches apart in the lines. The following year they will be ready for working. Layers strike freely, but as a rule they do not make such durable and well-shaped trees as can be obtained by other means. Grafting and budding upon seedling stocks of their own species are the most generally practised methods for perpetuating particular varieties. These operations are performed in the same way and times as is suitable for other deciduous trees.

DURION.

History and Uses.

This is the Indian name of the fruit of *Durio Zebethinus*, a robust evergreen tree belonging to the order Sterculiaceæ, which attains a height or seventy or eighty feet. It is indigenous to various parts of Southern Asia, and grows to great perfection in the Malayan Archipelago and the islands of the Indian seas. The flowers are pale yellow, produced from the main stems and larger branches. The fruit is as large as a man's head, being generally about ten inches in length by about seven in breadth. It has a thick hard rind which is covered with warts and short strong prickles. The inner portion consists of several cells which contain the seeds and these are about the size of pigeon's eggs. The seeds are surrounded by a thick cream-like substance which is the portion of the fruit that is utilized. The flavour of the fruit to persons unaccustomed to it is at first most revolting, as its odour may be compared to rotten onions, or decaying animal matter. This strong smell is caused by the presence of a large proportion of sulphuretted hydrogen. The feeling of disgust, however, soon passes away, and when that is overcome, it is generally admitted by those who have eaten

it, that the Durion is one of the most palatable fruits, and equal in flavour to the Mango. The fruit is in fact considered to be an exquisite delicacy, and in addition very nourishing and easy of digestion. It is a great favourite with the natives of Borneo, Sumatra, Java and Malaya who use it in large quantities. Europeans residing in those regions also become partial to it.

Durion.

CULTIVATION AND PROPAGATION.

As the Durion is a native of moist tropical regions it can only be successfully cultivated in the warmest parts of Australia. It would probably thrive in the coastal regions of Northern Queensland and North Australia. The most suitable localities are rich deep soils, bordering rivers or creeks where there is shelter from strong gales. Propagation is easily effected by seeds, which should be planted about two inches deep. They may be planted at any time of the year, but in the autumn or spring are the two most favourable periods. Plants may also be obtained from ripened cuttings of the current season's growth, with the leaves left on, which will strike freely in sand or light soil.

EDIBLE ACORNS.

Several species of Oak yield Acorns that are turned to good account as food for mankind in various countries. *Quercus Castanea*, an evergreen American species, commonly known as the Mexican Oak Chestnut, yields Acorns that are in flavour something like the Chestnut, and are used to some extent as food in Mexico. *Quercus Garryana*, a North West American species, commonly known as the Californian White Oak, has Acorns having a sweet agreeable flavour, which are eaten to some extent. This species attains a large size, and its timber is pale, hard grained, and very durable. *Quercus lobata*, another species indigenous to North West America, known as the Sacramenta White Oak, has fairly sweet Acorns, which were formerly one of the staple articles of food with the aboriginal Indians.. The tree is tall and wide spreading, and its wood is of good quality. *Quercus turbinella*, a shrubby species which attains a height of only a few feet, has very sweet Acorns that are used as food. It is a native of California, and other parts of North West America. *Quercus cuspidata*, an evergreen tree of large proportions from Japan, bears

small Acorns in bunches which are regularly sold as food in its native country. These Acorns have a sweet, pleasant flavour, and when baked taste somewhat like Chestnuts. Another evergreen species, *Quercus glabra*, has Acorns that are largely used as food in its native country. Edible Acorns, largely used as food in China, are obtained from *Quercus cornea*, an evergreen tree of moderate growth indigenous to that country.

Cultivation and Propagation.

All the species mentioned will thrive in the temperate regions in Australasia. They will also freely adapt themselves to various local condition of soil and climate. Though their cultivation as food-yielding trees for mankind would be of little practical value in this part of the world, yet they might prove worthy of attention for feeding some classes of live stock. Pigs are remarkably fond of Acorns, and all the species mentioned are relished by cattle, horses, and poultry. As ornamental trees all the species are worthy of attention, and are well adapted for parks and shrubberies. Some of them may also prove worthy of cultivation for the sake of their timber, which is highly appreciated in their native countries. Propagation is generally effected by seeds which should be planted soon after they are ripe, covering them to the depth of two inches. Plants may be obtained from layers or cuttings, but these never make good trees, which can only be obtained from seed.

EGG PLANT.

History.

This plant, which also passes under the English names of Guinea Squash and Vegetable Egg, is known botanically as *Solaanm melongena*, and it belongs to the natural order Solanaceæ. It embraces a number of varieties bearing blue or purple flowers, and fruits varying considerably in shape, size, and colour. The one after which the plant is named is known as *ovigerum*, its fruit in shape and colour bearing a perfect resemblance to a hen's egg, though sometimes it is much larger. There are also purple, red, violet, yellow, and striped fruited varieties of various shapes. In France the fruit passes under the name of Aubergines, and in other places they are known as Bringals, Brinjals, and Begoons. In its natural state the species is very widely distributed, as it appears to be indigenous to India and various other parts of Asia, as also Northern Africa and Tropical America. According to Baron von Mueller, *S. insanum*, *S. longum*, *S. serpintinum*, *S. undatum*, *S. ferox*, *S. album*, *and S. pseudo-saponaceum* are closely allied species, and may prove useful esculents. *Solanum muricatum*, a shrubby South American species, known in Peru as the Pepino, may also prove serviceable. The fruit of this species is egg-shaped, about six inches in length, white with purple spots.

The common Egg Plant appears to have been cultivated in England as early as the latter part of the sixteenth century according to historical records. Gerard, in a work published in 1596, says that the plant has somewhat doubtful qualities, and advises people to use it with care, or to leave it alone altogether and be satisfied with such fruit as they know to be wholesome. This opinion was doubtless based upon the popular prejudice that formerly prevailed in the United Kingdom against plants belonging to the Solanum family, as they were all supposed to possess deleterious qualities. A closely allied species, *Solanum Insanum* (*esculentum*), was commonly known as the Mad or Raging Apple (Mala Insana) from its supposed identity with the Male Mandrake of the ancients, which is stated to have caused madness in those who ate it. Though these prejudices against the family gradually disappeared, yet, strange to say, though a useful esculent, the fruit of the Egg Plant has never come into general use in the United Kingdom. In France and other countries in Europe, however, the fruit is in general use, and large quantities are sold in the markets of Paris and other large cities, where they are as common as Tomatoes. The most popular varieties in Europe are the purple fruited kinds, which are more generally cultivated than others. The fruit is also extensively used in America, and more especially in Southern United States, where it is a common dish with all classes of the community. In the Australasian Colonies the fruit of the Egg Plant is but seldom used, though it can be grown with little trouble. Sometimes plants are grown, but chiefly as curiosities owing to the curious appearance of the fruit, and but comparatively few people appear to know its value for culinary purposes.

Uses.

The fruit of the Egg Plant can be used either when green or ripe. When used green the most common method is to boil it in the same way as a vegetable marrow, to which it has some resemblance in flavour. Sometimes the fruit is peeled, scored thickly with a knife, and oil poured over it to soak into the cracks, after which it is sprinkled with bread crumbs, salt, vinegar, pepper, and herbs being added to taste, and then it is baked. In Italy and France a common way of using the ripe fruit is to cut them in slices half-an-inch thick, and soak them in water eight or ten hours to remove the bitter flavour. The slices are then squeezed to press out as much of the juice as possible, parboiled, and afterwards fried in oil or butter with grated bread crumbs, seasoning of pepper, salt, and chopped herbs being added according to taste. Another popular way of using the fruit is to scoop out the insides and fry them in oil or butter, and boil the outsides whole. When they become soft they are taken out of the water, the insides replaced, and then sent to the table. Sometimes the fruit is simply cut in halves lengthways, the seeds removed, and the spaces filled with chopped herbs and other seasoning, after which they are baked or fried. The ripe fruit of the Egg Plant can,

if required, be kept for a considerable time, and will be found very serviceable as a winter vegetable.

Cultivation.

The Egg Plant may be cultivated successfully in all the Australasian Colonies. Independent of the value of the fruit for culinary purposes, the plants may be utilized to advantage for ornament in pleasure gardens. When used for this purpose their flowers are showy, and the bright-coloured and curiously-shaped fruit of most of the varieties is very effective in miscellaneous beds and borders. Any ordinary good garden soil is suitable for the Egg Plant, but it will only thrive to perfection in rich ground. In preparing the land, manure should be used freely when necessary, and the ground deeply worked. It is essential in the cultivation of this plant for culinary purposes that growth should be strong and rapid. When grown as a crop the plants should be arranged in rows, four feet apart, leaving about three feet between in the lines. As the plants are tender, they cannot be safely planted out till all danger from frost has passed unless means are taken to protect them. The plants should be kept as free from weeds as possible, and more especially during the early stages of growth. Before the hot weather sets in it will be advisable to mulch the surface soil between the plants to conserve the moisture as much as possible. Should the plants show any tendency to make straggling growth, they must be kept within bounds by pinching back the shoots from time to time. As the plants require a steady supply of moisture, water should be used freely in dry weather, and growth will be materially assisted by the use of liquid manure occasionally,

Propagation.

As a rule the Egg Plant is propagated from seeds, though, if necessary, plants may be obtained from cuttings of the young shoots, which root freely in sand under a glass. Seed should be saved from the largest and most perfect fruits, which, as a rule are those that are first formed. The fruits must be allowed to get perfectly ripe before they are gathered. If required for home use the seed can be allowed to remain in the fruit till it is wanted, but, if necessary, it may be taken out, washed, dried, and packed away in paper bags. Seed will retain its vitality for about seven years, and will sometimes germinate when eight, nine, or ten years old. The seeds should be sown in rich, finely-prepared soil, covering them to the depth of half-an-inch. It is the better plan to sow it in pots or small frames rather than in the open ground. If early plants are required, and in many localities it will be an advantage to have them, they may be obtained by sowing in a hot bed as recommended for Cucumbers (see page 281). Before putting them in the open ground, plants raised by artificial heat should be gradually hardened off, so that they will not be materially affected by the change. It will also be

advisable to shade fom the sun for a few days till the plants are established by sticking a few small branches round them, or in some other way.

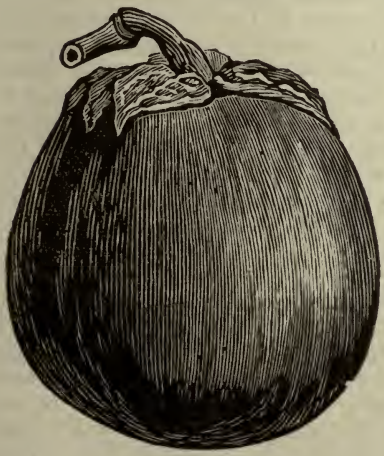
VARIETIES.

The following list embraces some of the best and most distinct varieties, of which there are many:—

Black Pekin.—A moderately robust variety, with large pyriform fruit. Colour, a very deep black-purple.

Black Pekin.

Long Purple.



Large Purple.

White Fruited

Chinese Long White.—This is a late and somewhat tender kind, with pale green foliage. The fruit is white, eight or nine inches in length and about two and a-half in diameter, more or less curved.

Large Purple (American Large Purple, Round Purple).—This variety has remarkably large fruit from seven to eight inches long, and six or seven in diameter. Colour, deep purple, with occasional stripes of yellowish-green. The plant is hardy, compact in habit, and fruits rather early in the season.

Long Purple.—A hardy and prolific kind, with fruit from six to eight inches in length, slightly curved. Colour, light purple, usually marked or blotched with yellowish-green. Plant moderately hardy.

Scarlet Fruited.—A handsome variety, with brilliant scarlet fruit, which in shape and size is similar to a hen's egg. This variety is chiefly cultivated as an ornamental plant, and seldom for culinary purposes. It is somewhat tender in habit, and ripens late.

White Fruited.—This is the common variety from which the name is derived. The fruit is milk white, similar in shape to a hen's egg, and ranges from three to five inches in length, and from two to three in diameter. This is one of the earliest, hardiest, and most productive varieties.

ELDER.

History and Uses.

The European Elderberry is known botanically as *Sambucus nigra* and it belongs to the natural order Caprifoliaceæ, or the Honeysuckle family. The generic name is said to be derived from *Sambuca*, a musical instrument, some of the earliest of these being made from the wood of the Elder. The specific name *nigra* is derived from the dark colour of the fruit. Several species of the family yield berries that are sometimes used for making wine and medicinal purposes, but only to a small extent as compared with the common Elder (*Sambucus nigra*). This species is indigenous to the United Kingdom and many other parts of Europe, being a common plant in the forests and hedgerows. It is a very hardy plant, and will flourish in the most bleak situations, and at the same time its growth is very rapid, though, as a rule, it does not attain a large size, seldom exceeding twenty feet, but, exceptionally, larger trees have been known.

In England and some of the northern countries of Europe it is a common practise to make wine from the deep purple or black berries, which are produced in great abundance. Elderberry wine is a popular beverage with many during the winter season, being generally considered to be a comforting draught when warmed and spiced and taken before going to bed. It is also considered to be an excellent remedy for colds. From the wine an excellent spirit can be obtained by distillation. Both the flowers and the berries have a faint, sickly smell that is unpleasant and hurtful to some people, and

for this reason the Elder should not be planted too near dwellings. Medicinally, the flowers, berries, leaves, and bark, are considered to be serviceable for certain complaints, though they are not in such high repute as they were formerly. The berries at one time held high rank among the remedies for fever, gout, rheumatism, and cutaneous disorders. Both the berries and flowers act as aperients. The berries are also reputed to possess narcotic properties to some extent. The flowers are used as a fomentation and in the preparation of cooling ointments. To a large extent they are also used by distillation in the preparation of Elder flower water, which is a popular application in cases of inflammation and cutaneous eruptions. The bark of the Elder is strongly purgative, and was formerly considered to be a sovereign remedy for dropsy. When boiled in lard the leaves form a good unguent, formerly in general use by farriers. They are not touched by horses or cattle, but sheep will sometimes eat them. They are obnoxious to many of the smaller insects, and assist in keeping them away. Branches hung up in dwelling-houses or stables will, to some extent, mitigate the pest of flies in summer, and when placed about the heads of horses the animals get great relief. An infusion of the leaves makes an excellent insecticide for aphides, thrips, red spider, and mealy bug. The leaves are also said to banish moles and mice and other vermin. When young the wood of the Elder is brittle, but with age it becomes hard and tough and can be utilized for various purposes where these qualities are desirable. Owing, however, to the large proportion of spongy pith, it does not take rank among timber trees.

Other species whose fruits are utilized are *Sambucus australis* a native of South America *Sambucus canadensis*, (Canadian Elder) a robust species indigenous to North Eastern America which is used to make a wine, and has also valuable medicinal qualities. *Sambucus glauca* is the Californian Elder, a robust species which attains a height of about twenty feet and is very prolific. The fruit is used to some extent in its native country in the same way as the common Elder. *Sambucus Gaudichaudiana* an Australian species found in all the colonies except West Australia, and *Sambucus xanthocarpa*, indigenous to Victoria, New South Wales and Queensland, yields sweetish fruit that is eaten by the aboriginals.

Though the Elder flourishes in many parts of Australasia, and more especially in the cooler regions, yet its value seems to be altogether ignored. Trees are by no means uncommon, and the writer has come across very fine specimes in various localities, but the fruit or flowers are seldom utilized as in Europe. As a rule it is simply grown as an ornamental plant, and growers seem to have no knowledge as to its economic value. Possibly in time it will receive greater attention, and will be utilized as in other countries.

Cultivation and Propagation

The Elder will grow in any ordinary soil, and its cultivation is very simple. Prepare the ground as for other trees, and, if a regular

plantation, set the plants out about twenty-one feet apart. The plant, however, does well as a hedge, and makes an excellent breakwind for the more tender fruits. When required as a hedge it may be planted five or six feet apart, and the plants must be well cut back for a year or two to induce a bushy bottom growth.

Propagation is most usually effected by cuttings which strike freely in sand or light soil. They should be from twelve to fifteen inches long, and must be put in just before spring commences. Plants can also be readily obtained from layers which may be put down at any time when growth is active. But little pruning is required, all that is necessary being to thin the branches when too numerous and to regulate growth to effect other objects.

ELEPHANT APPLE.

The fruit known under this name is the product of an evergreen small tree belonging to the order Aurantaceæ, or Orange family, and known to botanists as *Feronia elephantum*. It is a native of Southern India, and has bluish-white flowers. The name is derived from Feronia, the Goddess of forests, in allusion to the natural habitat of this tree. The fruit is the size of a large Apple, and has a hard, woody rind, with numerous seeds embedded in a pulp that is pleasantly sub-acid, with a flavour somewhat similar to the Bhel Fruit or Bengal Quince.

Being a native of a warm country the Elephant Apple can only be successfully cultivated in the tropical regions of Australia. As a commercial fruit it is scarcely worth cultivating, but in congenial localities it is worthy of attention as an ornamental tree. It requires an open soil, rich in vegetable matter, and must be sheltered from high winds. Propagation is easily effected by seeds, which should be sown when fresh, covering them an inch deep. Plants may also be obtained from layers and cuttings of the ripened wood of the current season's growth, which strike freely in sand under a glass.

EUGENIA.

History and Uses.

Several species of *Eugenia*, a genus belonging to the natural order *Myrtaceæ* or Myrtle family, yield edible fruits of more or less value, which are utilized in various parts of the world. They are all handsome evergreen shrubs or small trees, and are rather widely distributed, species being found in Australia, Polynesia, India, South Africa, Ceylon, and South America. In some of the countries to which they are indigenous several of the species are regarded as useful fruits, but in Australia, though several are cultivated as ornamental plants, they are not utilized in any other way. Though

some of the species belong to tropical countries, and are therefore too tender for cultivation in the Southern Colonies, yet there are several natives of cooler regions that thrive well in all but very cold districts. These may be worth trying, and though they may not prove quite satisfactory as fruit-bearing plants, yet their ornamental appearance will make them attractive as evergreen trees or shrubs. The fruits of the various species differ considerably in size, colour, and flavour, some being as large as small Apples, while others are only the size of Currants. The relative value of the fruits of many of the species have not been precisely ascertained, and it is possible, by hybridization and careful culture, to improve upon the original kinds, as has been done with many other fruits

The principal fruits obtained from this family are what are known as Rose or Malay Apples, which are the products of *Eugenia Jambos* (*Jambosa vulgaris*) and *Eugenia Malaccensis*), Indian species. These bear fruit sometimes as large as small Apples, the pulp of which is juicy, wholesome, and agreeable. These and other tropical species, can only, as a matter of course, be cultivated in the warmer parts of Australia, and therefore are not likely to receive much attention in other regions. *Eugenia uniflora* (*Michelii*), a South American species known as the Brazilian Cherry, with fruit the size of Cherries, is more hardy, and will grow in the medium warm districts where frosts are not severe. It is a handsome ornamental evergreen. *Eugenia Ugni*, a Chilian species, yields a fruit that is very popular in its native country, and largely cultivated. It bears small dull purple fruit about the size of a marble, and yields a pleasantly flavoured pulp and an aromatic juice, which when mixed with water makes a refreshing drink. This species is an evergreen shrub which will thrive in all the milder districts. *Eugenia myrtifolia* (*australis*) is a handsome Australian species which attains the size of a large shrub. It bears oval, crimson, small fruit which is juicy, acidulous, and very palatable. The tree is very ornamental, and may be grown successfully in all the milder districts. *Eugenia Smithii*, (*Myrtus Smithii*,) another Australian species, is the "Lilly Pilly" of New South Wales. It has small waxy white fruit that is edible but inferior to other kinds, yet its handsome foliage makes it a desirable ornamental shrub. It is one of the hardiest species and will thrive in all but the cold districts.

Among the many other species of Eugenia that yield edible fruits worthy of attention. Baron von Mueller, in his valuable work "Select Plants for Industrial Culture," makes the following selection. *Eugenia Hallii*, a Peruvian species with large fruit. *Engenia Jambolana*, a species indigenous to Southern Asia, Polynesia, and Eastern Australia, with fruit the size of Cherries. *Eugenia cordifolia*, a species from Ceylon, with fruit about an inch in diameter. *Eugenia maboides* a species from Brazil, with fruit the size of small Cherries. *Eugenia Nhanica*, a Brazilian species with fruit the size of large Plums. This is a popular table fruit in its native country. *Eugenia pyriformis*, another Brazilian species with large palatable pear-shaped fruit known in Brazil under the name of Uvalho de Campo. *Eugenia revoluta*, a

species from Ceylon, where it grows in elevated regions, with fruit the size of a large Cherry. *Eugenia rotundifolia*, this species is also from elevated regions in Ceylon, growing to an attitude of 8000 feet, and has fruit as large as a Cherry. *Eugenia supra-axillaris* a Brazilian species with large palatable fruit commonly known in its native country under the name of "Tata." *Eugenia Zeyheri*, this is a robust South African species which attains a height of about twenty feet and bears fruit the size of Cherries. It must also be stated that the fruits of any of the before-named kinds make an excellent conserve, similar to that made from the Guava, to which they are closely allied.

Cultivation and Propagation.

Any of the hardier *Eugenias* may be cultivated without difficulty in congenial localities. They will not stand severe frosts. however, and must be sheltered from the effects of strong winds. Any fairly good soil is suitable for them, but they will thrive best in a rich sandy loam. The ground should be well prepared, and drainage provided where necessary. If planted in shrubberies care must be taken tbat stronger trees do not interfere with the growth of the plants. Keep the ground as clean as possible, and mulch the surface before the hot weather sets in, which will materially assist the plants. Seeds may be sown at any time, covering them an inch deep. When large enough to handle, the growing plants should be potted off singly, or planted out in beds, where they must be kept till the following season. The quickest way of obtaining plants is by layers, which may be put down in the spring or late in the summer. Cuttings of the ripened wood of the previous season's growth will strike in sand or light soil, if placed under a handglass, and be fit for planting out the following season.

FIG

History and Uses

Botanically the Fig is known under the name of *Ficus*, the origin of which is unknown, and it belongs to the natural order Urticaceæ, or the Nettle family. The edible Fig of commerce is *Ficus Carica*, a species indigenous to the greater portion of Asia and Northern Africa. It has been naturalized in the south of Europe from time immemorial, and ranked among the necessities of life with the nations of antiquity. The Fig appears to have been a popular and generally used fruit with the Hebrews, Egyptians, Greeks, and Romans. By the ancient Jews this fruit appears to have been highly valued, as it is frequently mentioned in Bible history from the time of Moses. In Greece when Lycurgus decreed that the Spartans should dine in a common hall, Figs were included in

the contributions that each individual had to make to the general stock. The Athenians considered this fruit to be of such great importance to the welfare of the community that they prohibited its export. This decree, however, was not generally popular, and was so frequently evaded that it became necessary to employ officials specially to detect breaches of the law. These officers were called *Sukophanti* (meaning, literally, discoverers of Figs), which in time became a term of reproach. From this name the English word sycophant is said to be derived. According to ancient historians, the Fig was always carried immediately after the Grape vine in the processions in honor of Bacchus, the god of wine. This deity was supposed to derive his vigour and corpulence from eating Figs as well as drinking wine. Saturn, one of the ancient deities, who was supposed to have introduced agriculture into the Roman states, was always represented with a crown of Figs. Cleopatra, the most luxurious of queens, is said to have had the asp, which deprived her of life, introduced in a basket of Figs. Among the Romans the opinion prevailed that plants had their sympathies and antipathies, and, according to Pliny, they were in the habit of planting rue near their Fig trees. This practice, he informs us, caused the fruit to be sweeter, while at the same time the rue would grow with more than ordinary luxuriance and have a more intensely bitter taste.

Great medicinal virtues were attributed to the Fig by ancient nations. According to Pliny, among the Romans the fruit was considered to be the best restorative food for persons recovering from sickness, and he tells us that "Figs increase the strength of young people and preserve elderly ones in good health, making them look younger and preventing wrinkles." He further informs us that "Figs were considered to give corpulency and strength, and that it was usual with the athletes in the public games to eat large quantities." This writer also tells us that in his time no less than twenty-nine distinct varieties of Figs were known and cultivated by the Romans. In modern medicine the fruit is considered to be demulcent and laxative. When quite ripe the fruit becomes highly flavoured, and is very wholesome and digestible when eaten in moderate quantities. If it is eaten too freely, or if the fruit is not thoroughly ripe, some people are apt to suffer from flatulence or diarrhœa. Sometimes the fruit is eaten to remove habitual costiveness; and, when split and roasted, Figs are often used as poultices for ulcers.

The Fig is said to have been introduced to England in the beginning of the sixteenth century, during the reign of Henry VIII. Probably, however, it was introduced at a much earlier date by the Romans, when they invaded the country. Being more tender than many other fruits, and requiring protection in cultivation, it never became popular with the bulk of the people in any part of the United Kingdom. In fact, according to the old writers, this fruit appears to have been held in great contempt in England, and this is how such expressions as "Not worth a Fig," and "A Fig for such rubbish," had their origin. These expressions are used up to the present time, and are frequently heard. It is said to have been the custom of the Italians and Spaniards of the middle ages to give poisoned Figs to those upon whom they wished to have revenge, and

probably this practice may have been the cause of vulgar prejudice that formerly prevailed against this fruit in England. This prejudice, however, no longer exists in that country, where the fresh fruit is now largely used for dessert, and is highly esteemed by most people. In the south of Europe, throughout Asia and a considerable portion of Africa, dried Figs is an important item in the diet of the inhabitants. They are also an important article of commerce in some countries, and more especially France, Spain, Italy, Turkey, and Syria.

The process of drying is simple, and easily carried out. In the countries where the Fig is an article of commerce, the practice is to gather the fruit when it is perfectly ripe and dip it in a scalding-hot lye made with the ashes of the tree. The fruit is merely dipped, and not allowed to stand in the lye, after which it is spread out on trays or mats and exposed to the sun. The fruit must be turned daily till it is thoroughly cured, taking care that it is not exposed to the rain or night dews. When the fruit is sufficiently dry it must be piled loosely in boxes or casks for two or three days. After this is done the Figs should be tightly packed in layers in small boxes or drums, in which they are sent to market. Another method of drying, practised to some extent, is to plunge the fruit into a boiling syrup of sugar for about two minutes and then dry in the usual way. The practice of drying in slow ovens has been introduced of late years, and more especially in America, by growers on a large scale. This plan is no doubt the most economical, easiest, and surest method of curing, as the grower has the most perfect control over his fruit, and the process can go on uninterruptedly through changes of the weather. On the other hand, however, sun-dried fruit, when carefully prepared, is generally superior to that which is manufactured by artificial heat.

The Fig may be grown successfully in nearly every part of Australasia, and its cultivation should be more general than it is at present It is one of those fruits that are likely to prove of great value in the future. For the fresh fruit the demand will always be somewhat limited, as in that state the Fig only keeps a short time, and its carriage is difficult for long distances. Probably, however, better and more certain supplies for our local markets may induce a larger consumption. In the production of dried Figs there is a wide field open to the energies of cultivators residing in favourable localities. The Fig is a fruit specially well adapted for the warm interior districts of Australia, where it flourishes as well as in any other part of the world and yields heavy crops. As yet growers have scarcely turned their attention to this industry, but the results obtained by a few enterprising pioneers show clearly that there is a great deal to be done in this direction. There is no reason whatever why growers should not make the drying of Figs an important business, and they will always be likely to command good markets for their produce. Even to supply the local demand, which is now met from outside sources, a considerable quantity of fruit is required. Then after this demand has been supplied, there ought to be no great difficulty in finding good markets elsewhere for any surplus that we may raise.

Cultivation

Any fairly good soil is suitable for the Fig, and it does equally well in heavy or light land. The land should be well worked if of a heavy, retentive character, but in light, porous soils deep stiring is not so essential. Drainage must be provided for when necessary, as the Fig, even more than many other trees, is impatient of its roots standing for a length of time in soddened ground. Fully-developed trees, when growing under favourable conditions, will attain a height of from twenty to twenty-five feet, and must not stand closer than from twenty four to twenty-seven feet if it is desired that they should grow to the largest size. Some growers, however, do not care about large trees, and prefer those that are more dwarf in habit. There is some reason in this preference, as dwarf trees are more easily managed in gathering the fruit and other respects. Dwarf trees are also more suitable for small places, where a number of fruits are required upon limited areas. Trees may in a great measure be kept down by severe root pruning and avoiding highly stimulating manures. The most favourable time for planting is in July, though it may be done at any time between the fall of the leaf and the starting of growth in the spring.

The Fig requires but little in the way of pruning when the trees reach maturity if growth has been properly regulated previously. Young trees, as a matter of course, must have their branches thinned out or shortened, in order to get a strong woody growth and heads of the desired form. Sometimes, owing to local circumstances—such as a very rich soil, using manure too freely, or the natural vigour of the variety—trees will make a rampant growth of wood, and produce but little fruit. This is a very common thing with Figs, and the evil can only be counteracted by root pruning, which should be done before growth commences. By adopting this plan the growth of over-luxuriant trees will be materially checked, and in most cases their fruitfulness is increased.

The Fig always produces two, and sometimes three, crops of fruit, which are borne upon wood of various ages. As a rule the second crop is the largest, and yields the best fruit. Fructification occurs in a somewhat singular manner, there being no visible flowers, and fruit rises from the wood in the shape of small buds. These are perforated at the ends, but do not show the organs of fructification, which are concealed within. As the fruit enlarges the flower comes to maturity in its concealment. The pollen, being confined in this manner, requires the assistance of insects to disperse it, as without this help the fruit becomes abortive and drops off early. European cultivators assist in bringing about fertilization, or caprification as it is termed, by inserting straws, which have been dipped in olive oil, to mix the pollen. In Turkey and Syria the operation is assisted by hanging branches of the wild Fig in the trees. These wild Figs are infested with a species of *cynips*, which, in its winged state, penetrates the cultivated fruit, and so effectively disperses the pollen. This insect, which is known as *Blastophaga psnes*, (*grossum*) and commonly as the Caprification

Insect, has been introduced to New South Wales at the instigation of Baron Von Mueller and the Australian Association for the Advancement of Science. It should be known however, that some good authorities are doubtful as to the value of this insect to the cultivators of Figs.

Prepared Cutting.

Plants from Cuttings.

Flute or Annular Budding.

As in the case of other fruits, the Fig does best when its roots have not to contend with an undergrowth of weeds. The ground should, therefore, be kept as clean as possible by frequent scarifying and

hoeings, taking care not to disturb the roots to any great extent. Before the hot weather sets in, let the ground be mulched three or four inches deep, to check rapid evaporation and conserve moisture as much as possible. The Fig tree is a rather strong feeder, and, if necessary, must be kept in good heart by the use of manure occasionally. Manure in large quantities, however, or when of too forcing a nature, is apt to cause over-luxuriance in growth, which is not desirable. When grown under favourable conditions the Fig is naturally a very long-lived tree. The first trees introduced from Italy to England by Cardinal Pole in 1525, and planted it in the grounds of Lambeth Palace, were alive and flourishing but a few years ago. They were of the kind known as the White Marseilles, and when over three hundred years old bore excellent crops of fruit. Another tree of the same variety brought from Aleppo by a Dr. Pocock was planted at Oxford in 1648, and up to 1819 it was in a flourishing condition, bearing heavy crops. Many other well authenticated records exist of Fig trees attaining great ages. The wood of the Fig tree is light and spongy, and but of little value commercially. In the south of Europe it is sometimes used, when charged with oil, for polishing iron and steel. Formerly it was extensively used by the Egyptians in embalming the bodies of their dead.

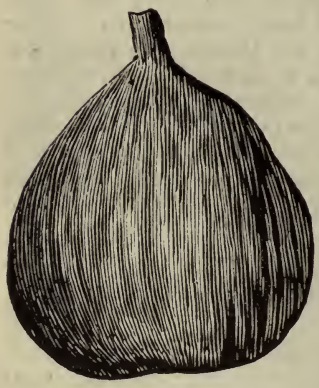
Propagation.

Propagation is effected by seeds, eyes, cuttings, layers, grafts, buds, and suckers. Seeds will vegetate freely as a rule, and the plants generally come fairly true to their parents, but they are several years before they fruit. Cuttings root freely in sand or light soil, and produce vigorous, well-shaped plants. Those of last season's wood, ten or twelve inches long, should be selected, and planted in rows about thirty inches apart, leaving a space of a foot between in the lines. Insert the cuttings about half their depth in the soil. Layers root readily, and very good plants may be obtained by this means. If desirable, plants may also be obtained from single eyes, with a fair portion of wood attached, and planted two or three inches deep. This method, however, is only serviceable in allowing particular varieties to be propagated more quickly than could be done in the ordinary way. Suckers are freely produced, and plants obtained by this means are those mostly used. Grafting may be practised, as also budding, both methods being useful in perpetuating varieties quickly and in substituting better for inferior kinds. What is known as annular, flute, or whistle budding is popular with European gardeners in propagating Figs. Full directions are given at page 21 for practising this method. Probably if the practices of grafting and budding were more generally adopted with the Fig, as with most other fruits, it would be an advantage to growers. Varieties of fruits are often altered materially in character by the influence of the stocks upon which they are worked, and doubtless the Fig may be acted upon by the same means.

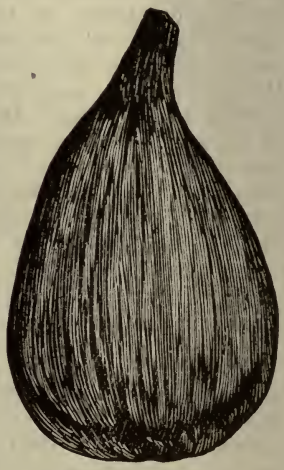
Varieties

The varieties of the Fig are numerous, and the following selection embraces most of those that are reputable. The list includes several French, Italian, and Spanish varieties that are reputed to be specially well adapted for drying, but which, as far as the writer is aware of, have not been introduced to the Australasian Colonies.

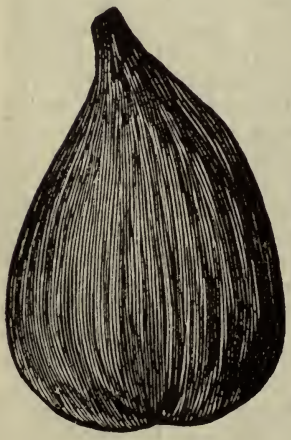
Bêc de Perdrix.—A Spanish variety, with highly flavoured fruit, rather below medium size, pyriform in shape, and an excellent Fig



Brown Ischia.



White Adriatic.



Brown Turkey.

Smyrna.

for drying. Skin dark purple, with a rich bloom. Flesh dark rose coloured, firm, sugary, and juicy. Tree moderately vigorous, and a free bearer.

Black Bourjassotte (*Précoce Noire*).—A very early French variety, with medium-sized, roundish oblate fruit. Skin quite black, and thickly covered with a blue bloom, cracks in lines when fully ripe. Flesh deep red, firm, syrupy, and very highly flavoured. Tree vigorous and prolific.

Black Genoa (*Nigra*).—This variety, which is supposed to be of Italian origin, bears large oblong fruit, very broad at the apex, and slender towards the stalk. Skin deep purple-black, covered thickly with bloom. Flesh deep red, juicy, sweet, and well flavoured. Tree very robust, hardy, and prolific.

Black Ischia (*Blue Ischia*).—An Italian variety, with medium-sized turbinate fruit, flattened at the top. Skin deep purple-black. Flesh deep red, sweet, and luscious. Tree hardy, very prolific, and bears at an early period of growth. Fruit ripens a little after the Black Genoa.

Black Provence (*Black Marseilles*).—A French variety, with roundish oblong fruit, rather below the medium size. Skin brownish-black. Flesh red, tender, very sweet, and luscious. Tree hardy, very prolific, and bears at an early age. Ripens rather early.

Bordeaux (*Violette, Violette de Bordeaux*).—A desirable French variety, with large, long pyriform fruit. Skin black, thickly covered with bloom, and when dead ripe splits in lines. Flesh yellowish-red, tender, juicy, and sweet. Tree robust, and a moderately good bearer.

Brown Ischia.—An excellent Italian variety, with medium-sized roundish fruit, which ripens early. Skin light chestnut brown. Flesh reddish-purple, very sweet, and highly flavoured. Fruit somewhat liable to crack and burst in wet seasons. Tree hardy and robust, and a heavy bearer.

Brown Turkey (*Blue Fig, Blue Burgundy, Brown Italian, Brown Naples*).—This is a popular Fig of Italian origin, with large oblong or pyriform fruit, which ripens early. Skin brownish-red, covered with a thick blue bloom. Flesh red, very sweet, and luscious. Tree very hardy, and a regular and abundant bearer.

Brunswick Black (*Naples, Brown Hamburgh*).—This is an excellent variety of doubtful origin, and one of the best of the dark-skinned sorts. Fruit large and pyriform. Skin deep violet-brown. Flesh reddish-pink, sweet, and richly flavoured. Tree very hardy and prolific.

Castle Kennedy.—This is an old and popular variety in the United Kingdom, and derives its name from Castle Kennedy in Scotland, where it has been cultivated for considerably more than a hundred years. The fruit is very large, obovate in shape, and remarkable for its earliness, being ripe several days before most other kinds. Skin pale dingy-brown mottled with grey. Flesh pale, with slight stains of red in the centre, tender, sweet, and fairly well flavoured. Tree hardy, of vigorous habit, and an abundant bearer.

Col di Signora Blanca.—An Italian variety of high quality, said to be

well adapted for drying. Fruit medium-sized, pyriform, with a rather long neck. Skin thick, yellowish-green, thickly covered with bloom. Flesh deep-red, firm, syrupy, and very highly flavoured. Tree said to be robust and prolific.

Col di Signora Nero.—Another excellent Italian variety, that ripens late, and said to be specially suitable for drying. Fruit above medium size, long, and pyriform. Flesh very dark red, and exceedingly sugary and highly flavoured. Tree reputed to be vigorous, and a free bearer.

D'Or de Laura.—A French variety, said to be excellent for drying. Fruit rather under medium size, oblong. Skin yellowish-green. Flesh richly flavoured and sugary. Tree reputed to be hardy and prolific.

Early Violet.—A variety of doubtful origin, with small roundish fruit, which ripens very early in the season. Skin reddish-brown, with a thick, blue bloom. Flesh red, and well flavoured. Tree hardy, remarkably prolific, bears early, and generally three serviceable crops. Though the fruit is small, this variety is valuable for its earliness and freedom in bearing.

Malta (*Small Brown*).—A small but very richly flavoured variety of doubtful origin, suitable for drying, whose fruit will hang on the trees till it gets shrivelled, when it becomes a pleasant sweetmeat. Fruit roundish, and ripens late. Skin pale brown. Flesh pale brown, and very sweet. Tree fair, vigorous, and bears freely.

Peau Dure (*Peldure*).—Another French variety, said to be admirably well adapted for drying. Fruit medium-sized, pyriform, with a short neck. Skin pale yellowish-green. Flesh pale red, sweet, firm, and rich. Tree fairly robust and prolific.

Smyrna.—A variety with medium-sized, or under, sweet, richly flavoured fruit. This variety is one of the best drying Figs, and largely used for the purpose. It is, however, doubtful whether the true variety has yet been introduced to Australasia.

White Adriatic.—This name has been given by the Americans to an excellent Italian variety which is known in its native country as *Fico di Fragola*, or the Strawberry Fig. It is a hardy, robust, and prolific variety. Fruit above medium size, pyriform, with medium neck and short stalk. Skin yellowish-green, and very thin. Flesh Strawberry-red, when dry a pale yellow, very sweet and rich. A good variety for drying.

White Genoa (*Large White Genoa*).—An Italian variety, with large roundish obovate fruit. Skin pale greenish-brown. Flesh pale red, sweet, and highly flavoured. Tree less hardy than some kinds, and bears moderately well.

White Ischia (*Green Ischia*).—Another Italian variety, with small roundish fruit, which ripens a little late. Skin pale yellowish-green. Flesh reddish-purple, very sweet, and luscious. Tree small in habit, bears very early, and is remarkably prolific.

White Marseilles (*Raby Castle*, *White Naples*, *White Standard*).—An excellent French variety, with round fruit rather above the medium size. Skin yellowish-green. Flesh pale brown, juicy, sugary, and very highly flavoured.

INDEX.

VOL. 1.

The Scientific Names and Synonyms are printed in Italics.

CRAB APPLES.

APRICOTS, VARIETIES.

BLACKBERRIES, VARIETIES.

CAPSICUMS, VARIETIES.

CHERRIES, VARIETIES.

THE AUSTRALASIAN

FRUIT CULTURIST,

CONTAINING

Full and Complete Information as to the History, Traditions, Uses, Propagation, and Culture of such Fruits as are Suitable for Victoria, New South Wales, South Australia, Queensland, Western Australia, Tasmania, and New Zealand;

ALSO

Descriptive Lists of the Principal Varieties of Fruits, With Remarks as to their Adaptability for Particular Purposes.

VOL. 2.

BY DAVID ALEXANDER CRICHTON, F.R.H.S.,

Late Expert and Lecturer upon "Fruit Culture" and "Special Agricultural and Horticultural Industries" to the Victorian Department of Agriculture.

MELBOURNE:

MINERVA PRINTING WORKS, ANDERSON ST., MELBOURNE W.

1893.

FIG MARIGOLD.

This is the common name for various species of Mesembryanthemum which yield succulent fruits somewhat similar in appearance to small Figs. They are succulent or fleshy leaved plants belonging to a natural order, of which they are the type, known as Mesembryaceæ or Ficoidæ: The species known are very numerous, the great majority being natives of South Africa. What is known as the Hottentot Fig is obtained from two distinct species, viz., *M. acinaciforme* and *M. edule*. A somewhat similar fruit is obtained from *M. æquilaterale*, which is indigenous to Australia and the west coast of America, as also from other species. The fruit has a sweetish pulp that is grateful to the palate. The leaves of these species may be used as a vegetable when boiled, and are eaten by sheep and other stock. The Hottentot Figs will thrive in the dry interior districts of Australia, and are worthy of attention for their fruit in some localities, and also as vegetable and fodder plants. The indigenous species named (*M. æquilaterale*) thrives well in salt land of all descriptions, and is a valuable plant for binding sea coast and other sandy soils. Propagation is readily effected by seed which is freely produced, or pieces of the stems, planted as cuttings, can be rooted without difficulty.

FIVE CORNER.

This is the common name of an Australian plant, an evergreen shrub of low growth, belonging to the order Epacridaceæ, and known botanically as *Styphelia viridiflora*. The fruit is very small, oval in shape, and contains a comparatively large seed which has a thin covering of gelatinous flesh that has a sweet and pleasant taste. The common name has originated owing to the calyx, or husk, having five angles. Though the fruit is of comparatively small value compared with others, yet it is very popular with children in localities where it is indigenous, and is to some extent collected for sale in Sydney and its suburbs. The plant is indigenous to the coast regions of New South Wales, and is generally found in sandy and peaty soils.

The plant is not worth cultivation for its fruit as other kinds are vastly superior, but being a neat shrub of compact growth, it deserves attention for ornamental purposes, and its light green flowers contrast well with others. Propagation may be effected by seed, layers, or cuttings of the young shoots, which will strike in sand under a glass.

GAULTHIERIA.

History and Uses.

This is a genus of ornamental evergreen shrubs belonging to the natural order Ericaceæ. They are chiefly natives of cool regions in North Western America, and two of the species yield fruit that is largely used by the inhabitants of the countries where they grow naturally. *Gaulthieria*

Shallon, a spreading shrub, attains a height of from four to ten feet. It bears white flowers, and the fruit, which is produced in great abundance, is, when ripe, a purple-black. The fruit is pleasantly flavoured, and is largely used in a fresh state, and also when dried by sun heat for winter use. It is also turned to good account for making jam and jelly. *Gaulthieria myrsinites*, a procumbent shrub indigenous to Northern California, Oregon, and British Columbia, produces fruit in great abundance, which is in colour scarlet. With the exception of being somewhat more aromatic, the fruit has similar properties to the other species, and is used in the same ways.

Cultivation and Propagation.

The Gaulthierias can only be cultivated successfully in the colder parts of Australasia. They would thrive well in the alpine districts, and their fruits are likely to prove useful acquisitions, as when known they would doubtless become popular. Both species thrive best in moderately moist peaty soil, and attain perfection under somewhat similar conditions to the Cranberry. When grown for their fruit the plants should be arranged in rows, about ten feet apart. As ornamental plants they may be utilized with advantage in congenial localities. Propagation may be effected by seeds, which should be sown early in the spring and covered to the depth of half-an-inch. Plants may also be readily obtained from layers which strike freely if put down early in the autumn or spring.

GEEBUNG.

This is the common name for the fruit of several species of Persoonia, Australian shrubs or small trees belonging to the order Proteaceæ. They are indigenous to the coast districts of New South Wales and other regions, and have handsome bright green foliage that makes them very attractive as shrubs. The foliage is much used in Sydney in the formation of wreaths for decorations, as the leaves retain their rigidity longer than most other evergreen shrubs. The fruit is about the size of a small Cherry, the mucilaginous flesh covering a large seed. In flavour it is very insipid, slightly astringent, and it is absolutely worthless as a fruit, though it is eaten with relish by aboriginals and children. The wood is light coloured, hard and durable, and is excellent for tool handles and similar purposes. The various species are not worth growing as fruit plants, but in congenial localities they are worthy of attention as ornamental shrubs. They thrive in sandy or peaty soils, and may be grown in localities where the frosts are but light. Propagation is effected by layers, and cuttings of the ripened wood of the current season's growth will strike in sand under a glass.

GENIP.

This is the name of an evergreen tree, indigenous to Guiana and other parts of tropical South America, belonging to the order Cinchonaceæ

(Rubiaceæ), and known botanically as *Genipa Americana*. It attains a height of about thirty feet, has handsome foliage, and bears pale yellow flowers. The fruit, which is about the size of an ordinary Orange, has a thick rind or shell, containing a brown pulpy flesh which has a flavour somewhat similar to Orange marmalade. It is a popular fruit in Guiana, where it is commonly called Marmalade Box. This tree can only be grown successfully in the tropical regions of Australia, but where the climatic conditions are favourable it is worthy of attention both for its fruit and as an ornamental plant. It requires a deep, rich, and moderately moist soil, and must be sheltered from strong winds. Propagation is readily effected by layers, which should be put down early in the autumn or spring. Cuttings of the ripened wood of the current season's growth root freely in sand under a glass.

GINGERBREAD PALM.

This plant, which is also known as the Doum Palm is indigenous to Egypt, Arabia, Nubia, and Abyssinia, and its fruit is used as food by the inhabitants of those countries It attains a height of about thirty feet, and is known botanically as *Hyphæne crinita* (*Thebaica*). After a few years growth branches are formed, each one being surmounted with a crown of fan-shaped leaves. The fruit is produced in large pendulous bunches of from one to two hundred. Each fruit is the size of a small Apple, the outer portion being a fibrous sweetish pulp, having a flavour somewhat similar to Gingerbread, hence the common name. Several other species of Hyphæne yield edible fruits, and might prove worthy of cultivation in congenial regions. The Gingerbread Palm and kindred species can only be cultivated successfully in the warmer parts of Australia. It can stand heat and drought well, and would probably prove a useful fruit for the dry interior districts of the northern colonies This Palm is also well worth cultivating for ornament in warm dry regions, and makes a good avenue plant. As regards cultivation and propagation, the methods are precisely the same as those recommended for the Date Palm.

GINGERBREAD PLUM.

The fruit known under this name is produced by *Parinarium macrophyllum*, a handsome evergreen small tree indigenous to tropical West Africa, belonging to the Chrysobalaneæ section of the order Rosaceæ. The tree has fine large foliage, odorous white flowers, and Plum-like fruit having a pleasant flavour somewhat like Gingerbread, hence the name. *Parinarium excelsum*, also a West African species, is a large evergreen tree attaining a height of about sixty feet, with long leaves and large terminal branches of scented white flowers. The fruit is produced in great abundance, and is about the size of an Orleans Plum, but it is dry and insipid in flavour as compared with the Gingerbread Plum. It

is known under the names of Grey Plum and Rough Plum. *Parinarium Nonda* is a species indigenous to North Eastern Australia, known as the Nonda Tree, and recommended by Baron von Mueller for trial culture. It is a handsome evergreen tree, and attains a height of about sixty feet. The fruit is Plum-like, and is rather mealy, but possibly might be improved by cultivation. The Gingerbread Plum and kindred species, being natives of tropical regions will only thrive in the warmer parts of Australia, where they are worth cultivation both for their fruit and as ornamental trees. Propagation is readily effected by seed and layers. Plants may also be obtained from cuttings of the ripened wood of the current season's growth, which strike freely in sand under a glass.

GOAT NUT.

This name is used in California for the fruit of *Simmondsia Californica*, a low-sized shrub of rigid habit belonging to the order Brexaceæ. It is indigenous to California and other parts of North West America, and grows naturally under widely different conditions as regards soil and climate. This plant flourishes equally well near to the sea coast, in mountain districts, or the interior desert regions. It bears regularly and profusely Acorn-like Nuts, which have a pleasant flavour. The Goat Nut will thrive in any part of Australia excepting the tropical regions, as also in Tasmania and New Zealand, and owing to its hardiness and profuseness in bearing is worthy of attention, though the fruit is greatly inferior to many other Nuts. It may be grown successfully in almost any kind of soil or situation, and even in the most exposed places. Probably if tried it would prove a serviceable plant for hedges. Propagation is easily effected by seeds, which should be planted an inch deep. Layers put down in the spring root readily, and cutting will strike freely if put in at the same season of the year.

GOOSEBERRY.

History.

This familiar fruit is known botanically under the name of *Ribes*, and it belongs to the natural order Grossulaceæ. The genus embraces a number of species, natives principally of the northern regions of Europe, Asia, and America, and only three or four are found in other parts of the world. With a few exceptions all the species are deciduous small shrubs, and, while only a few yield serviceable fruits, several others are used for ornamental purposes. The Gooseberry has originated from *Ribes grossularia*, which embraces seven or eight sub-species, and is indigenous to Great Britain and many parts of Northern Europe. The specific name comes from the Latin *grossur*—a small, green fig. There is some

uncertainty as to the source from which the English name has been derived. According to some authorities, Gooseberry is a corruption of of Gorseberry, a name given on account of the bushes being prickly, like gorse or furze. Others assert that the name was originally Grosberry, derived from the specific one. Then, again, other writers say that the name originated through the fruit being commonly used in England as a sauce for young, or green geese. In some of the northern counties of England the fruit is commonly known as the Feaberry (Fever Berry). In some places this name is abbreviated to Feabes. A common name for the fruit in Scotland is Grozet or Grozer. Carberry is another name used in some parts of England for this fruit. In its wild state the fruit of the Goosebery is very small, and has a poor appearance in comparison with the cultivated varieties. Unlike most improved fruits, however, the Goosebery in its wild state has a richer flavour, if anything, than the improved varieties. Cultivation has greatly altered the fruit in size, but has not improved its flavour.

Edible fruits that may be classed as Gooseberries are yielded by several American species, the more prominent being as follows. *Ribes cynosbata* which is widely distributed in the United States and Canada, where it is known as the Prickly-fruited Gooseberry. *Ribes divaricatum* which is also widely dispersed, yields a small but pleasant fruit, as does also *Ribes hirtellum*. *Ribes Menziesii* a species indigenous to California, has large but somewhat dry berries. *Ribes niveum*, an Oregon species, has small dark berries that have a rich vinous flavour, but are somewhat acid. *Ribes oxycanthoides*, indigenous to the mountain regions of California, where it is found at an attitude of from six to nine thousand feet, has pleasantly flavoured berries of medium size. *Ribes quercetorum*, a species with well flavoured berries, is the Wild Gooseberry of California. *Ribes rotundifolia* a species with small richly flavoured berries is indigenous to Canada and the Northern United States.

The Gooseberry appears to have been quite unknown to the nations of antiquity, as no mention is made of it in their records. As to when it was first cultivated in England there is no evidence, but it was mentioned by the oldest writers upon British husbandry (Tusser and Gerard). The last-named writer says that in his time Gooseberries were generally used "in sauces for meats, also in broths, to which they not only gave a pleasant taste but made them serviceable to those troubled with the ague." Parkinson, another standard English writer, tells us that in his time "the green berries were much used when boiled as a sauce for meat or fish, and more especially with mackerel." Gordon, a prominent Scotch horticulturist, writing in 1774, enumerates twenty varieties of Gooseberries as being cultivated in his time. Among the sorts mentioned by him are the Champagne, Ironmonger, and one or two others that still hold their own in collections.

Uses.

The Gooseberry is a useful fruit, both for dessert and culinary purposes, and it is turned to good account in several other ways. As a dessert

fruit it must be thoroughly ripe, as otherwise its flavour is not developed and it is somewhat indigestible. For culinary purposes the fruit is mostly used before it becomes ripe. Gooseberries are used in a green state extensively for puddings and tarts, being, when cooked, both wholesome and palatable. The unripe fruit may be kept for a long time in bottles with water, and large quantities are preserved in this way. In preserving in this way, the bottles are filled nearly to their tops and then plunged for two or three minutes in boiling water, after which they are tightly corked and sealed to prevent the admission of air. For canning the Gooseberry is one of the best of fruits and is in steady and increasing demand. In the form of jam the Gooseberry makes an excellant and popular preserve, and for this purpose it may be used either when green or ripe. Gooseberries yield an excellent and palatable wine, which when carefully made from the most suitable kinds and well matured, is somewhat similar to champagne. Wine is made by pressing thoroughly ripe berries (as in the case of Grapes), straining off the juice, and allowing it to ferment. When fermentation ceases it should be put into casks, and after standing five or six months, may be racked off and bottled. The wine may be used as soon as it is bottled, but it will be improved if allowed to stand for a few months. If carefully made, Gooseberry wine may be kept for many years, and its quality will improve with age.

Cultivation.

The Gooseberry thrives to perfection in a cool and moist climate, and is a fruit specially adapted for elevated localities and mountain ranges. It is useless to attempt its culture in the warmer districts. The flavour of the fruit is more highly developed in a cold region, as long as there is sufficient warmth to ripen it. Fruit grown in the north of Scotland is by general consent admitted to have a higher flavour than that which is grown in the southern parts. In England also the Gooseberry is more highly flavoured in the northern than in the southern counties and more generally cultivated. Lancashire, in particular, has been, specially noted for Gooseberry culture for a long period, and many of the best varieties have originated in that county. Under the most favourable conditions the Gooseberry will attain a great age, and instances are on record of plants in Great Britain that were over forty years old and then yielded good crops of fruit. As a rule, however, there is a falling off in the yield and size of the fruit when the plants have passed their prime, which is usually the case when they are six or seven years old. The finest fruit and the best crops are invariably obtained from young plants, and plantations should be renewed at intervals of not more than seven or eight years.

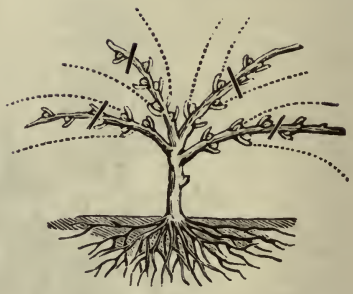
Though the Gooseberry may be grown successfully in any fairly good land, yet it thrives best in a rich, medium-light soil. To some extent the size and quality of the fruit is influenced by the character of the soil. For highly flavoured dessert fruit a rich, light, sandy loam, resting upon a gravelly subsoil, is the most suitable. If large Gooseberries are

required, a strong loam, highly enriched, will give the most satisfactory results. In preparing the ground let it be worked deeply, as a good root bed is a great advantage. Drainage must also be provided for if necessary, and if the soil is not sufficiently rich use enough manure to give the plants a fair start. Planting may be done at any time while growth is at rest, but it is advisible not to delay till after July. In selecting varieties the cultivator should bear in mind the object he has in view, and choose those adapted for his requirements. Care should also be taken to select well-shaped, vigorous-looking young plants. The distance between in planting should be eight to ten feet each way. Keep down weeds by constant attention, but as the plants are apt to suffer when their roots are disturbed to any extent the work should be performed with care and as lightly as posssible. The Gooseberry is very impatient of drought, and it will be advisable to conserve the moisture in the soil as long as possible by mulching four or five inches deep early in the season, This mulching will also assist in supplying nutriment to the plants, which are strong feeders, and whose roots are never quite inactive. Plantations of Gooseberries must be kept in heart by the use of manure when necessary, and the plants should never be allowed to get stunted through lack of nourishment.

SUMMER PRUNING. X Showing where Shoots should be pinched back.

Branch showing one and two year old wood.
X—Showing where some of the side shoots should be cut back.

Prepared Cutting



Plant second year from the Cutting. Black lines showing where to cut. Dotted lines showing where branches will be the following season.

The fruit of the Gooseberry is produced both upon the last season's wood and spurs from older branches. As a rule the bushes require a regular pruning every winter, but to some extent the system must be varied according to the habit of the variety and the age and growth of the plant. The upright growing kinds, as a matter of course, require

somewhat different treatment in pruning to those that have drooping branches. Then, again. if specially large fruit is required, for show or other purposes, the shoots must be thinned out and shortened back more than would otherwise be necessary. As a general rnle in pruning the branches should be shortened back and thinned out sufficiently for the circulation of air and light and to keep the plants compact. Care must also be taken to prune so that no branches will rest upon the ground. Summer pruning is useful, as it conserves the energy of the plant and saves cutting to some extent in the winter. The practice consists in rubbing off superfluous shoots as soon as growth has fairly started, and afterwards stopping those that are too vigorous.

Propagation.

Propagation is effected by seeds, layers, and most generally by cuttings. Seed is seldom used except for the raising of new varieties, and ordinary cultivators rarely trouble themselves to raise plants by this means. The seed should be sown in shallow drills as soon as the fruit is ripe, and covered with soil to the depth of half-an-inch. In the following winter the young plants should be transplanted in rows about two feet apart, leaving from twelve to fifteen inches between in the lines. The plants will generally fruit the second year, when those that do not come up to a fair standard should be weeded out. Plants are readily obtained from layers, but this mode of propagation is not widely practised. The most generally adopted way of raising plants is by cuttings, which root freely. They should be selected from the previous season's growth from strong plants, leaving them about a foot long when the tops are cut off. Insert the cuttings about six inches deep after removing all the buds that would be below the surface, and press the soil firmly. The following season the plants will be sufficiently rooted for planting out permanently. A partially shaded and moderately moist piece of ground is the most suitable location for a cutting bed.

Varieties.

Gooseberries vary considerably in size, colour, shape, and quality, and an immense number of varieties are cultivated. As a general rule, the thinner the skin the finer the flavour of the fruit, but there are exceptions. The yellow-fruited kinds, and more especially those of a deep amber hue, are considered to be the richest in flavour. The red-fruited kinds have, as a rule, a more acid flavour than the yellow sorts, but there are many exceptions. For instance, the Red Champagne variety is one of the richest and sweetest of Gooseberries. The green-fruited kinds are generally inferior to the yellow and red sorts, but to this rule there are also many exceptions. The white-fruited kinds are the poorest of all in flavour, but as this class, and also the green-berried section, comprise a number of large and fine-looking varieties, they are grown rather extensively for culinary and exhibition purposes.

The following list embraces a number of the leading varieties in each class :—

Red Gooseberries.

Beauty.—A useful late variety, with long berries. Skin deep red tinted with pink. Flavour good. Plant strong, spreading, and a good bearer.

Billy Dean.—An old and popular variety, with large berries. Skin red. Flavour very good. Plant vigorous and prolific.

Companion.—This is a useful early variety, with medium-sized berries. Skin bright light red, thin, and very hairy. Flavour rich. Plant spreading in habit, and a very good cropper.

Clayton.—A good mid-season variety, with very large long berries. Skin dark purplish-red with broad light veins. Flavour very good. Plant robust, somewhat pendulous in habit, and bears freely.

Conquering Hero.—A mid-season variety, with very long well-proportioned berries. Skin dark red dotted with grey, and slightly hairy. Flavour good. Plant strong in habit, large, and spreading, and a fairly good cropper.

Crown Bob.—An old and favourite variety, with very large oblong berries, ripening at mid-season. Skin bright red with a tinge of green near the stalk, thin, and hairy. Flavour first-class. Plant strong, pendulous in habit, and an abundant bearer.

Dan's Mistake.—A useful variety, with medium-sized berries, which ripen at mid-season. Skin bright light red tinted with pink, hairy. Flavour fairly good. Plant robust, erect in habit, and prolific.

Dr. Hogg.—A desirable variety, with long somewhat flat-sided fruit. Skin purplish-red with veins of a deeper colour, slightly hairy. High flavour. Plant of strong, upright habit, wood short-jointed, leaves large, and a good bearer.

Foreman.—An excellent medium early variety, with large long berries. Skin smooth, colour very dark red. Flavour very good. Plant strong, spreading, with long pendulous shoots.

Forester.—An early variety, with plump short fruit. Skin hairy, bright red. Flavour sweet and rich. Plant erect in growth, and a very free bearer.

Ironmonger (*Hairy Black*).—This is one of the oldest varieties in cultivation and is a general favourite. Berries small and roundish. Skin hairy, very dark red. Flavour rich. Plant spreading in habit, and very prolific.

Lion's Provider.—An excellent and useful mid-season variety, with large long handsome berries. Skin bright light red with a pink tinge. Flavour good. Plant produces long erect shoots, and bears very freely.

Red Champagne.—A favourite old variety, with small roundish fruit. Skin thick, hairy, deep red. Flavour very sweet and rich. Plant very erect in growth, and bears in great abundance. One of the most popular dessert Gooseberries.

Red Robin.—An excellent early variety, with plump berries of medium

size. Skin hairy, very dark red. Flavour rich. Plant erect in habit, and a prolific bearer.

Red Warrington (*Aston, Volunteer*).—This is an old and popular late variety, with roundish oblong berries, above medium size, and will hang well after they are ripe. Skin hairy, deep red. Flavour fairly good. Plant strong, pendulous in habit, and very prolific. This is one of the best varieties for culinary use and preserving.

Rifleman (*Duke of York, Royal Anne, Admirable*).—A first-class late variety, with large roundish berries. Skin hairy, deep red. Flavour very good. Plant robust, erect, and a free bearer.

Rough Red (*Red Hairy, Scotch Red*).—An old and favourite variety, with small round berries. Skin hairy, dark red. Flavour sweet and rich. A good preserving variety. Plant strong, spreading in habit, and very prolific.

Ploughboy.—A fine and useful late variety, with very large long berries. Skin smooth, bright light red with a yellow tinge. Flavour very good. Plant spreading, and bears freely.

Slaughterman.—An early variety, with fine large long berries. Skin thin, slightly hairy, dark red and mottled. Flavour first-class. Plant pendulous in growth, and an excellent bearer.

Whinham's Industry.—An excellent and popular variety, with very large berries, and in England considered one of the best early market Gooseberries. Skin a dark dusky red. Plant robust and very prolific.

Green Gooseberries.

Drill.—A late and excellent variety, with large long berries Skin smooth, deep dull green tinged with yellow. Flavour good. Plant vigorous, with a spreading habit, and bears abundantly.

Fearless.—A very good mid-season variety, with plump berries of medium length. Skin smooth, light green suffused with grey. Flavour good. Plant strong, spreading, and bears fairly well.

General Markham.—A fine, medium early variety, with large long berries. Skin smooth, dark bright green with veins of a lighter colour. Flavour very good. Plant strong, with large foliage, and a prolific bearer.

Glenton Green (*Hedgehog*).—A mid-season variety with medium-sized berries. Skin rather thick, very hairy, bright green with lighter veins. Flavour sweet and rich. Plant strong, pendulous, and an excellent bearer.

Green Gascoigne (*Early Green, Green Hairy*).—A very early variety, with small round berries. Skin thin, thickly covered with hairs, dark green. Flavour very sweet and luscious. Plant strong, very erect in habit, and bears freely.

Green Overall.—An excellent early variety, with plump round berries of medium length. Skin thin, smooth, deep green. Flavour sweet and rich. Plant robust, spreading in habit, and bears very freely.

Green Prince.—A medium early variety, with thick long berries.

Skin thin, slightly covered with hair, pale light green. Flavour good. Plant vigorous, spreading, and an excellent bearer.

Gretna Green.—A mid-season variety, with round plump berries of medium length. Skin hairy, dark bright green. Flavour sweet and good. Plant strong in habit, erect, and very prolific.

Heart of Oak.—This is an excellent and popular old variety, with large oblong berries. Skin thin, smooth, pale green with yellowish veins. Flavour sweet and luscious. Plant strong, pendulous in habit, and a heavy bearer.

Jolly Tar.—Another excellent and popular old variety, with large obovate berries. Skin smooth, deep green. Flavour first-class. Plant robust, pendulous in habit, and an abundant bearer.

Laurel (*Green Laurel, Green Willow*).—This is an excellent medium early variety, with large obovate berries. Skin pale green. Flavour sweet and luscious. Plant erect, and very prolific.

Pitmaston Green Gage.—A desirable variety, with small obovate berries. Skin smooth, bright green. Flavour rich. Plant erect in habit, and bears well.

Plunder.—A medium early variety, with large long berries. Skin smooth, light green tinged with white. Plant vigorous, spreading in habit, and a very free bearer.

Progress.—A late variety, with long berries a little flat-sided. Skin slightly covered with hair, pale green. Flavour good. Plant strong, pendulous in habit, and very prolific.

Safety.—A mid-season variety, with long tapering berries. Skin thin, smooth, pale green. Flavour sweet and luscious. Plant robust, spreading in habit, and an abundant bearer.

Sir Charles Napier.—This is a good variety, with large berries of medium length. Skin smooth, deep green with lighter veins. Flavour good. Plant vigorous and prolific.

Shiner.—A variety with very large and heavy roundish berries. Skin smooth, light green tinged with white. Flavour good. Plant vigorous, spreading in habit, and bears abundantly.

Telegraph.—An excellent late variety, with large long berries. Skin smooth, deep bright green with light veins. Flavour very good. Plant strong, erect in habit, with short joints, and a good bearer.

Thumper.—A first-class late variety, with large plump berries of medium length. Skin hairy, deep green. Flavour very good. Plant moderately robust, erect in habit, with short-jointed wood, and bears freely.

Thunder.—A good early variety, with plump berries of medium length, Skin hairy, deep green. Flavour very good. Plant moderately robust, erect in habit, with short-jointed wood, and bears freely.

White Gooseberries

Alma.—A useful variety, with large plump berries of medium

length. Skin smooth, greenish white. Flavour good. Plant strong, spreading in habit, and an excellent bearer.

Antagonist.—This variety is one of the largest white Gooseberries in cultivation. Berries very large and long, ripening at mid-season. Skin hairy, creamy white with pale green veins. Flavour very good. Plant very robust, spreading in habit, and bears in great abundance.

Bright Venus.—An excellent rather late variety, with medium-sized obovate berries, which hang well after they are ripe. Skin slightly covered with hair, greenish white. Flavour very sweet and luscious. Plant strong, rather erect, and a good bearer.

Careless.—One of the best of the white varieties, with large long berries. Skin smooth, creamy white. Flavour good. Plant vigorous, spreading in habit, and bears very freely.

Crystal.—A useful very late variety, with small roundish berries. Skin thick, smooth, creamy white. Flavour fairly good. Plant moderately vigorous, spreading in habit, rather pendulous, and a fair bearer

Elizabeth.—A fine medium early variety, with large long berries. Skin smooth, greenish white. Flavour good. Plant strong, pendulous in habit, and a prolific bearer.

Hero of the Nile.—A mid-season variety, with plump berries of medium length. Skin smooth, greenish white. Flavour good. Plant moderately vigorous, spreading in habit, and bears freely.

Jenny Jones.—A medium early variety, with large long berries. Skin smooth, thin, greenish white. Flavour sweet and rich. Plant strong, spreading, and a moderately good bearer.

King of Trumps.—This variety has thick plump berries of medium length. Skin slightly covered with hair, dull greenish white. Flavour good Plant moderately strong, pendulous in habit, and a free bearer.

Lady Leicester.—An early variety, with plump berries of medium length. Skin hairy, greyish-white with green veins. Flavour good. Plant moderately robust, erect in habit, and prolific.

Mitre.—A variety ripening at mid-season, with thick round berries. Skin hairy, greyish-white. Flavour very good. Plant strong erect in habit, and an excellent bearer.

Moreton Lass.—An excellent mid-season variety, with thick roundish berries of moderate length. Skin smooth, creamy white. Flavour sweet and rich. Plant strong, erect, and bears very freely.

Postman.—A desirable variety, with large round berries of medium length. Skin hairy, white, with broad green veins. Flavour good. Plant very vigorous, spreading, and a good bearer.

Queen of Trumps.—A first-class early variety, with large long berries. Skin smooth, dull greenish-white. Flavour rich. Plant very robust, spreading in habit, and a good cropper.

Sheba Queen.—A variety with large obovate berries. Skin greyish-white and downy. Flavour very good. Plant strong, erect in habit, and a good bearer.

Snowball.—This variety has large round fruit of medium length. Skin hairy, creamy white. Flavour good. Plant strong, spreading, and prolific.

Snowdrop.—An excellent variety, with thick plump berries of medium length. Skin thin and hairy, greyish white with broad green veins. Flavour rich and luscious. Plant vigorous, spreading, and prolific.

Tally Ho.—This variety has large long oval berries. Skin hairy, greenish-white. Flavour fairly good. Plant strong, erect, and a free bearer.

White Lion.—A first-class late variety, with very large long berries. Skin greyish-white. Flavour very good. Plant strong, pendulous, and prolific.

Whitesmith (*Lancashire Lass*).—An old and popular variety, with large roundish oblong berries. Skin creamy white. Flavour very good. Plant strong, erect, and a free bearer.

Yellow Gooseberries.

Broomgirl.—An excellent old variety, which ripens early, and has large plump berries of medium length. Skin thin and hairy, dark yellow shaded with olive brown. Fruit sweet and highly flavoured. Plant robust erect in habit, and bears very freely.

Catherina.—A medium early variety, with large long berries. Skin slightly covered with hair, bright deep orange. Flavour sweet and luscious. Plant moderately robust, spreading, and a fairly good bearer.

Criterion.—An excellent variety, with plump berries of medium length, Skin slightly hairy, dark greenish-yellow. Flavour very good. Plant vigorous, spreading, slightly pendulous, and bears very freely.

Early Sulphur (*Golden Ball*).—A very early variety, with medium-sized roundish oblong berries. Skin hairy, pale yellow. Flavour fairly good, but not equal to many other varieties. Plant strong, erect, and a great bearer

Garibaldi.—A variety with large long well-formed berries. Skin hairy, bright deep yellow. Flavour sweet and rich. Plant strong, spreading in habit, and very prolific.

Gipsy Queen.—A first-class early variety, with large fruit of medium length. Skin pale yellow, blended with white. Flavour sweet and luscious. Plant moderately vigorous, spreading, and a good cropper.

Goldfinder.—A desirable variety, with very large long berries. Skin hairy, light yellow. Flavour very rich. Plant robust, spreading, and prolific.

High Sheriff.—An excellent variety, with large round berries. Skin very hairy, deep orange. Flavour sweet and rich. Plant strong, pendulous, and an excellent bearer.

Leader.—One of the best yellow varieties, with large berries of medium length. Skin smooth, thin, dull greenish-yellow. Flavour very rich. Plant robust, spreading and a very free bearer.

Leveller.—Another of the best yellow varieties, with large long berries. Skin smooth, dull greenish-yellow. Flavour sweet and rich. Plant vigorous, spreading, and an excellent bearer.

Moreton Hero.—A first-class variety, with large long berries. Skin

thin, smooth, pale yellow. Flavour very rich. Plant strong, erect, and prolific.

Mount Pleasant.—A late and excellent variety, with large long berries. Skin hairy, deep orange yellow. Flavour rich. Plant strong, spreading, and a free bearer.

Perfection.—A variety with large roundish berries of medium length. Skin thin, slightly hairy, light yellow. Flavour sweet and luscious. Plant fairly vigorous, and a moderately good bearer.

Pretty Boy.—A very good variety, with large berries of medium length Skin hairy, bright orange, mottled with a deeper shade. Flavour rich. Plant moderately vigorous, and very prolific.

Railway.—A good late variety, with large roundish fruit of medium length. Skin dull greenish-yellow. Flavour good. Plant strong, spreading in habit, and bears freely.

Smiling Beauty.—A variety with large oblong berries. Skin thin, smooth, deep yellow. Flavour very rich. Plant robust, pendulous, and a good cropper.

Trumpeter.—A desirable variety, with large long berries. Skin smooth, dull pale orange. Flavour good. Plant strong, spreading, and prolific.

Two to One.—A variety with large long berries. Skin thin, hairy, bright golden yellow. Flavour good. Plant robust, spreading in habit, and a free bearer.

Yellow Champagne (*Hairy Amber*).—An old and favourite variety, with small roundish berries. Skin hairy, deep yellow. Flavour very sweet and rich. Plant vigorous, erect in habit, and very prolific.

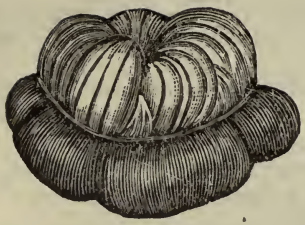
Yellow Warrington (*Yellow Aston*).—A useful old variety, with medium-sized roundish oblong berries. Skin hairy, deep yellow. Flavour rich and luscious. Plant strong, pendulous in habit, and bears abundantly.

GOURDS.

History and Uses

The plants known under this name, embrace several species of Cucurbita which is the type of the order Cucurbitaceæ or the Cucumber family. They include the Pumpkin, Squash, Vegetable Marrow, Calabash Gourd, and other kinds. Several of them are largely cultivated as vegetables, some are utilized in other ways, and many are grown as purely ornamental plants. The various kinds differ considerably in the size and shape of their fruits, which in some cases assume fantastic forms. Pumpkins, or Pompkins, have originated from two species, viz., *Cucurbita maxima*, which is the source of large fruited varieties and *Cucurbita Pepo* the parent of the smaller kinds. There is some uncertainty as to the origin of these species, but probably they belong to Eastern or Central Asia. The various kinds of Pumpkins are excellent as a vegetable when

FORMS OF PUMPKINS.



Turks Cap.

Ironbark

Large Oval.

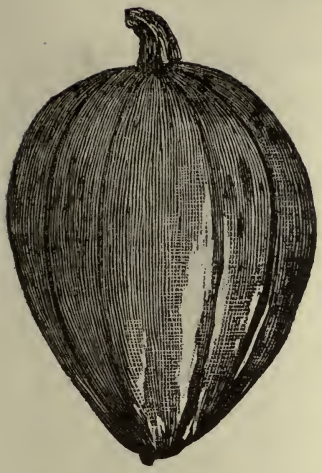
Flat.

FORMS OF SQUASHES.

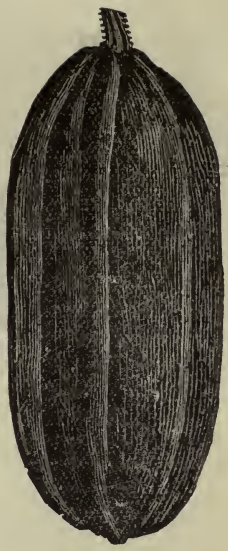
Electors Cap

Round Warted.

FORMS OF SQUASHES.



Ohio.



Patagonian.

Chestnut.

Crookneck.

Warted or Early Bush Crookneck.

Portmanteau or Neapolitan.

FORMS OF SQUASHES

Hubbard.

Brazilian Sugar

FORMS OF VEGETABLE MARROWS

Long White.

Common Forms.

Italian Green Striped.

FORMS OF LAGENARIA VULGARIS.

Long-fruited Gourd.

Long Siphon Gourd.

Club Gourd.

Flat or Plate Gourd.

Siphon Gourd.

Bottle Gourd

ripe, and may be kept in good condition for several months. They make also a very good vegetable when used young. As food for cattle, the Pumpkin is also deserving of attention. They are extensively cultivated in some parts of Australia and more especially in New South Wales, where they are often grown with the maize crops.

What is known as the Squash has its source in *Cucurbita melopepo* which however is considered by some botanists to be merely a variety of *C. Pepo.* Fruits differing widely in form and size commonly bear the name of Squash and many would be more correctly classed as Pumpkins. The fruit of several varieties is largely used as a vegetable and these kinds are generally cultivated.

The Vegetable Marrow or Succade Gourd as it is sometimes called, has its source in *Cucurbita ovigera* which some botanists consider to be merely a form of *C. Pepo* It is said to have originated in Persia, and was first taken to Europe about seventy years ago. The fruit of the Vegetable Marrow can be utilized as a vegetable in various stages of growth, and when used green is better than that yielded by any other plant of the same family. Though generally used green when partially grown, the ripe fruit also makes an excellent vegetable, and it may be kept for a considerable time. It makes an excellent winter vegetable and should be largely used as such. When the young unripe fruit is used it should be removed from the plants when not more than half grown, leaving none to mature, as when allowed to attain its full size and ripen, the plants will cease to bear freely.

Cucurbita moschata is the Musky Gourd, a species whose origin is uncertain. This species has very large fruit and is extensively used in Italy and other countries in Southern Europe. The Calabash or Bottle Gourd is *Lagenaria vulgaris* (*Cucurbita lagenaria*) an Indian species. The fruit of this species, when ripe, has a hard outer covering or shell, and after the inside pulp is removed it is used as vessels for holding liquid, hence the name Bottle Gourd. There are numerous varieties of this species which differ widely in the shape of their fruits. *Luffa ægyptica* (*Momordica luffa*) yields the fruit known as the Dish-Cloth or Sponge Gourd. The flesh of this Gourd consists of a porous sponge-like substance which is very soft and pliable. For use in the bath it is preferred to the ordinary sponge by many and also for kitchen use.

Cultivation and Propagation.

All the species and varieties of Gourds require a rich soil, warmth and moisture to bring them to perfection. They also require strong and rapid growth for their development. All the species are tender and cannot be safely planted in the open ground till all danger from frost has passed. The treatment required in cultivation is, in every respect the same as recommended for the Cucumber. Propagation is also effected in the same way. Some slight difference in practice will, however, be necessary, as regards the distances between the

plants, which should be determined by the growth of the particular kind, leaving in all cases sufficient room for free development. There must also be some difference in practice as regards the removal of the fruit, as when used before it is fully developed, as with the Vegetable Marrow, it must be taken off regularly when partially grown. On the other hand when Gourds have to ripen, none of the fruit should be removed, as that which is formed first is usually the best.

GRAPE.

History.

Botanically, the Grape Vine is known as *Vitis vinifera*, and it belongs to the natural order *Vitaceæ*. Vitis is derived from a Celtic word, and signifies the best of trees, in allusion to the great usefulness of the genus. The specific name vinifera means wine-bearing. The English name Grape comes from the Saxon "Grab" or "Gripe," signifying a bunch or cluster. As is the case with many other of our economical plants, the early history of the Grape is involved in some obscurity.

Excepting the Fig, the Grape is the oldest fruit mentioned in history, and it appears to have been cultivated by mankind from a very remote period. The first record we have of this fruit is in the Bible, which informs us that Noah planted a vineyard, and made use of wine. Probably the Grape was known at a still earlier period, though no records exist as to its cultivation previous to the Deluge. Some learned theological writers have been of opinion that it was the Grape, and not the Apple, as is generally supposed, which was the forbidden fruit that tempted Adam and Eve in the Garden of Eden. With the ancient Hebrews and contemporary nations the Grape Vine appears to have been very popular, as it is frequently mentioned in the Bible. Wine appears to have been in general use by the Jews, and they are said to have had a custom of, from humane motives, plying criminals with it before their execution, in order to stimulate them. Vineyards were common with this nation, and at a very early period Ararat, Damascus, and Lebanon became famous for their wines.

According to history, the Grape was first introduced to Europe by the Greeks, who, at an early period, became renowned for their wines. This reputation is alluded to frequently in the works of Homer, Horace, and other ancient historians. Old Greek writers inform us also that in making wine it was the practice of their nation to use various odoriferous herbs, as also salt water, to give particular flavours. According to pagan mythology, Bacchus was made a deity because he taught men the use of wine. As the god of wine and the vintage he was always represented with a crown of the Grape Vine. According to Pliny, Bacchus was the first being who wore a crown. The goddess Juno was also always represented wearing a crown of Grape leaves. The traditions of the early Egyptians claim for Osiris the credit of being the first to grow the Grape

and teach the use of wine. Some authorities have been of opinion that Bacchus, Osiris, and Noah were simply different names for the one individual.

From Greece the Grape was taken to Italy, and soon afterwards it was distributed through the other countries of Southern Europe. Soon after its introduction to their country the Vine became very popular with the Romans, who cultivated it extensively. According to Pliny, no less than 195 varieties of Grapes were known and cultivated in his time. Wine appears to have been used freely by both Greeks and Romans, not only for ordinary purposes, but also in oblations to the gods when practising their religious ceremonies. But though the use of wine was general with the Roman nation, yet for a long time its abuse was strictly guarded against by special legislation. Young men were not allowed to drink wine till they were thirty years of age, and women were strictly prohibited from touching it at any time. Any breach of the laws dealing with this matter led to very severe punishments. According to history, a prominent Roman, Egnatius Macennis, in a fit of anger killed his wife for drinking wine, and when tried for the offence before Romulus he was acquitted on the ground that under the circumstances his action was justifiable. It is also recorded that a Roman lady of rank was stoned to death by her own relations for breaking open a cellar and indulging in wine. Cato informs us that the custom of kissing women originated in the desire to find from their breath whether they had been taking wine. Gradually, however, the severe restrictions as to the abuse of wine were relaxed, and drinking to excess become a common practice with both sexes. So great did the demand for wine become eventually, that vine-growing increased to such an extent as to cause the neglect of other branches of Roman agriculture. To change this state of affairs, Domitian issued an edict ordering that half the vineyards should be destroyed, and prohibiting the planting of new ones.

Great attention appears to have been given to their vineyards by the ancients, who seem to have been well acquainted with the arts of propagating and pruning. Pliny informs us, that, in order to encourage pruning, wine from unpruned vines was prohibited in sacrificing to the gods. The art of preserving Grapes, both in a fresh and dried state, appears to have been generally practised by several of the nations of antiquity. Dried fruits, or raisins, was prepared by both Greeks and Romans, whose practise was to dip the bunches into a hot lye made with wood ashes, and then dry them in the sun. Fruit is prepared in Spain at the present time in precisely the same manner. Columella informs us that fresh Grapes were in his time preserved for long periods by packing them in small jars, one bunch in each. The fruit was gathered when perfectly dry and the sun shining fully upon the bunches, which were then hung in a shady place to cool. The bunches were suspended in the jars so that they hung by their stalks, and the space left between was filled with chaff. Afterwards the mouths of the jars were closed tightly, and covered with a layer of pitch or wax, to exclude the air. The jars were then kept in cool cellars till the fruit was wanted.

According to history vineyards were at one time common in England, and the Grape is supposed to have been introduced to that country at the time of the Roman invasion. Vineyards are frequently mentioned in early Saxon charters, and also in the Domesday Book. William of Malmsbury, who lived at the beginning of the twelfth century, described flourishing vineyards as existing in Gloucestershire, and states that the wine made from them was equal to that which was obtained from France. In the thirteenth and fourteenth centuries many of the castles and monasteries in the southern and western counties of England appear to have had their vineyards. If these historical records are to be credited, the climate of England must have changed materially, or the Grape Vine has become more tender than it was, as in that country it is at the present time a very uncertain plant when grown in the open air without protection. Under cover, however, Grapes are grown to a greater degree of perfection in the United Kingdom than in any other part of the world. Within the last few years bunches up to 26 lbs. in weight have been produced under glass, and 10 to 15 lbs. is quite a common weight.

Grape Culture as a Prominent Industry.

Among the many useful fruits none is more universally cultivated or holds a higher rank, from a commercial point of view, than the Grape. It is cultivated extensively in every division of the globe, and in many countries vine-growing is a staple agricultural industry. The cultivation of the Grape became a staple agricultural industry in France, Spain, and Portugal at remote periods, and ever since those countries have been in high repute for their wines. In those countries at the present day, and also in Italy and Greece, vine-growing is a prominent industry, and in many cases localities are turned to good account for vineyards which are comparatively useless for other purposes. In those countries vineyards are frequently to be seen on the steep sides of mountains, where it would be impossible to cultivate grain or any other ordinary crops. Throughout a considerable portion of Germany, the vine-growing industry occupies a prominent position, as it does also in Hungary and Switzerland. Vine-growing is also receiving a considerable amount of attention in the United States, and more especially in California where the production of wine and the manufacture of raisins and currants has assumed large proportions. Great advances in Vine culture has also been made in the Australian colonies, and more especially within the last few years, and the annual yield of wine is now very considerable. There is every promise that it will be much greater a few years hence, and one of our staple agricultural industries.

The Grape is sucessfully cultivated for wine-making in European countries up to the 51st degree of latitude. In the Southern Hemisphere the limit is about the 40th degree. As regards altitude the highest point at which the Grape is successfully cultivated is about 3000 feet above the sea-level in Spain. At Teneriffe the limit of successful cultivation is 2500, and on the Alps about 2000 feet. Though the

Grape Vine will grow freely in moderately cool localities, and may even yield heavy crops, yet the fruit always possesses more acidity than when grown in warmer regions, and consequently is less valuable for wine. A moderately high temperature is not only more favourable to the perfect ripening of the fruit, which is essential to the production of good wines, but the strong heat also develops more saccharine matter, which increases their strength. Within the tropics, however, except in very elevated regions, the heat is generally too great for the successful cultivation of the Grape Vine, as the juices are apt to ferment before the berries are fully ripe. In Australasia the climatic conditions vary considerably, and growers for wine must always bear this fact in mind when they are planting. The character of wines are materially influenced by climate, as also other local conditions, and planters must select varieties that are likely to prove most suitable. In the warm dry districts, where there is a strong light, and a great heat at the ripening period, wines rich in alcohol can be obtained, which will be similar to the Sherry and Port of Spain and Portugal. From the cooler districts near the coast, or more elevated regions, light dinner wines such as Claret, Chablis, and Hock can be produced in perfection. Then, again, in intermediate climates, such as exist in many parts of the colony, various classes of wine can be produced.

Hardiness and Longevity.

The Grape Vine is naturally a long-lived plant, and under favourable conditions will attain a great age and size. Many instances are recorded by ancient writers as to its great longevity. Pliny mentions a vine that existed in his time, which was over 600 years old. Columella tells us that Seneca possessed a large Grape Vine that produced over 2000 bunches of fruit in a year. Strabo describes a Grape Vine whose stem was twelve feet in diameter. Theophrastus mentions a plant that was so large that a statue of Jupiter and columns for Juno's Temple were carved from it. At Ravenna in Italy, the doors of the cathedral are said to be made of vine wood. The planks being twelve feet long and fifteen inches wide. Coming to modern times, there are numerous instances of Grape Vines attaining a great age and size. In Italy, Spain, and Greece, well authenticated records exist of vineyards lasting for more than 300 years, and then yielding good crops. The celebrated Hampton Court Vine in England, which was planted in 1769, is still in a flourishing condition. covering about 2000 feet of wall space, and producing over a ton of fruit annually. Another English vine, growing in Essex, and planted in 1756, has attained a still greater size. Both of these plants are of the variety known as the Black Hamburgh.

Uses.

Medicinally, ripe Grapes are considered to be cooling and antiseptic, but laxative if taken in large quantities. They are considered to have

beneficial effects in bilious fevers, dysentery, and inflammatory infections. Raisins and currants are considered to be somewhat more laxative than the fresh fruit. The unripe berries of Grapes contain free citric and tartaric acid in abundance, which disappear as the fruit ripens. The juice of unripe fruit, which is known as "verjuice," was at one time considered to be a good application for bruises. Formerly, the leaves and tendrils of the Grape Vine were used in cases of diarrhœa and hemorrhage, or other complaints requiring astringent remedies. By ancient nations the sap of the Grape Vine, called "lachryma,," was considered to be an excellent remedy for weak eyes when applied externally, and for the stone or gravel when used internally.

The Grape Vine was utilized by ancient nations in a variety of ways. In addition to making wine, large quantities of the fruit were eaten fresh, or dried as raisins, and they formed a considerable item in the diet of the people. The tendrils cut young were very popular with the Romans as a pickle. From the Summer prunings, or tendrils cut into small pieces and bruised, with the addition of boiling water, an intoxicating liquor was obtained by fermentation. It was also customary to use the leaves in cooking for enveloping small balls of chopped meat, a practice still followed to some extent in various parts of Europe in roasting small birds.

There is a wide field open to cultivators in the Australasian Colonies, in the production of Grapes, and they can scarcely go wrong in entering upon this industry. Whether the object of the grower be the production of wine or the making of raisins and currants, he has a large and expanding market open to him, as these products are not only required in considerable quantities for our own use, but any surplus raised can be profitably exported. The cultivation of the Grape Vine for wine is likely to prove one of our staple agricultural industries, as the right kind of produce will always be in great demand in the British market, to which we must necessarily look to as the safety-valve against over-production in carrying on our agricultural industries. Wine has an advantage over some of our other farm products, as it is more valuable in proportion to bulk, and is, therefore, better able to bear the transport and other charges. Another advantage is that wine may be kept for many years, if necessary, and therefore, need not be forced upon stagnant or glutted markets. Some attention, during the last few years, has been paid to the growing of Grapes for raisins and currants, and a considerable area has been planted with kinds that are suitable. This industry gives promise of expanding to large proportions, as the consumption of both raisins and currants within the colony is considerable, and after the home supply is met, there is nothing to prevent Australian growers from finding a good market for any surplus they may raise in the United Kingdom.

Conditions under which the Grape may be Cultivated.

The Grape Vine may be grown with success in almost any soil and situation, and no fruit is more cosmopolitan in its requirements. It will

thrive more or less in most parts of Australasia, except in tropical regions, and comparatively poor soils, which are useless for other crops. may be often utilized to advantage with Grape Vines. But though the Grape will readily adapt itself to various conditions, yet the fruit will vary considerably in quality according to the climate, nature of the soil, and treatment. As a rule, the strongest and highest flavoured wines are obtained from calcarous or limestone soils in the medium warm districts ; clay, schistose, and volcanic soils also yield rich wines. Though heavy crops of fruit may be obtained from rich deep alluvial soils, yet the wine from them will usually be only of a secondary class. Sandy soils are more suited to the production of light than strong wines. The same remarks will apply when the fruit is grown for raisins or currants, but to a less extent with table grapes. As regards the site for a vineyard, the question of aspect is not of much consequence in the medium warm regions. In the colder districts, however, or in other localities where the frosts are apt to linger, the aspect is a matter of some importance, and when a choice is available, some care should be taken to get the best one as far as is practicable. The most perfect site is a gentle slope, with an aspect between north and east, so as to obtain the advantage of the morning sun. Alluvial flats, or the bottoms of gullies, where cold fogs are prevalent, should be avoided for vineyards, as late frosts are generally common in these localities. In situations that are liable to these late frosts, a crop of Grapes can never be depended upon, as if they occur when the plants are in blossom, there is small chance of any fruit setting. Proximity to mountain ranges will often have a material effect upon the climate, and consequently upon the quality of the fruit for wine-making. The cultivator will find it to his advantage to take into consideration all these details, in order to obtain the maximum of success in his business.

Preparation of the Soil.

It is advisable in planting vines to prepare the ground in the best possible manner, as far as is practicable, as a good foundation is of greater importance than is commonly supposed. The treatment required is not the same in all classes, and the cultivator must modify his practice to suit local conditions. Heavy retentive soils require to be deeply stirred, so that air may be able to penetrate freely, and to give the plants facilities for sending their roots down. These soils are too compact to afford a good feeding ground for the vines unless they are worked deeply. Things are, however, somewhat different in the case of loose sandy and gravelly soils, or where the subsoil lying near the surface is free and open. An ordinary deep ploughing may be sufficient in these cases, as no mechanical treatment is required to free the under soil, which is naturally open enough, when the top crust is broken, to admit air and allow the roots to penetrate. When such conditions exist, it is unnecessary to spend labour and capital in stirring the land deeply. But, unless in soils that are naturally light and open, deep cultivation should be the rule, and any extra expenditure in this direction will generally

prove an excellent investment. It is true that some cultivators have obtained satisfactory results from land that has been merely ploughed in the ordinary way, and this fact has induced many to arrive at the conclusion that deep stirring is unnecessary. This conclusion, however, is wrong, as though shallow working, as previously stated, may be sufficient for certain soils, yet it is not for others. In breaking up the ground, though deep stirring may be necessary, it is not advisable to turn up a bad subsoil to the surface, a mistake that has often been made. Whenever, therefore, the under soil is inferior, the better plan will be to simply break or stir it, and leave it in the same position as before. On the other hand, if the soil is uniformly good no harm will result from turning it over. The very best means of preparing land is by hand trenching, which disintegrates and mixes the soil more thoroughly than can be done in any other way. This method, however, is too costly for the majority of cultivators, who have necessarily to study economy in getting the ground prepared and planted. Land may be fairly well prepared by using a subsoil plough, by which it can readily be stirred to the depth of from fifteen to eighteen inches. The ground may also be easily and cheaply prepared by deeply ploughing, and following in the furrows with another plough without the mouldboard.

Drainage should be provided for when necessary, and more especially in the case of heavy soils. Though the Grape is more hardy in being able to stand in wet land than most other fruits, yet it will thrive better when there is perfect drainage. Whenever the water hangs for any length of time in the ground it shows that assistance is required in the form of drainage. Some soils, such as are sandy, gravelly, or open limestone, may have sufficient natural drainage, when, as a matter of course, there is no occasion to make provision for it.

Selection of Varieties.

In making a selection, cultivators must be guided in a large measure by the objects they have in view in utilizing their Grapes, as also the climatic and soil conditions, which are important factors. When the production of wine is the object the planter should carefully consider what kinds of Grapes are likely to give the most satisfactory results. He should, therefore, plant such kinds as will supply wines that can be produced to perfection in the particular locality. Some districts are specially suitable for wines of a particular class, which other localities are unsuitable for, and this fact the grower should duly consider in making his selection. Growers will also do well to bear in mind that it is impossible to obtain superior wines of different classes from the same vineyard. Many of the early cultivators made the great mistake of planting many reputable varieties, and attempting to make wines of all classes. Because they grew the same varieties of Grapes as produce Claret, Hock, Port, Sherry, and other European wines, they have been too often under the impression that their products would be similar. They lost sight of the fact that the various classes of European wines are produced under widely different conditions as regards climate, soils, and

treatment. Though a particular kind of Grape is certainly required as the base of each sort of wine, yet it must be remembered that results are often materially modified by climates, soils, seasons, degree of ripeness when fruit is gathered, and after treatment. The same kind of Grape will, under widely different conditions, produce wine that will vary greatly in quality. In this respect, however, some varieties differ to a much larger extent than others. Lateness in starting into growth and ripening its fruit is also a matter that must be considered in choosing a variety for the more backward districts, though in warmer regions this is a matter of no great importance. As regards climate, the varieties chosen for the cooler and moister regions should be such as produce Claret and other light dinner wines of a similar class to those made in the French districts of Bordeaux, Burgundy, and Champagne. On the other hand, in the inland or more northern districts, where great heat prevails with a dry atmosphere, strong wines similar to the Port and Sherry of the South of Europe can be produced. Then again in some localities there is a sort of intermediate climate where different classes of wine can be produced in perfection. As regards the influence of soils upon the quality of wines, it is a well-known fact that many of the choicest kinds in Europe are the products of poor land that is unfit for general cultivation. Some of the best vineyards of Burgundy consist of calcareous soil containing over eighty per cent. of insoluble matter. Bordeaux has vineyards composed of from eighty-five to ninety per cent. of pebbles and sand. In the Hermitage district the soil is a decomposed granite containing over seventy-five per cent. of insoluble matter. In the Champagne district the best wines are obtained from chalky soils containing about eighty per cent. of carbonate of lime. The famous wines of Madeira are obtained from volcanic soil containing a very large percentage of sand and gravel. Then again in the Gironde district in France good wines are produced from low-lying flat land, but their excellence is said to be due to the large proportion of oxide of iron contained in the soil. As a matter of course, Grape Vines grown in poor soils yield much smaller crops than the same kinds growing in better land, but the low return usually gives wine of the highest quality. There is certainly some subtle influence in these poor soils to cause a higher quality in the wine, though the yield may be small. The writer is of opinion that lists of varieties said to be better adapted for particular localities, soils, and other local conditions are more likely to mislead than benefit the cultivator, as from the lack of precise information there are no data upon which absolute conclusions can be based. Some kinds are certainly more cosmopolitan in their requirements than others, but the main object of the cultivator should be to produce Grapes suitable for the wines best adapted for his locality and purposes. A list of varieties at the end of this article will afford sufficient information to enable growers to make suitable selections.

In planting for Raisins and Currants, the selection of Grapes is more limited, as but a comparatively few varieties are suitable. The kinds suitable for drying are those that have sweet fleshy berries, and belong to the Muscat section. It may not be out of place to mention that the

name Muscat, which is applied to a class of Grapes, is not derived from the peculiar musky flavour of the fruit as is generally supposed, but is a term applied by the ancient Romans, and signified "to attract bees," from the great sweetness of the berries. One of the best and most generally cultivated varieties for Raisins is the Muscat of Alexandria, which also passes under the name of Muscat Gordo Blanco and various other synonyms. For Currants the only Grape is the Black Corinth, or Zante as it is sometimes called, both names being used for the one kind. The source of the Sultana Raisins is the White Corinth, which has somewhat larger berries. These are the principal kinds used, but several others may be utilized for drying.

As regards table Grapes, the grower has a wider range in making a selection, but, as a matter of course, he should only plant such varieties as are likely to give him the best returns. In selecting, he should take into consideration quality, appearance, freedom in bearing, period of ripening, and hardiness. Early Grapes may pay well in some districts, but not in others, and kinds that will hang long and keep well will often give the best return. Then, again, if the Grapes have to be sent long distances, the adaptability of the fruit for packing and carriage must also be considered. Some kinds are excellent table Grapes, and also suitable for wine-making, a matter of some consequence to the grower, as it gives him the option of utilizing the fruit in two ways. Raisin Grapes may also be used as table fruit, and there is a great demand for the Muscat of Alexandria in its fresh state. This demand will in many cases enable growers to sell large quantities of fresh Grapes at higher prices than can be obtained by drying the fruit.

Propagation.

The Grape Vine may be propagated by seeds, eyes, cuttings, layers, grafting, inarching, and budding.

Seeds are seldom used except in raising new varieties, and, as a matter of course, there is no certainty as to what kind of fruit seedlings will yield. The seeds should be sown early in the spring in rich light soil, covering them to the depth of half-an-inch. When the young plants have made their second pair of leaves, they should be carefully transplanted into rows, three feet apart, leaving half that distance between in the lines. No further removals should take place till the plants fruit, which will generally be in the second or third year, but it is often longer before they can be tested.

Eyes.—Propagation by *eyes* is a very common method among European gardeners in the cultivation of the Grape under glass; but, as the only advantage that ordinary vine-growers can obtain from this method is that it enables them to propagate a particular variety quickly, there is no great inducement to practice it in this part of the world. When this plan is adopted, the eyes should be taken from well-ripened shoots, leaving about an inch of wood above and below. These pieces should be planted about two inches deep, with the eyes uppermost, and as a rule they will strike freely.

Cuttings.—The most general mode of propagating the Grape Vine is by *cuttings*, which root with great facility. They should be made from well-ripened wood of the previous season's growth, taking care that the shoots are free from disease of any kind. Some difference of opinion exists as to the best length for cuttings, but this point must, to some extent, be decided by the locality in which they are to be grown. The proper length will range from nine to fifteen inches, with from three to six joints, and as a rule the cuttings should be inserted so as to only leave one or two buds above the ground. In the warmer and drier districts, where the dry seasons are severe, the cuttings should be planted deeper than in cooler localities, and consequently they must be proportionately longer. There is, however, no other advantage in using long cuttings, and for ordinory conditions shorter ones are preferable. The best cuttings are those that are taken from the lower portions of the shoots, and these should have the preference when they can be readily obtained. Sometimes cuttings are used with a base of two-year-old wood, and these are called, from their appearance, "mallet cuttings." These cuttings strike freely, but only from the portion at the base of the last season's shoots

Strong Cutting with two joints.

Cutting with three joints.

Mallet Cutting.

Shield or Heel Cutting.

and the old wood is liable to decay. To get over this drawback, some growers make it a practice to merely leave a "shield" or "heel" of the old wood, as shown in the illustration. Cuttings may be either planted directly where they are to remain or rooted in nursery beds. Each plan has its advantages and drawbacks. As regards the first, Grape Vines do nor bear shifting so well as ordinary fruit trees, and are often seriously checked by removal. On the other hand, when cuttings are planted out directly they often fail through the effects of dry weather unless they receive special attention in watering and keeping them free from weeds. The writer considers that the surer and more economical method is to strike the cuttings in nursery beds, and plant out the following season. When this plan is adopted, a large number of plants can be obtained from a small area that can be readily attended to by the cultivator. The

cuttings should be planted in rows, from two to three feet apart, leaving from four to six inches between in the lines. Many plant closer, but this, in the opinion of the writer, is a mistake, as when the cuttings begin to root they must have space for development. The rooting of the cuttings will be assisted by placing a layer of broken charcoal, about an inch thick, at the bottom of each trench so that the heels will rest upon it. Failures often occur through cuttings being allowed to get too dry before they are planted; in fact, many thousands fail every year in Australia from this cause alone. Though the Grape possesses great vitality, and will stand some ill-usage, yet when the wood, by long continued exposure, has its juices dried up more or less, growth becomes uncertain. Cuttings are too frequently sent to planters with little or no coverings to protect them, and sometimes remain for weeks in this condition before they are put into the ground, and as a consequence a large proportion will fail. It will, therefore, be advisable to partially or wholly bury the cuttings in the soil till they are wanted, and when sent away they should be packed so that they will not suffer from exposure till they arrive at their destinations.

Showing form of Roots from a long Cutting.

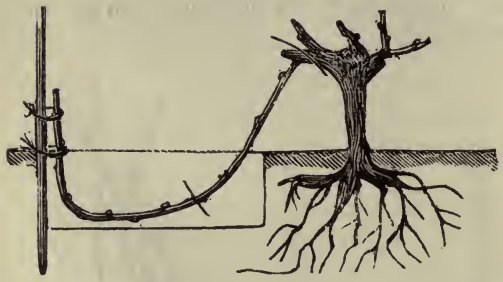
Showing Form of Roots from a short Cutting.

Layering is a method not generally practised, though it is often useful for filling up gaps in vineyards, where plants have gone off. It is effected by simply bending down the branches, and covering them with

LAYERING.

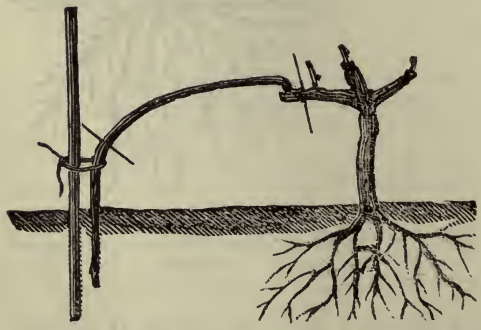
Multiple Layer.—Layer with Plants forming from each joint.

Plant from a Multiple Layer.



Layering an old vine. Lines showing where to cut when rooted.

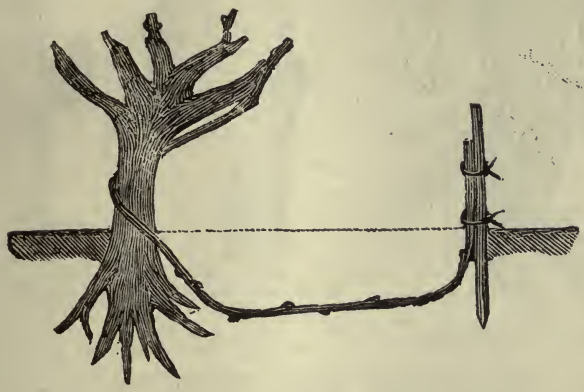
Ordinary Layer



Layering with a reversed branch. Lines showing where to cut when rooted.

Layer seperated into two plants.

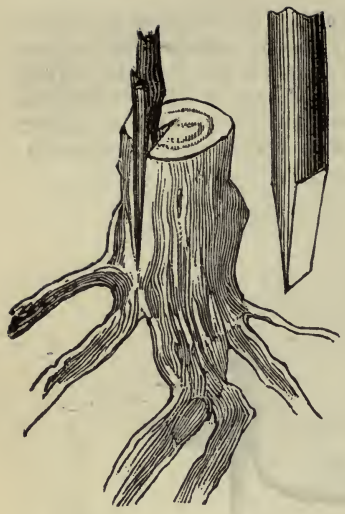
three or four inches of soil at the part where they are required to throw out roots. They will generally root very freely when treated in this manner, and furnish strong plants. When a layer is put down to supply the place of a plant that has gone off, it must be carried across in a trench sufficiently deep to prevent any interference with the cultivating implements. Plants may also be replaced by another method known technically



Another way of Layering an old vine.

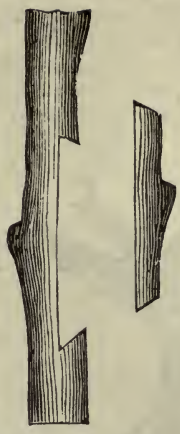
as "Reversed Layering," by which the top of the shoot is inserted in the ground, as shown by the illustration. The branches strike readily in this position, and their future growth is not affected. it being precisely the same as from an ordinary layer. As a matter of course, all the buds on the looped branch should be removed excepting those required to form the future plant.

Grafting may be sometimes practised with advantage in working old stocks of inferior kinds with better ones. Whenever the varieties are not giving satisfaction, it will be advisable to replace them with better kinds. Varieties are sometimes shy bearers when growing upon their own roots owing to the peculiarities of soils and other local causes, but bear freely when grafted upon other kinds. In Europe grafting is largely practised since the advent of the Phylloxera insect which has caused immense losses in the vineyards of France and other countries. It has been found that the American species of Grapes, which are quite distinct from the varieties of *Vitis vinifera*, afford stocks that can withstand the attacks of the troublesome insect. There has been no occasion so far to use these stocks in Australasia, and it is to be hoped that there will be no need for them in the future. Grafting the ordinary varieties of Grapes upon stocks of species indigenous to hot countries may also prove serviceable in the tropical portions of Queensland and North Australia, as also in some of the South Sea Islands. Baron von Mueller, in his work, "*Select Plants for Industrial Culture*," directs



Cleft Grafting for an old Stock.

BUDDING.



Stock and Scion prepared.

Stock and Scion fitted.

attention to a number of these species. There are various methods of grafting, and care must be taken that the one practised is suitable to the conditions existing between stock and scion. When the stock and scion are equal, or nearly so, in size, what is known as "whip" or "saddle" grafting are the best methods. For old stocks ordinary "cleft" grafting is the method most generally practised. Full instructions as to these forms of grafting will be found at pages 8 and 10, volume 1. Then, again, some of the more delicate kinds thrive better upon stronger stocks than their own, and then grafting may be an advantage. Ordinary cleft-grating is the method most generally adopted with the Grape Vine, and the operation should not be performed till after active growth has commenced, and the sap is rising freely.

Inarching, or grafting by approach, is a method of propagation that may sometimes prove useful for filling up vacancies in the branches, or enabling new or weakly varieties to be established quickly upon robust stocks. The operation may be performed at any time when growth is active.

Budding is a method of propagation that is but seldom practised, though it may be useful in some cases. Plump well-formed buds should be chosen for the purpose, and they must be inserted as soon as the sap is in full motion, as in budding fruit trees. Another method of budding is to inlay a piece of wood with a bud into the stock, as shown by the illustration. In practising this form of budding, great care must be taken that the inserted piece fits closely into the cut made in the stock.

PLANTING.

In planting Grape Vines, the cultivator must be guided to a great

extent by practical and economical considerations. In the first place, he has to decide as to what distance apart the vines should start in order to get the maximum returns when fully established, and to enable the work of cultivation to be carried on with the greatest facilities. The next consideration is whether cuttings or rooted vines are to be used, and how the plants are to be trained. Some difference of opinion exists as to what distances the plants should be apart, and, consequently, conflicting advice is given by authorities. The writer holds the opinion that, as with other fruits, the Grape Vine requires sufficient room for free development, and that it is a disadvantage to plant too thickly. Better returns can be obtained from a vineyard of well-established vines planted at the rate of 500 to the acre than from a similar area containing four times that number. By crowding the vines they, after a few years' growth, must necessarily show a falling off in vigour through the competition of their roots and the diminished supplies of light, air, and plant food. It is maintained by some authorities that Grape Vines should be planted closer in the cooler regions than warmer districts, but the writer disagrees with this conclusion. Close planting not only lessens the vigour of the vines, but also, owing to the large amount of foliage, retards light and heat, which are primary essentials in ripening crops in late and cool districts. According to the experience and observations of the writer, Grape Vines should not be planted closer than 8 feet by 8 feet, and up to 10 feet by 10 feet. These distances allow plenty of room for development, and facilities for cultivating with horse-power. Currant Vines being of extra vigorous habit, and requiring to be pruned long, should be planted from fifteen to twenty feet apart. The plants should be so arranged as to afford the greatest facilities for cultivating the ground and gathering the crops. The simplest and most generally adopted practice is to plant in squares, which admits of the ground being worked in two directions. But, as a matter of course, when the vines are trellised, the cultivating implements can only be worked in one direction. Care should be taken in planting that the vines are regularly placed, so that the rows will be perfectly straight every way. When the area planted is large, it should be subdivided into moderately-sized blocks by cross-ways, sufficiently wide for vehicles, so as to afford the greatest facilities for carrying away the crop, carting manure, and other purposes. Planting may be done at any time between the fall of the leaf and the starting of growth in the spring, but it is not advisable to delay too long. On the other hand, no advantage is gained by planting in the dead winter months. If cuttings are used, they should be inserted so as to leave two eyes above ground. They may be planted in slits made by the spade, or small holes formed with a dibber or bar. Care should be taken that the openings are uniform in depth, and that the earth is consolidated round the base of the cuttings, and more especially in light soils. When rooted plants are used, the holes should be made sufficiently large to allow the roots to be spread out properly. Broken or bruised roots should be carefully removed, as they will afford no assistance to the plants, but may rot if allowed to remain. One year rooted plants

are, as a rule, better than those of a greater age, as the older they are the more they suffer when shifted.

The number of vines required to plant an acre can be ascertained from the following table :—

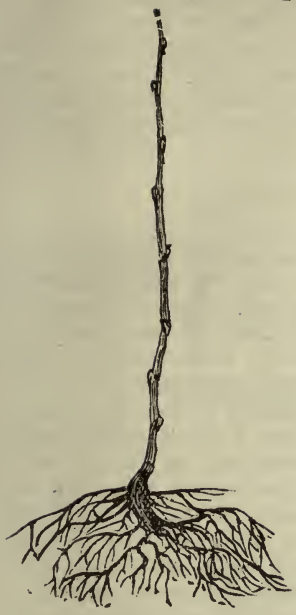
Plants to the Acre.			Plants to the Acre.		
3 x 3	requires	4840	9 x 8	requires	605
4 x 3	,,	3630	9 x 9	,,	537
4 x 4	,,	2722	10 x 7	,,	622
5 x 4	,,	2178	10 x 8	,,	544
5 x 5	,,	1742	10 x 9	,,	484
6 x 5	,,	1452	10 x 10	,,	435
6 x 6	,,	1210	11 x 11	,,	360
7 x 6	,,	1023	12 x 12	,,	302
7 x 7	,,	888	13 x 13	,,	257
8 x 7	,,	788	14 x 14	,,	222
8 x 8	,,	680	15 x 15	,,	193
9 x 7	,,	691			

Training.

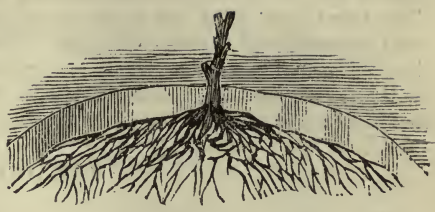
The Grape Vine may be trained in various ways according to the requirements or fancy of the cultivator. The one most generally adopted in vineyards is the Currant-bush style, in which the plant is encouraged to form several branches, each carrying one or more fruit-bearing shoots. When the plants are trained on trellises, fences or walls, long lateral branches should be encouraged, and spurs formed along their whole length. Care should be taken, whatever form may be adopted, to arrange the branches, as far as is practicable, so that each one will get a fair share of the planters growth. In order to attain this object, the main lateral branches should, as nearly as possible, be kept at the same level, as there is always a tendency for the sap to rise more freely to the upper shoots than the lower ones. The height of the stems to the branches is of no material importance. but in all cases, the growth should be so arranged that the bunches of fruit will hang clear of the ground.

Forming the Plants.—It is essential that Grape Vines should, from the time they are planted, be trained so as to bring them into the desired forms, whatever style of growth may be adopted. The first consideration is to form the stems to the required height, before allowing the formation of permanent lateral branches. If a high stem is required it will be stouter and stronger if formed gradually, and more especially when the Currant-bush style is adopted. This object will be attained by shortening the main or leading cane for two or three years, to two or three eyes, according to its strength, in preferance to leaving long shoots. Sometimes, if growth is weakly, it may be advisable to shorten back the leading cane to one eye. When planted the vine should be simply shortened back to two, three, or four eyes, according to its strength. The next year the same course must be followed but if the plant is strong a second shoot from an upper bud may be preserved and shortened back to a single eye. The second year after planting it will be advisable

Pruning Young Vines.



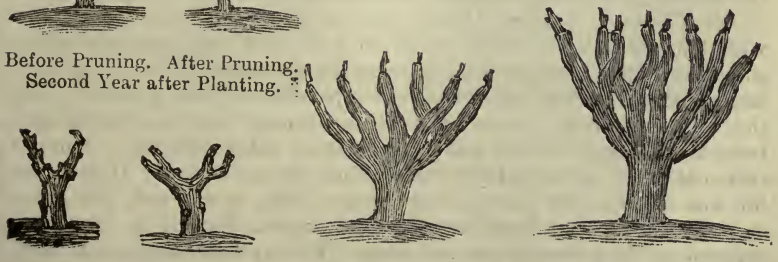
Young Plant



The same properly Pruned and Planted

First year after Planting.
Before Pruning. Lines showing where to cut. | After Pruning

Before Pruning. After Pruning.
Second Year after Planting.



Third Year after Planting and subsequent Prunings

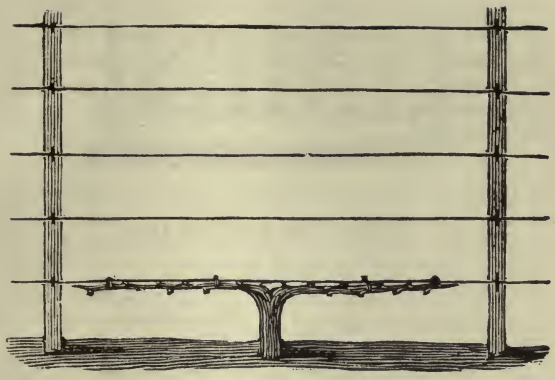
to cut away, clean to the stem, the lower shoot, shorten back the leading one to two or three eyes, and also the branch that has formed below it. The third year after the vines are planted the shaping of their stems will be completed, under ordinary circumstances, and the shoots should be cut back so as to form the necessary lateral branches. The illustrations will afford a good idea as to the way vines of different ages should be cut to bring them into the proper forms.

Trellising.

The system of trellising in vineyards has certain advantages, as it allows the branches to be spread out so that they can get the maximum of benefit from sun and light. They can be better secured against the effects of high winds and heavy rains. and facilities are afforded for long-rod pruning, which is the better mode for some varieties. Some people object to trellising, on the ground that it increases the cost of cultivation, because horse implements can only be worked one way, and more hand labour is required. On the other hand, it can be argued that vines or trellises are flat on their supports, and do not take up so much room as round-headed bushes. Consequently, the cultivating implements can approach nearer to the plants. Trellises carried overhead offer advantages when space is limited, or a shady walk or yard is required. Very large returns can be obtained from vines trained in this way, and this method is specially commended to persons having but limited areas of ground. It is also an excellent way of training the Currant Grape.

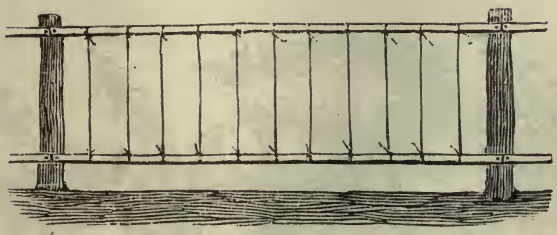
The Thomery System.—This method of training is practised to some extent in France and other parts of Europe for high trellises, walls, and buildings. By this method the drawback of having one set of horizontal arms starting from a higher level than another, and consequently an irregular growth, is obviated, and an area of trellis or wall space well above the ground can be regularly covered. The theory of the system is to form the stems either high, low, or medium, so that the crowns will be at different heights from the ground. Each vine is trained with either one or two lateral arms, as shown by the illustration, and these carry the full strength of the plants. There is no limit as to the height Vines may be trained under this system, and it is specially suitable for the cultivation of Grapes against the sides of buildings or high walls.

The Chaintre System.—Under this system the vines are trained with long stems and branches so as to trail over and cover the ground surface. These branches are supported by short forked stakes, in such a manner that the bunches of fruit are kept clear of the ground. When the winter pruning is given the vines are turned over into the adjoining rows, the stakes removed, and the necessary tillage effected. Then the stakes are fixed again and the branches placed upon them. It is claimed for this system that through the foliage being spread out, the ground is well shaded, and keeps moister and cooler than if it were fully exposed to the action of sun and wind. This system entails more labour in pruning and tilling than ordinary modes of training, as also in



Vine Trained with Two Arms.

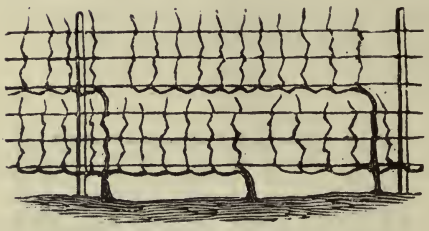
Showing Trellised Vine in Fruit.



Trellis formed of Battens and upright Wires.

harvesting the crop. In practising the Chaintre system the rows should be farther apart than for ordinary cultivation, say from fifteen to eighteen feet.

Fruiting Vine with One Arm.



The Thomery System.

The Chaintre System

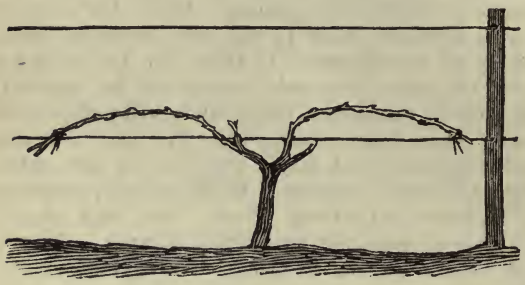
Pruning.

Grape Vines require regular and systematic pruning, in order to distribute the bearing wood regularly, and obtain large bunches of fruit. Most of the buds contain, in embryo, a shoot that if allowed to develop, will produce two or more bunches of fruit, and if all these are permitted grow, the strength of the plant will be distributed through a large number of channels. Consequently, the shoots will be slender, and weakly, and the bunches and berries small. Therefore, it is necessary to reduce the number of shoots to what the plant can support to perfection. The system most generally practised in this part of the world is what is known as "short-spur" pruning With this method, the previous year's wood is shortened back to one, two, or three buds, according to the strength of the shoots. If there are two or more shoots starting from near the same base, only one should be retained, and the others cut out close to the stem. Some kinds will yield better and with greater certainty upon longer spurs, with five, six, or seven buds. This method may be tried with kinds that do not give satisfactory returns under the "short-spur" system. Short pruning, generally speaking, induces the formation of strong shoots and large showy bunches, and hence it is well adopted for many table Grapes. On the other hand such wine Grapes as the Burgundy and other Pinots, Cabernet Sauvignon, and kindred varieties, whose bunches are comparatively small, require long pruning. In all cases the higher buds are stronger and more fruitful than those near the base, and this is specially the case with some varieties. Another method is what is known as "long rod" pruning, which is extensively practised by European gardeners and vine growers, and under this system one or two of the previous season's shoots are left half their length, or longer according to their strength. These branches are fastened horizontally to stakes or trellises, and will produce several fruit-bearing shoots. A corresponding number of the previous season's shoots should be cut back to short spurs, with one or two buds. The main shoots from these buds furnish the "long rods" for the following season, when the old ones must be cut back to "short spurs." By alternating in this way a supply of suitable wood will always be provided for. The balance, however must always be preserved. Another system of "long-rod" pruning, practised to some extent by European gardeners, is to provide for three shoots instead of two, as by the ordinary method, and renew the wood every third year. This system has advantages, as it affords a better supply of ripened wood to carry the fruit-bearing shoots, and it may be practised as easily as the more common method. Some varieties, and more especially the more delicate or shy-bearing kinds, will yield better crops with a long run of the previous season's wood than with short spurs. An extended growth of wood appears to be more congenial to the nature of the Grape Vine than the close cutting that pertains to the "short-spur" system. By practising the "long-rod" method, the advantages of a long growth can be obtained without unduly extending the plants. When, through defective pruning or old age, branches do

LONG ROD PRUNING.

With ne Rod and Spur.

With Looped Rod and Spurs.



With Two Rods and Spurs.

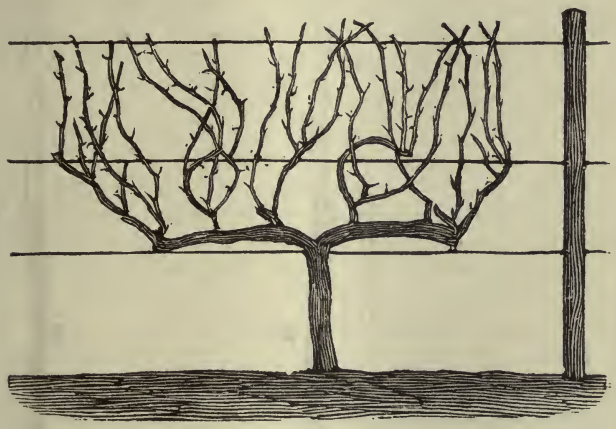
become unduly extended they should be headed back and a new growth encouraged. In localities where frosts are troublesome, it will be advisable to adopt the "long-spur" system, as if the upper and more advanced buds are seriously injured the shoots may be shortened back to a lower bud that has not been affected. In pruning Grape Vines the cut should invariably be from the side opposite the bud, and a little above it, slanting upwards. Pruning may be done at any time during the winter, but it should be delayed as long as possible. Early pruning is conducive to an early growth in the spring, and, as a consequence, there is a greater risk from frosts. July will be quite early enough to commence, even in the warmer districts, unless large areas have to be treated, when it may be necessary to begin sooner in order to get through the work in good time. Even if the plants bleed rather freely after being pruned it does not matter, as the the loss is merely water, and not true sap as is generally supposed. Root pruning is not often required by Grape Vines, though in the case of very vigorous plants it may sometimes prove useful.

PROTECTING GRAPE VINES FROM FROST.

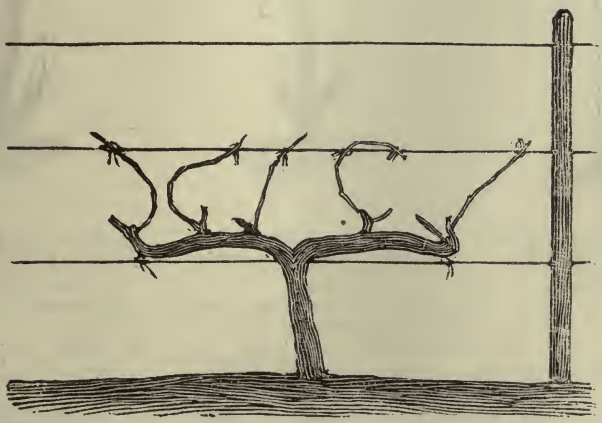
A great trouble to cultivators in many localities, and even in the medium warm districts of Australia, is the risk from frosts during the first and second stages of growth. This risk may to a great extent be avoided in localities where frosts are but light or unfrequent by adopti g

the practice, which is general in some parts of Europe, of making small fires that will give a dense smoke, in various parts of a vineyard. These fires will not be required regularly, but need only be kindled on nights when danger from frost is apprehended. By adopting this plan losses of crops will often be avoided, and the extra labour entailed will simply be an insurance charge. In the cooler regions of Australia, and to a large extent in New Zealand and Tasmania, where frosts are more severe, Grape Vines must be effectively protected, or otherwise the crops will necessarily be uncertain. Vines may be effectively protected in these

MIXED PRUNING.

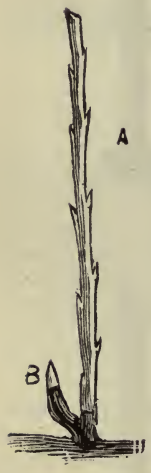


Vine before Pruning



Vine after Pruning.

Double Long Rod Extension.



Pruning First Year.
A—The Long Rod.
B—The Spur.

Pruning Second Year.
A—Long Rod of the First Year.
B—Long Rod from Last Season Spur.
C—Extension Long Rod from upper bud of A.
D—The Second Spur.

Pruning Third Year.
A—Spur formed by cutting back close A and C branch of previous Season.
B—Long Rod Second Year's Wood.
C—Extension Long Rod from upper Bud of B.
D—Long Rod from last Season's Spur.

regions by partially covering them with light mats made of straw or other suitable material, from the time growth starts in the spring till all risk of frosts is passed. This mode of protection is very common in those parts of Europe where similar climatic conditions exist. The coverings used most generally are straw mats, which are fixed in a nearly horizontal position over the plants at first. As growth progresses the mats are raised to a slanting position. In order to supply supports for the mats it is usual, on one side of each row, to form a ridge of soil eight or nine inches high, and on the other side a line of stakes is fixed. The mats, or other coverings, rest upon these earthen walls, or ridges, and are fastened to the stakes upon the other side. Possibly strips of hessian cloth or some similar material may, in many cases, be found to be cheaper than mats. But whatever material is used, it must be something that will permit the free circulation of air. It should be borne in mind that, in affording protection to Grape Vines, not only does it prevent the ill effects of frosts, but induces the more vigorous development of the buds, and the fruit sets with greater certainty. Though the expense of protecting the plants will certainly add considerably to the cost of cultivating, yet on the other hand it makes results more certain, and in some regions will allow the Grape Vine to be grown successfully where otherwise it would fail. In fact, the practice of protecting Grape Vines is indispensable to cultivators in most parts of New Zealand and Tasmania, and would prove very serviceable in the cooler regions of Australia.

Summer Pruning.

This term includes various operations to regulate the growth of the Vines from the time they start in the spring till the crop is fit for use. Summer pruning is of material importance in the cultivation of the Grape Vine, it being essential that the growth of the shoots should be regulated so as to distribute them to the best advantage, and prevent a waste of energy by the plants. The operations comprised under this heading are Disbudding, Stopping, and Topping.

Disbudding.—This operation, as the term implies, consists in the removal of surplus, and therefore useless shoots, in the early stages of growth. Disbudding should be practised more or less with all kinds of Grapes, but some varieties require it to a far greater extent than others. Sometimes the necessary disbudding may be done by one operation, but in most cases it will be advisable to go over the vines a second time. As the plants when starting into growth usually make more shoots than are required, it will be advisable to remove some of them. It will, however, not be advisable to remove all the surplus shoots at this early stage of growth, as a portion should be left for awhile. By adopting this plan there will be a better final choice of shoots, and more foliage to stimulate root action. The second disbudding should take place when the shoots are six to eight inches long, or as soon as possible after the flowers appear. In disbudding care must be taken to remove the weaker and sterile shoots by rubbing them off.

Stopping.—When the fruit has formed, the tops of the shoots should be pinched off with the thumb and finger, three or four joints above the upper bunch. It is not advisable to nip the shoots closer, as sufficient foliage must be left to shade the bunches. Cultivators must also bear in mind that each shoot should carry enough foliage to supply its share of the plant food obtained from the atmosphere, and assist in promoting healthy root action. When extended shoots are required, as will be the case when "long-rod pruning" is practised, the branches should not be pinched back at all.

Topping.—In some parts of Europe it is a common practice to cut the tops off the vines just as the fruit is beginning to ripen so as to reduce the amount of foliage and expose the bunches more freely to sun and light. To a limited extent this practice is followed by some cultivators in this part of the world. The advantages to be derived from topping will depend upon local conditions, such as climate, aspect, character of the season, and lateness in ripening of the variety. In the colder regions, where the Grape is late in maturing, the ripening period will be accelerated by the removal of some of the foliage, and exposing the bunches more freely to light and sun. Vines growing on a shaded slope, where the sun has but little power, may also be assisted by the reduction of the foliage. Then, again, the removal of a portion of the foliage may be beneficial in a late cool season, and with kinds that are backward in ripening. Topping is not required in the warmer regions as a rule, though it may prove serviceable under special conditions. Where the sun is powerful and the heat great, a good shade is required, and a reduction of the foliage is likely to do much harm. When bunches are fully exposed to the sun's power the fruit is liable to get scalded and seriously injured. Foreign cultivators from the colder wine-growing regions of Europe often fall into error through adopting the same practice in topping their vines that they were taught in their native countries. These people too often, in ignorance, lose sight of the fact that, though in cool late regions a reduction of the foliage is an advantage, yet, on the other hand, a full shade is an essential requirement in the warmer districts.

STOPPING.—Showing where Shoot should be pinched back.

Thinning.—Sometimes more bunches are formed on a shoot than it can bring to perfection, and it will be necessary, if fine fruit is an object, to reduce the number. As a rule, not more than two bunches on a shoot can mature to perfection. Some varieties set their berries very close on the bunches, and it is a common practice with European gardeners to thin them out when about the size of small peas. If specially fine fruit is required this practice may be adopted with advantage with close-berried table varieties.

Ringing the Bearing Shoots.

The practice of ringing, or girdling, the branches, known also as "annular incision," is followed to some extent in Europe, chiefly by gardeners growing Grapes under glass, but is seldom adopted in Australasia. The theory of ringing is that it assists in causing the fruit to set, and hastens the period of maturity. Very often at the flowering period the sap is too strong, and unless interrupted this excess of vigour tends to the abortion of the flowers. By checking the return flow of sap this contingency is avoided. Experience has also proved that this treatment causes the fruit to ripen earlier than it would do otherwise, and some growers are of opinion that its quality is improved. The operation should be performed when the flowers are fully developed. It is performed by the removal of a narrow ring of bark from the fruit-bearing shoot, below the bunch. In order to ensure success the cut must be clean through to the wood, and the ring of bark should be perfectly removed. As a matter of course, shoots treated in this way will die back, and must be cut away at the winter pruning. The practice of annular incision is not of much value in general Grape culture, but it will sometimes prove serviceable in regions where vines are grown under glass, as will be the case in some parts of New Zealand and Tasmania and in the colder districts of Australia.

Girdling.—Showing a Girdled Shoot.

Tying

When long canes have been left they should be securely fastened to the trellises or stakes before the leaves expand. If single stakes are used for long canes, it will be advisable to fasten them so that they will bulge out to some extent. When no supports are used—a common practice in some districts—the canes should be tied together so as to form bows or loops. As growth progresses the young shoots should be carefully tied to their supports when they are from twelve to fifteen inches long, or sooner if practicable, as, being very brittle, they are easily broken off by strong winds and heavy rains if not well secured. It is not advisable, however, to make the fastenings too tight, as the branches require room for free development. Every vine grower should make due provision for an adequate supply of suitable material for tying. The materials are various, the principal being the Osier Willow, New Zealand Flax, and indigenous Rushes or similar plants that grow in many localities. Rye straw also makes a good tying material. As a matter of course,

the material that is most readily and economically obtained should have the preference, other things being equal.

Keeping the Land Clean.

An undergrowth of grass or other weeds is undesirable in a vineyard, as it helps to exhaust the plant food and moisture at the expense of the vines. In the spring and early summer this undergrowth is specially injurious, as it absorbs a deal of moisture, and causes the soil to dry up much more rapidly than would be the case under other conditions. The more the moisture can be conserved in the summer, the better for the vines, and this object will be materially promoted by keeping down the weeds as much as possible. Sometimes continuous rains will prevent cultivators from keeping the land clean, but weeds should never be allowed to make headway if it is possible to prevent it. Care should, however, be taken in destroying weeds not to work the ground deeply among the vine roots. Deep ploughing or digging will necessarily injure the roots, more or less, and the lighter the work is performed the better, The scarifier and the hoe are better implements for the work than the plough or the spade. Several stirrings may be necessary during the year to keep the weeds down; but, as a matter of course. the requirements in this respect will often differ materially. These stirrings will also assist in keeping the suface soil loose—a matter of some importance in the case of heavy soils which are liable to cake after rain. A loose surface is a material check to rapid evaporation, and the finer the tilth the better. Surface stirring should be invariably practised with irrigated land after each application of water. In cleaning ground, advantage should be taken of bright drying days, and on no account should the work be done while the surface soil is wet and cloggy.

Mulching.

Mulching is not generally practised in vineyards, yet it is a valuable aid to cultivators in dry districts. If the surface soil is covered with a layer of long stable manure, straw, grass, or other material suitable for the purpose, it is protected from the direct influence of sun and drying winds, and consequently their is less evaporation and the ground retains its moisture longer. There are some who object to mulching, on the ground that the material used harbors insects and interferes with cultivation. As regards the first objection, it may be admitted that mulching does to some extent favour certain kinds of insects, but notwithstanding this drawback, the advantages are far greater than the disadvantages. Respecting the second objection, it may be said that, when the surface soil is mulched, weeds grow but little during the summer, and the ground does not require stirring. When the summer is over and the

mulching has served its purpose, it can readily be worked into the land by the cultivating implements if the layer is not too thick. A layer three or four inches thick will be sufficient for practical purposes. Mulching should be done before the hot weather has fully set in.

Manuring.

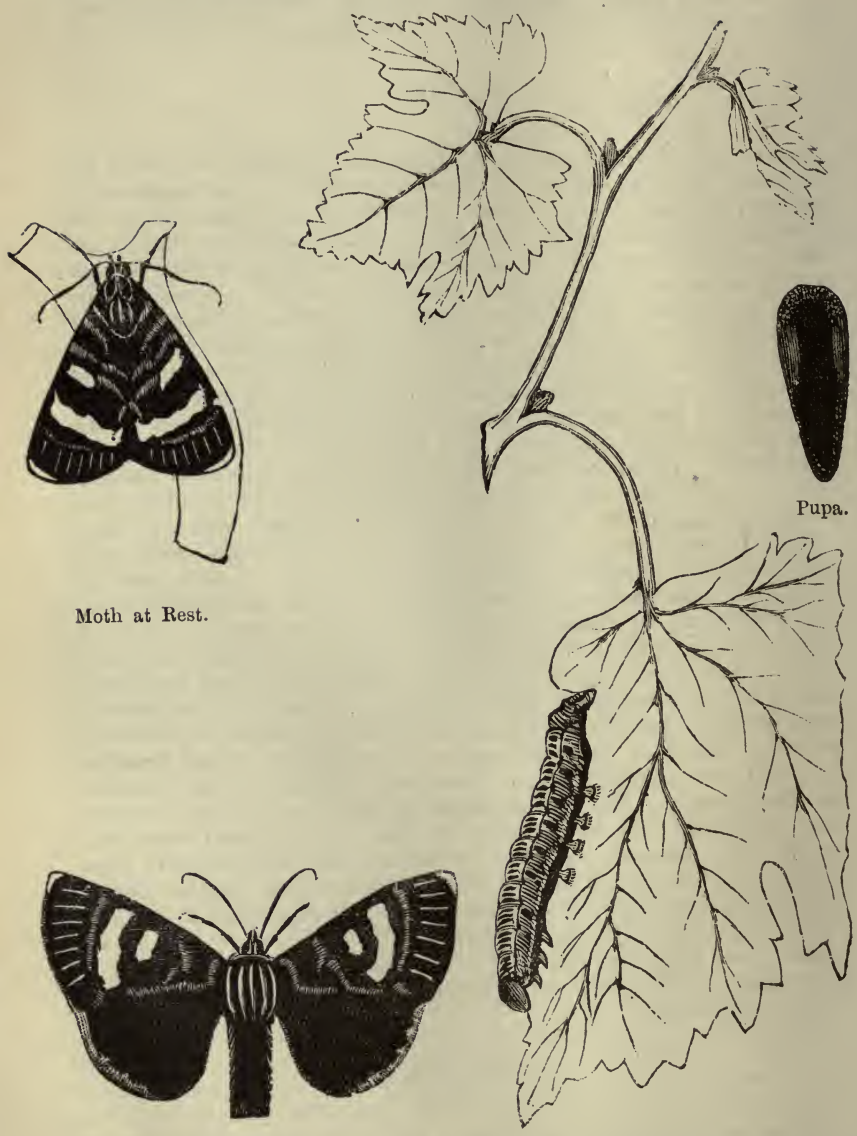
Some soils contain naturally large deposits of suitable plant food for the Grape Vine, and these will require but little or no assistance in manuring for many years. Others again are poorer in plant food, and deficiences have to be made good at an earlier period, and before the plants suffer through lack of nourishment. It is wrong to suppose that manure is not wanted for Vines, an opinion that is common, as the Grape, like all other fruits, must be able to obtain the necessary amount of congenial plant food from the soil, or otherwise growth will fail more or less. Though it is quite true that the excessive use of manure, while conducing to strong growth and heavy crops, will cause deterioration in the quality of fruit, and more particularly with wine Grapes, yet, on the other hand, supplies sufficient to keep up a healthy normal growth will be beneficial. In exhausted soils the fruit is not only limited in quantity and size, but is often also poorer in quality than it would be under more favourable conditions. Even soils that were originally rich may after a while become more or less exhausted, and cease to give satisfactory returns without assistance in the form of manure. Certain essential minerals, such as lime, potash, or phosphorus, may be lacking in the soil, and a deficiency of either will prevent satisfactory growth. Any of these materials, when lacking, can be replaced at a comparatively small cost. Potash, according to the writer's experience, is more frequently lacking in vineyards than other minerals, and many of the failures, either wholly or partially, are due to its absence, or presence in insufficient quantity. Stable or farmyard manure is an excellent general fertilizer for weakly or exhausted Grape Vines, as it contains all the essentials for plant growth. The work of manuring may, however, often be done more effectively and economically by the use of special fertilizers. Annual and moderate dressings of manure are more effective than heavier ones given every two or three years, as steady regular growth is better than over-vigour at one period and a lack of strength at another. Table Grapes, as a rule, may be more freely stimulated by the use of manure than kinds that are grown for wine, raisins, or currants, as a lower density in the juice and a lesser degree of sweetness are of no material importance.

Injurious Insects.

Cultivators of the Grape are troubled with various insect pests which sometimes cause a great amount of injury The more prominent of these are as follows :—

COMMON VINE MOTH.

Showing Various Stages of Development.



All Natural Size.

HAWK OR CELERY VINE MOTH.

Showing Various Stages of Development.

Pupa.

Moth on Wing.

Moth at Rest.

Caterpillar.

All Natural Size.

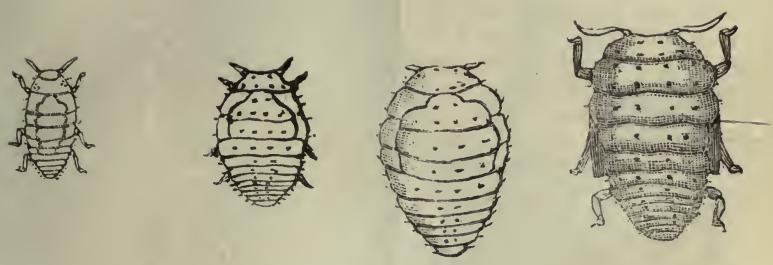
Caterpillars.—Several species of Caterpillars cause damage to Grape Vines and it will be advisable to keep them down as far as practicable. The Common Vine Moth (*Agarista glycine*) is familiar to all cultivators, and seldom fails to make its appearance. The Caterpillars of this species

are very voracious, and make great havoc with the foliage of Grape Vines in a short time, and very often strip the plants bare. The Moth is a handsome insect having black wings with yellowish white markings and when expanded they measure about an inch and a half across. This insect increases with great rapidity and produces two or three broods of Caterpillars in a season. The first brood generally makes its appearance soon after the vines come into leaf. The eggs which are produced in great numbers are deposited in the stakes and stems of the vines. Being so numerous these Caterpillars are difficult to deal with when they make their appearance. Hellebore powder lightly dusted over the plants is one of the best remedies. A solution of London Purple or Paris Green in the proportion of ½ lb. to 100 gallons of water used as spray is also effective. But if possible the Caterpillars should be prevented from making their appearance, and this may be done to a great extent by painting the stems of the plants and stakes with a thick coating of lime and sulphur when the vines are pruned. When this practice is adopted, immense numbers of the eggs will be destroyed. Another prominent and sometimes very troublesome Caterpillar is the Celery, or Silver-striped Hawk Vine Moth, (*Chærocampa celerio*) This is a very large and voracious Caterpillar that frequently causes a good deal of damage by rapidly clearing vines of their leaves, though fortunately these pests are not often numerous. They are about two inches long, in colour vary from green to brown, and are furnished with a horn-like protuberance near the tail. The Moth is large, measuring three or four inches across with its wings expanded, and is of a chocolate brown with spots and markings. It is nocturnal in habit, flies with great rapidity, and makes a humming noise with its wings. The Caterpillars appear to be produced all the while the vines are in leaf. The remedies are the same as those recommended for the Common Vine Caterpillar. Hand picking is, however, the most effective way of dealing with this pest, when the Caterpillars are but few in number, as is often the case. There are several different species of Hawk Moth and other Caterpillars that eat the foliage of Grape Vines and they require precisely the same treatment as recommended for the ones described.

Phylloxera.—This is one of the most destructive insects with which European Vine-growers have to contend and one of the most difficult to deal with. It has caused great ravages in France and other countries where viticulture is a prominent industry, and in some regions has completely destroyed what previously were flourishing vineyards. It has made its appearance in Australian vineyards having been discovered in the Geelong district, Victoria some few years back. Prompt and severe measures were adopted and there was good reason for believing that the pest had been eradicated in Victoria. Afterwards the insect was discovered at Camden and Seven Hills in New South Wales, and strong efforts have been made to eradicate it. Recently, however, the pest has re-appeared in Victoria, in the Bendigo district. The insect is of American origin, is known scientifically as *Phylloxera vestatrix* and commonly as the Grape Vine Louse It is a very small insect, being barely visible with the naked eye, and in colour is a

PHYLLOXERA.

Insect in Various Stages of Development



Larva First Stage. | Larva Second Stage. | Larva Third Stage. | Perfect Insect

Winged Female

All Highly Magnified.

dull orange. There are various forms of the insect, one class being subterranean and feeding upon the roots, while another section attacks the leaves. Each class has breeders or "queens" which multiply with great rapidity and more especially the ærial class. This last named class is, however, less common than the underground one. Some of the insects produced under ground come to the surface, develop wings and become ærial. Scientists also say that the ærial type will produce subterranean insects. The underground form of insects attach themselves to the small roots which they feed upon and gradually destroy the vitality of the plants. A strong vine may be able to withstand the attack for two or more years but it must eventually succumb to it. Roots of affected vines become swollen in parts forming small tubercles. When the leaves are attacked, round fleshy galls are formed often in considerable number. Various remedies have been recommended, but none are thoroughly effective and some are not always practicable. Among these are the submersion of the vineyard in water, a method that is effective to a large

extent but only practicable in a few cases. Sulphide of Carbon injected among the roots has proved successful to a certain extent but it is an expensive remedy. The most effective way of dealing with the pest appears to be the destruction of affected plants as soon as the insect is detected. Should the pest make its appearance in any locality it will be advisable that the ordinary varieties be grafted upon what are known as resistant stocks. These are supplied by several American species which are being used very successfully in European vineyards. Full information respecting these kinds will be found under the heading of American Grapes.

Root of Grape Vine in Natural Condition.

Injurious Fungi.

There are various kinds of Fungi that are troublesome to Grape cultivators and several are unfortunately too well known. As regards others, however, our knowledge is less perfect and there is a wide field for further investigation. Grape Vines are often affected by obscure diseases and doubtless these in the majority of cases are due to the action of Fungi. In doubtful cases cultivators will do well to endeavour to ascertain, as far as may be practicable, the cause of the trouble and to promptly apply the most effective remedies. The following list embraces the more prominent and troublesome Fungi, so far as they are known :—

Root of Grape Vine affected with Phylloxera.

Anthracnose. — This disease which is commonly known as Black Spot and scientifically as *Spaceloma ampelinum* is a very troublesome fungus to Grape Vines. It first makes its appearance in the form of minute black circular dots on stems, leaves, and berries, and these gradually enlarge till they are half-an-inch across or more. As they advance in age and size these spots become lighter in colour. If not checked promptly as soon as it is discovered, this fungus spreads rapidly and will cause much damage. Its effects upon both the leaves and fruit cause them to gradually shrink up and drop off. This pest is not easily eradicated if it gets established, and though it may be kept in check by the judicious use of remedies, it is likely to reappear more or less the following season. Consequently the cuttings and leaves of affected plants should, as far as may be practicable, be destroyed by fire. The most effective remedy is the Bluestone Ammonia Solution used as a spray. Apply just as the Vines are coming into leaf, again when the flowers appear, and give a third spraying when the Grapes are the size of small peas. Further applications, if necessary, should be given at intervals of three or four weeks till the berries attain their full size. Bordeaux Mixture and Eau Celeste also make effective sprays and Sulphate of Iron is considered to be a good remedy.

BLACK ROT.

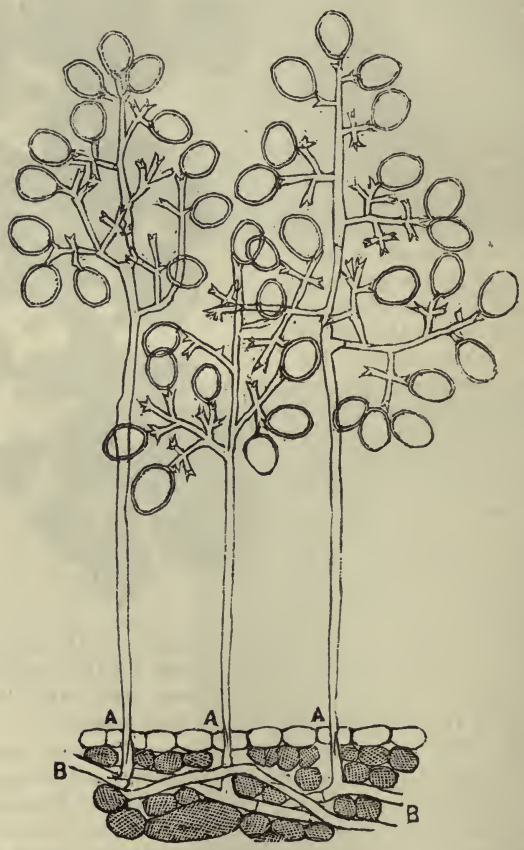
Showing effect on Grapes.

Black Rot.—This disease is very often comfounded with Anthracnose, but they are quite distinct. Though the effects are somewhat similar. The fungus is known scientifically as *Phsolospora* (*Lockstadia*) *Bidwillii*. It makes its appearance in minute dots upon foliage and fruit. These dots increase rapidly in size if not checked, and as the fungus growth extends the leaves and fruit shrivel up. Several remedies are used with more or less success including Bordeaux Mixture, Eau Celeste and Ammonia Carbonate of Copper. Directions for making and using these preparations will be found

on page 98, volume 1. Another remedy that has been used very effectively is a simple solution of Sulphate of Copper. It is made by dissolving one pound of Sulphate of Copper in twenty-five gallons of water using it as a spray. This solution is a good one for spraying the Vines before growth has started, but is too strong for young and tender leaves and shoots.

PERONOSPORA VITICOLA.

Enlarged 200 Diameters.



A A A—Showing the Conidia or Fruiting Threads emerging from the Pores on under side of the Leaf.

B B—Showing the Mycelium ramifying among the Cells inside the Leaf.

Downy Mildew. — This fungus is *Peronospora viticola* and as it is exceedingly troublesome to Vinegrowers in France, it is also commonly known under the name of French Mildew. This fungus makes its appearance in minute white spots, on the undersides of the leaves, warm humid weather being most favourable for its development. These spots gradually increase in size till they cover the greater portion of the leaf surface, and the foliage withers and decays. Remedies, Bluestone and Lime applied either as a spray or a powder, is considered to be one of the most effective remedies. It is prepared by mixing ten pounds of bluestone with six gallons of warm water in one vessel and seventeen pounds of quicklime and three gallons of water in another. When thoroughly dissolved mix together, and if required as a spray add water at the rate of ten gallons to one. If required as a powder the material should be placed in shallow vessels and allowed to dry by evaporation. Another fairly effective remedy is the ordinary Kerosene Emulsion with about three per cent. of carbolic acid and a small proportion of glycerine added. The remedies should be applied as recommended for Anthracnose.

DOWNY MILDEW
Showing Bunch badly effected.

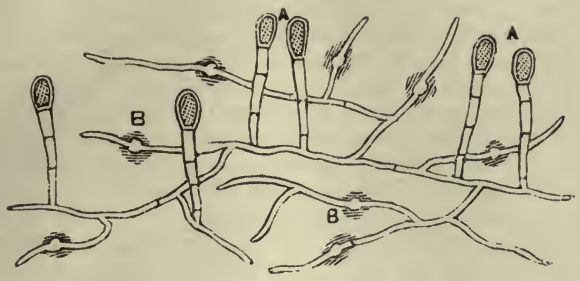
Mouldy Root.—This disease which is perhaps better known under its French name Pourridie is caused by various species of fungi including *Agaricus melleus* and *Dematophora necatrix* the latter being the most common. It mostly occurs in damp badly drained soils, and is said to be more frequent in land recently taken from forests, according to the experience gained in France, where the disease is very destructive. When Grape Vines are affected by this disease, they quickly lose their vigour, assume an unhealthy appearance, make weakly growth and gradually die away. If the roots are

examined a white grey or brown fungus growth will be found upon them. This mould is at first white then changes to grey then brown and black. It is composed of minute filaments which are matted together and spread over the roots, and also extend some distance into the soil. Some of these filaments come to the surface to fructify or produce a perfect fungus. *Agaricus melleus* or Honey Agaric may be taken as the type of the class. This fungus is as large as an ordinary mushroom, and is edible. The spores of this fungus are produced in great numbers and they rapidly germinate when the conditions are favourable. Whenever this disease is discovered it will be advisable to take up and destroy with fire, any plants that are badly affected, and lime should be supplied liberally to sweeten the soil. Prevention is, however, much better than cure and the disease should be avoided by perfect drainage. Mouldy Root is a disease that will never or rarely occur in land that is thoroughly drained.

Oidium.—This fungus (*Oidium Tuckerii*) is generally known as the Common Mildew or Powdery Mildew and is widely prevalent in vineyards in all parts of the world. In Australasia it is a widely spread and very troublesome pest, some varieties of Grapes being specially liable to its attacks. Heat combined with moisture seems to be the most favourable conditions for the spread of this fungus, and it is generally worse in districts near to the sea coast. On the other hand in the dry interior districts it causes less trouble, as a rule. The Oidium is a fungus that grows upon the outer tissues of the Vine and attacks the buds, leaves, young wood, tendrils, flowers, berries, and stalks. Its appearance at first is like thin white powder, and it usually attacks the leaves first. But the berries seem to attract the fungus most and they are often entirely covered with its greyish white powdery looking filaments. If left unchecked the effect of the parasite is to tighten the skins of the berries and cause them either to dry up or crack. But though the Oidium is a troublesome fungus, yet it may be effectively combatted by the use of sulphur, provided it is not allowed to get a strong hold before the remedy is applied. A still better plan is not to wait for the appearance of the fungus, but to apply sulphur as a preventative and give several dressings during the season. The first dressing should be given in the spring, soon after growth has started. A second one may be given when the flowers make their appearance and others at intervals of two or three weeks as circumstances may require. In applying sulphur Vine growers should bear in mind that the result may be materially influenced by atmospheric conditions. It is not the contact of the particles of sulphur with the fungus that destroys the latter, but the fumes that are caused by the action of heat. Sulphur should therefore be applied on bright calm days and while the air is warm. Sulphur is usually applied by means of bellows specially arranged for the purpose, but may be effectively used with a common flour dredger or a bag that will allow it to come through. Though sulphur in all its forms may be used, yet it should be remembered that the finer the powder it is reduced to, the quicker

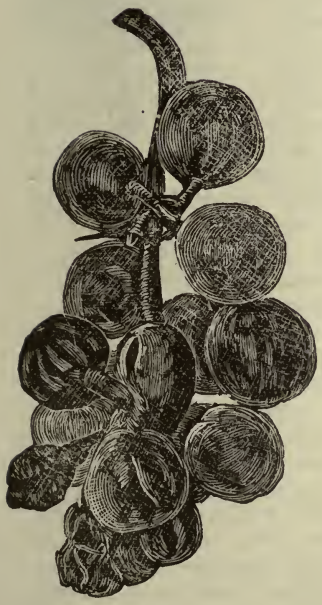
Oidium Tuckerii.

At an Early Stage of Development. Enlarged 200 Diameters.

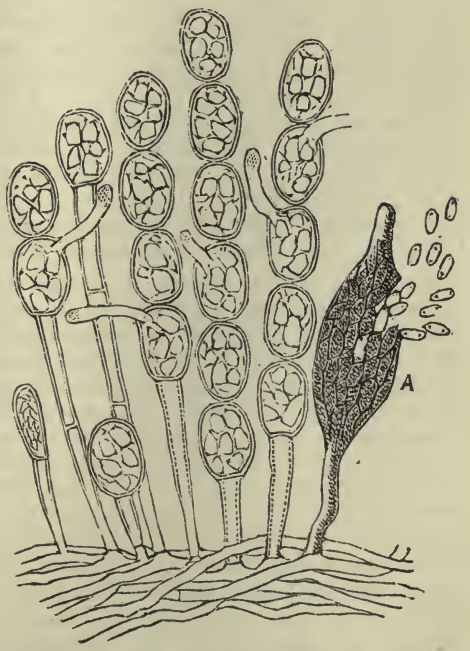


A A—The Conidia or Fruiting Threads.
B B—The Mycelium or Suckers.

Ripe Condition.
Enlarged 400 Diameters.



Showing effect on Grapes

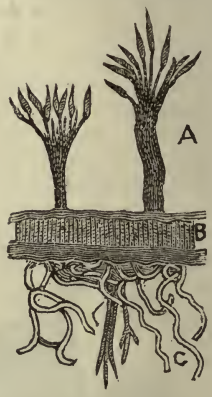


A—Showing the way the Spores are emitted.

will be its action as the greater will be the exposed surface. In France it is a practice to mix the sulphur with soot as by reason of its dark colour the latter absorbs more readily the heat from the sun, and causes a more active giving off of the sulphur fumes. The quantity of sulphur required for each dressing must necessarily vary to some extent according to the size of the plants, the distance apart and the stage of growth. For a vineyard planted ten by ten about 15 lbs. will be sufficient for a first dressing, per acre. A second dressing will take about double the quantity required for the first one as there will be a much larger expanse of foliage. For the same reason the after dressings will take from 35 to 40 lbs. each.

Tufted Leaf Blight.—This somewhat common disease in Australasian vineyards is caused by a fungus known as *Cercospora viticola* (*Cladosporium ampelinum*), which appears in the form of numerous rounded or irregular spots upon the leaves, which vary in size from minute points to half-an-inch. These spots when small are in colour a dark brownish purple, but when larger they become paler in the centre. As it develops, the fungus forms minute tufts of black or very dark green which are barely visible to the eye, but which when seen under a microscope have the appearance as shown by the illustration. This fungus like most others produces its spores in great numbers and increases rapidly. Though troublesome, however, it is less hurtful than some other fungi. In treating this disease it is advisable to destroy affected leaves as far as may be practicable. Remedies: 1. Lime in a powdered state dusted over the affected Vines. 2. Eau Celeste. 3. Bordeaux Mixture.

TUFTED LEAF BLIGHT.
Increased 100 Diameters.



A—Tufts bearing finger-shaped spores growing upon the upper surface of the leaf.
B—Upper surface of leaf.
C—Suckers or Roots.

White Rot:—This disease is caused by a fungus known as *Coniothyrium diplodeillia* which has been prevalent in various parts of Australia during the last few years. It is a very troublesome pest, and causes much damage in vineyards that it attacks. The effects of this disease are similar to those produced by Anthracnose and it is somewhat alike in appearance to a superficial observer. It attacks the leaves, shoots, and fruit, and seem to affect some varieties to a much greater extent than others. When the leaves are attacked, brown irregular patches appear upon the upper surface. Soon after their appearance the patches are covered with a bluish grey mould. When the young leaves are attacked they often turn black and wither off as from the action of frost. As the patches mature they break away, the spores of the fungus are spread and another germination takes place. When the shoots are attacked the disease most generally appears at the joints and often runs in longtitudinal

strips. The effects are at first small swellings and discoloration, and the bark detaches itself in strips from the wood. The wood has a blistered appearance and when badly attacked dies back. White Rot sometimes attacks the bunches when the berries are the size of small peas, but more generally when they are fully grown, and first appears in the form of small brown shining spots. These spots increase rapidly, and in a few days cover the entire surface. The effect is that the berries gradually shrivel up and in some cases drop off. The following preparations have proved effective remedies for the White Rot fungus: 1. Sublimated Sulphur 14 lb., Slaked Lime 5 lb., and Sulphate of Copper 1 lb. These materials which must be crushed to a fine powder, and thoroughly mixed, form a preparation known as Sulphatine. It is applied as a powder in the same way as sulphur. 2. Bluestone and Sodium Carbonate used as a spray. 3. Sulphate of Iron used as a spray. Directions for making and using No.'s 2 and 3 remedies will be found at pages 99 and 100, volume 1. Cultivators must bear in mind that in the use of remedies for this disease prompt action is necessary as soon as it can be detected.

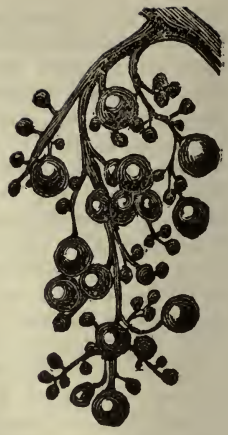
Fruit not Setting.

This is not a common occurrence, and may result from various causes. The most general cause is due to atmospheric conditions, such as an abnormally low temperature or excess of rain at the time the flowers make their appearance. Frost will often cause the abortion of the flowers, and heavy rain sometimes washes off the pollen, and prevents fecundation. In many cases the result is brought about by the action of minute insects or fungi. Other probable causes are over-luxuriant growth or want of vigour in the plant at the flowering period. Sometimes the tendency to failure is owing to short pruning, as some varieties have inferior fruit buds in the shoots near to the stocks, or none at all. Some varieties have a much greater tendency to fail through the non-setting of the fruit than others, which is a proof that atmospheric conditions are the principal cause. The evil can scarcely be altogether avoided, but cultivators may mitigate it materially by excluding varieties that are specially liable to be affected, care in pruning so that each vine is treated according to its particular requirements, and judicious cultivation. The French term for the non-setting of Grapes is "Coulure," and this name is frequently used in Australasia.

Berries Making Irregular Growth.

Sometimes, and more especially with a few varieties, the berries set freely, but they develop irregularly, so that while some retain their normal size, others increase in bulk but slightly, or not at all. Consequently, the bunches are composed of uneven berries, some

of which do not ripen properly. This defect may be induced by various causes, the principal one being unfavourable atmospheric conditions when the flowers appear, which prevents the proper development of the berries by making some of the blossoms abortive. When these flowers are rendered abortive their places are taken by later and secondary ones which are inferior to the first or main ones. These secondary flowers are usually weakly, and only develop berries when the primary ones fail. Sometimes the evil is caused by the lack of some essential materials in the soil, such as potash or phosphoric acid. When the trouble is due to the last mentioned cause the cultivator may avoid it by taking care that there are no soil deficiencies. If caused by atmospheric conditions the evil cannot be absolutely avoided, but it may be mitigated by discarding such varieties as are specially liable to be affected.

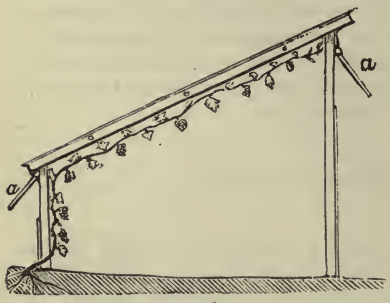


Bunch with Berries of irregular growth.

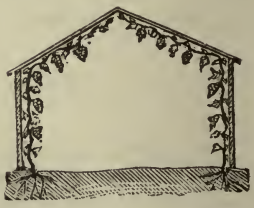
Cultivation Under Glass.

In the cooler regions of Australia, and to a large extent in Tasmania and New Zealand, the cultivation of the Grape in the open air will necessarily be uncertain, and the aid of glass houses will be required. Glass houses may also be used with advantage for the production of table Grapes earlier in the season than they can be obtained when growing under ordinary conditions. Grape houses may be divided into two classes, the first including structures that merely afford protection from the changes of the weather and low outside temperature, and the other embracing buildings fitted with appliances for supplying artificial heat to stimulate and hasten growth.

Cool Houses.—The first class, or cold houses, are those that will be more generally required, and when economy is a consideration they



A Lean-to Grape House. a a—Ventilators.



A Span-roof Grape House.

may be constructed very cheaply. The simplest and cheapest kind of Grape house is what is known as the *Lean to*. A useful house of this kind may be constructed as follows:—Dimensions, thirty feet in length, fifteen in width, with a back wall ten feet high, and the front one two feet. These walls may be simply composed of boards fixed to posts, but, if convenient, it will be better to make them of brick or stone. A wooden plate or cap is fixed on the top of the walls to receive the rafters, and upon these fixed sashes rest. Ventilation is provided by openings at the top of the back and front walls fitted with wooden shutters upon hinges which open outward, as shown by the illustration.

A *Span-roof* Grape house has the front and back walls of equal height, as shown by the illustration, and may be constructed as simply as the *Lean-to*, with the exception of the ridge, to receive the roof. In a house of this class it is also necessary to have openings in the ridge filled with shutters to afford the necessary ventilation.

Forcing Houses.—These are structures which can be heated artificially to hasten growth and bring Grapes to maturity earlier in the season than they can be obtained in the ordinary way. Houses of this description may be constructed on the same lines as recommended for cold structures, but it is necessary that the walls and other parts should be more solid as a protection against the external cold air and to enable the internal temperature to be easily kept up to the proper standard. Heat is applied by means of hot water pipes fixed low down on the inside of the walls, and supplied from a boiler placed outside the building. Very cheap and effective boilers of various forms are now available, and the cost of heating a Grape house need not be a very expensive item.

Treatment of Vines Under Glass.

Vines under glass, either in cold or forcing houses, should in the first place be trained so that the branches will cover the whole of the roof surface. The methods best adapted for the purpose are the "Thomery" and the "Extended Long Rod," both of which have been fully described in the section upon Training, page 38. A wire trellis or rods should be fixed six or eight inches below the rafters for the support of the branches, taking care that they are securely tied from time to time as growth progresses. In order to prevent scorching, the inside of the glass should be thinly smeared with whitening or some similar material shortly after growth has started. Air must be admitted freely, and more especially after the fruit has set. While the plants are in blossom the houses ought to be kept somewhat closer and warmer than usual, and at this time it is not advisable to wet or sprinkle the foliage. At all other times the syringe may be used freely with advantage, and more especially on harsh drying days. In heated houses growth should be started at a temperature of from 60 to 65 Fah., and this must be kept up till the bunches are well developed. As a matter of course, as the weather increases in warmth the fire heat may be reduced in

proportion. Insects and fungi are often troublesome in cultivating Grape Vines under glass, and care must be taken not to let these pests get a firm hold. As soon as detected, the necessary remedies should be promptly applied. Care should also be taken, as a preventative, to remove loose bark and paint the stems with lime and sulphur before growth starts. It will also be advisable, in the case of heated houses, to sprinkle powdered sulphur and lime upon the hot water pipes frequently, as the fumes will materially assist in keeping down *Oidium* and other fungi.

Thinning Bunches of Grapes.

In the cultivation of Grapes under glass it is a common practice with European gardeners to reduce the number of berries when too numerous. Some kinds have a tendency to set so thickly that as the berries increase in size they have not room for development, and consequently do not come up to the highest standard in quality. By thinning out the bunches the drawback is avoided, and the berries attain their full size and flavour. The operation should be performed when the berries have fairly well formed, and must be done with a pair of sharp-pointed scissors, and with great care. Sometimes a second thinning may be necessary, and this should be done before the berries get large enough to press each other by over-crowding. As a matter of course, the practice of thinning is only to be recommended for choice table Grapes, and can necessarily only be adopted upon a small scale. It will, however, prove serviceable if specially fine bunches are required for exhibition or other purposes.

Gathering, Packing, and Preserving Grapes.

The Grape reaches the highest degree of perfection when allowed to get fully ripe upon the Vine, and some kinds are richest in flavour when permitted to hang till they begin to shrivel. If required for packing, the bunches should be gathered when perfectly dry, and never when there is any moisture upon them from rain or dew. For local markets, that can be reached within two or three days, it will be sufficient to pack the bunches firmly in the boxes so that they will not shift. In packing the boxes, which should not be large, the fruit must be laid in bunch by bunch, as closely as possible, and in such a way that a gentle pressure will be required to fasten down the lids of the cases. When packed to travel long distances, and remain some days in the cases, the spaces between the bunches should be filled with thoroughly dry sawdust or corkdust. Large quantities of Grapes packed this way are sent to England from Spain and Portugal, and generally arrive at their destination in prime condition. Formerly, before the advent of steam transport, Grapes from these countries were often several weeks in the cases before they reached the English market, and seldom suffered to any great extent. Grapes may be preserved fresh for several weeks by various methods. One method is to

suspend the bunches, so that they do not touch each other, with strings from rods in a moderately dry room or shed; another plan is to place the bunches in jars or boxes, filling the spaces between with thoroughly dry bran or sawdust. Bunches of Grapes may also be kept for a considerable time if cut with pieces of the wood three or four inches long attached to the stalks. The ends of these pieces of stem should be inserted about two inches in tubes or bottles filled with water. These are placed slanting on shelves in such a way that the bunches will hang clear. There will be no occasion to change the water if a small piece of charcoal has been placed in each bottle; it will, however, be necessary to keep the tubes or bottles filled up as the water is absorbed.

Making Raisins and Currants.

Grapes can be readily dried by sun heat, and raisins or currants are most generally prepared by this means. This is, in fact, the method generally adopted in European practice. Drying by fire heat has of late years been practised to some extent, and more particularly in California, but though this method has the recommendation of being more economical and speedy, yet, as a rule, the produce is inferior to sun-cured fruit. Various methods are adopted in curing raisins, and even in Spain, where this industry is carried on principally, the practice varies considerably. In the province of Valencia the usual plan in curing is to prepare a hot lye made of the ashes of Vine wood and Rosemary. The bunches are dipped in this preparation, spread out in the sun to dry, and turned daily till sufficiently cured. In the district around Malaga, which is also noted for its raisins, the bunches are simply dried in the sun without undergoing any previous preparation. This dipping process doubtless hastens the curing, but in other respects no benefit can be derived from it. On the other hand, if the bunches are kept too long in the hot solution there will be a risk that the berries will be partially cooked, or the skins crack and allow a portion of the Grape sugar to escape. The easiest and quickest way of sun-drying is to spread a layer of bunches on wooden trays of moderate size and uniform in shape. These should be fully exposed to the sun, and the bunches turned every day till they are sufficiently dry. Care must be taken in drying that the fruit is not exposed to dew or rain, as if it gets wet there is a risk of its spoiling. The time required for drying will, as a matter of course, depend largely upon the weather, but also to some extent upon the size of the Grapes, and the degree of ripeness. If the weather is clear and hot, ordinary raisins can be made in twelve to fourteen days, but will require a longer time when the conditions are less favourable. Currants, having smaller berries, can be dried in a shorter period, and will generally be sufficiently cured in a week. Sultanas require a day or two more than currants, but less drying than the ordinary raisins. When dried by artificial heat, the bunches are placed on open trays in a building specially

constructed for the purpose, and currents of hot air are made to pass through them till the surplus moisture has evaporated. As soon as the drying process is complete, whether by artificial or sun heat, the fruit should be placed in heaps or boxes for a few days, when it will slightly ferment or "sweat." The next thing will be to pack it as tightly as possible into small boxes or kegs, where it will remain till required for use. When the stems have to be removed, which is necessary with currants and some classes of raisins, it must be done, as a matter of course, before the fruit is put into the cases. Grapes for drying should invariably be fully ripe before they are gathered, and when practicable they ought to be left to hang till they begin to shrivel.

Making Grape Jam or Jelly.

Grapes can be utilized to advantage when made into jam or jelly. All kinds may be used for the purpose, but those with pulpy and somewhat acid berries will give the best results. Only sound Grapes should be used, and these, when picked from the stalks, must be boiled slowly for about four hours for jam, adding sugar at the rate of about one pound to three pounds of fruit, or a greater proportion if the Grapes contain a large quantity of acid. For jelly the berries should be boiled slowly without sugar till the pulp separates freely from the skins, when the mass should be strained through coarse muslin or some other suitable material. To each pint of juice one pound of white sugar should be added, and then boil briskly for an hour. Preserve in jars as with other jams or jellies.

Wine-making.

This is a subject which the writer does not intend to treat exhaustively, as there are so many details to be considered, and so much to be said in connection with each one, that the most complete information can only be given in a work specially devoted to wine-making. The writer, therefore, proposes to touch lightly upon the more essential matters in such a way that the information may be serviceable to those whose knowledge of the subject is limited. Though the process of making wine is simple, yet various essential matters have to be duly considered in order to obtain the fullest measure of success. Modifications in treatment are necessary according to the variety of Grape, its degree of ripeness, and the class of wine that is desired. As regards the latter requirement, it must be remembered that the foundation of a particular class of wine is in a certain variety, which is essential to the production of the desired article. It is simply impossible to make a particular kind of wine without its proper base. But the qualities of Grapes are modified materially by climate, soil, and degree of ripeness, so that the one kind grown under different conditions may produce wines that vary considerably in strength and character. In the warmer districts, where there is a strong heat

and light at the ripening period, the Grapes will contain a large proportion of glucose, consequently the wine will be richer in alcohol, and, therefore, stronger by several degrees. In the colder regions, or in other localities when the season is unfavourable for ripening, the Grapes will retain more acidity and a lower proportion of glucose, and, consequently, the wine will be lighter in character. A very wet season, or when water has been supplied at a late period by irrigation, may decrease the percentage of glucose, and make the wine very low in quality. Then, again, if Grapes are allowed to hang till they are dead ripe and begin to shrivel, they will be richer in glucose and have less acidity.

When wine of a high strength is required, the Grapes should be allowed to hang till they attain the fullest degree of ripeness. In the cooler districts it will be necessary, as a rule, to let the crop get thoroughly ripe before it is gathered, as even then the fruit will, generally contain a good percentage of acidity. Unless the Grapes are fully ripe the wine will not be up to the highest possible standard. On the other hand, in the warmer regions, where wines are too rich in alcohol, it may be advisable to gather the Grapes before they get sufficiently ripe to develop the full amount of glucose. This plan is often adopted, and the result is wine less strong than the product of fully ripe Grapes. Some wine-makers, however, prefer letting the fruit attain the highest degree of maturity, and to lower the strength of the must by adding the necessary percentage of water before fermentation. In support of this practice it is contended that the development of the saccharine and other matters should not be checked, as their suppression is detrimental to the wine. Another mode of reducing the strength of wines is to blend with a lower quality of must from a different variety or locality.

Treatment of the Grapes.—When the Grapes are gathered it will be advisable to remove all unripe or decayed berries, as these if left will have a tendency to injure the wine. The fruit intended for white wine is crushed and pressed directly, but for red kinds the Grapes after being crushed are allowed to stand a few days in the vats before the pressing takes place. Many wine-makers separate the berries from the stalks before crushing, but this is not absolutely necessary. The stalks during fermentation yield astringent matter the base of which is tannin, and when this is in excess it is injurious to wines. The skins contain the same tannin as the stalks, and the colouring matter that is imparted to the wine. The pips contain tannin in larger proportions, as also a considerable amount of albuminous matter, fatty oil, gluten, and mineral salts. Though neither the stalks, skins, nor pips contain material that can be converted into alcohol, yet they accelerate the process of fermentation, and greatly influence the character of wines. A moderate proportion of tannin is beneficial to both white and red wines, and is, in fact, essential to them. It precipitates the albumen, improves the quality, and is not unpleasant to the palate. On the other hand, an excess of tannin makes wine hard, astringent, disagreeable to the taste, and heavy for the stomach. Consequently, neither stalks, skins, nor pips should be allowed to

macerate in the juice longer than is absolutely necessary to effect certain objects that are desired. There is no danger of an excess of tannin in white wines, as the Grapes being pressed soon after they are crushed the stalks, skins, and pips do not remain sufficiently long in the juice to part with their astringent qualities to any great extent. In fact, in some cases the stalks may be put through the press with the berries, in order that the necessary amount of tannin may be imparted to the wine. In making red or other deep-coloured wines the colouring matter is obtained from the skins, and they have necessarily to macerate for a period, longer or shorter, in the juice. Consequently, there is a risk of too much tannin being absorbed, and more especially in the case of wines strong in alcohol. Therefore it will be advisable to remove the stalks before crushing, so that a less quantity of tannin will be available for absorption. In crushing care must be taken, as far as is practicable, not to break the pips, as their oily and albuminous kernels have an injurious effect upon the wine.

Treatment of the Juice—The juice, after it leaves the press, is technically known as "must," while the mass of skins, pips, &c. left behind is called the "marc." The strength of the must is represented simply by the quantity of sugar contained which can be converted into alcohol. But the test of strength does not represent the variable quantities of acids, essential oils, salts, and other materials, each of which has an influence upon the quality of the wine. As soon as it is run from the press the must should be placed in large receivers, or fermenting vats. These receptacles are mostly made of wood, and when so, they must necessarily be made of some kind that will not impart an unpleasant flavour to the wine. Oak is the favourite wood for the purpose for which it is admirably suited. Some wine-makers prefer stone or brick and cement square tanks to wooden vats, and one class of receiver seems to be quite as useful as the other. Closed vats are now more generally used than open ones, as the fermentation is more regular. Fermentation also goes on with more regularity and briskness in shallow than in deep vats, and the work is sooner finished. Temperature, as a matter of course, has a great influence upon the fermenting process, as when low it goes on slowly, and if high makes rapid progress. When the fermentation goes on too slowly it may be incomplete, and, on the other hand, if too rapid there may be a material loss of alcohol and other essentials. It is, therefore, advisable to keep the temperature as regular as possible by constructing the cellars so that they will be least affected by the power of the sun and changes of the weather. The fermentation may possibly be stimulated when Grapes are gathered after the air and soil is heated by the sun, and more especially in the warmer districts. As a rule, the higher the temperature of the must when placed in the vats the more strong will be the fermentation.

Artificial Fermentation.—Some attention has during the last two or three years been paid to a system of artificial fermentation, said to have been practised with great success in French vineyards. The

investigations of Pasteur and other French scientists have led to the discovery that the wine "ferments," or "yeasts," are various, according to the variety of Grape, degree of ripeness, climate, temperature of the must, mode of fermentation, and other local conditions. These scientists also inform us that some of the essential qualities in wines are, to a large extent, dependent upon the character of the fermenting yeast. Under the ordinary system the fermenting agent must necessarily be a matter of chance, whereas it is claimed for the new process that the wine-maker can utilize a special medium. These mediums are selected "yeasts" which are carefully cultivated and preserved, so that they can be applied to wines with certainty. These "yeasts," which are known in French as "levures," are selected from the various classes of notable wines. It is claimed for these artificial ferments that their use ensures wines of more certain character and uniform quality than can be obtained in the ordinary way. Each class of "yeast" is also said to give to a wine a particular and distinctive bouquet, more or less similar to the European wine from which it has originated. As instances the advocates of artificial fermentation claim that cultivated "yeasts" of the Pinot Noir of Burgundy and Cabernet Sauvignon of Bordeaux will to a large extent supply the special characteristics that have made wines from those districts famous. Whether these claims are well founded time and experience must show. It is probable, however, that the advocates of artificial fermentation claim more for the system than results will warrant. Possibly it may prove of great service to wine growers, but it is doubtful whether the system will produce such certain and great results as is claimed for it. It must not be forgotten that the qualities of wines depend upon many factors, and each has a material influence. The "ferment" is only one factor though certainly it is not the least important. It is not likely that by merely using a cultivated "yeast" from a special French or German wine that the products of Australasian vineyards can be made to assume the same characters. Then, again, it must not be forgotten that in using cultivated "yeasts" they must necessarily come in contact with those that form naturally, and possibly results may be materially influenced by this means. Another matter in connexion with artificial fermentation, that will to some extent be a bar to the practice, is the fact that the cultivated "yeasts" must be prepared by skilled scientists, and will cost money. When the system is practised, the first consideration is to use only the special "yeast" that is suitable for a particular class of wines. As instances, a Bordeaux "yeast" is best suited for Cabernet, Malbeck, and similar kinds. A Sherry "yeast" should be applied to such varieties as Pedro Ximenes and Doradilla, and a Hermitage "yeast" must be used for Shiraz, Grenache, Mataro, and other sorts belonging to the same section. In applying the cultivated "yeasts" they should first be mixed with, say, about ten gallons of sterilised must which ought to be freely exposed to the air for a few hours before it is used in order to encourage active fermentation. The must may be sterilised by heating it to 160 degrees for two or three minutes, allowing it to cool gradually to below 70 Fah. before adding the "yeast." The prepared must is then

added to the main bulk, and the further treatment is the same as that required during fermentat on in the ordinary way.

Racking off the Wine.—As soon as active fermentation ceases the wine should be drawn off and filled into smaller casks. By this means it is separated from the lees and placed in casks that can be handled readily. No precise rules can be laid down as to the time wine should be left in the vats to ferment, as local conditions such as climate, season, and variety may have more or less an influence. The safest rule to go by is when the bubbling sound caused by the rising of the carbonic acid gas ceases, and the thermometer only indicates a temperature a few degrees higher than the surrounding atmosphere. The drawing off is most usually performed by means of a tap in the side of the vat, but very often the work is done with a syphon. Great care must be taken, whichever plan is adopted, that no lees are drawn off with the wine. Activity does not altogether cease when the wine is drawn from the fermenting vats. A limited amount of sugar, from two to four per cent., still remains, and this is slowly changed into alcohol. This process is called "insensible fermentation," as the signs are less noticeable than in the first, or "active fermentation." At the time it is drawn off, the wine gets ærated more or less, and the oxygen thus asorbed assists the fermentation of the remaining sugar into alcohol. Though the casks may be well filled from the fermenting vat, yet a shrinkage will soon take place from various causes, and the deficiency must be promptly made good. If a space is left unfilled the wine is liable to oxidize too rapidly. Second and even third rackings are required for some wines in order to get rid of deleterious matter.

Blending and Fining.—When wines are deficient in any desirable qualities, or contain some particular material in excess, blending may often prove of great service. Very frequently wines will contain too much alcohol, tannin, acidity, or colouring material, and by care and judgment in blending these defects may often be modified. As a matter of course, the wines used for blending must possess such properties as are likely to affect the desired purposes, and there should be some affinity between them and the wines they are applied to. All kinds of wine cannot be blended together, and it will be folly to adopt the practice with those that differ widely in character. Sometimes wines remain turbid and cloudy, notwithstanding various and careful rackings, and in order to assist clarification it will be necessary to use materials to "fine" them. In the case of blended wines, turbidity will often occur through the dissolving powers of the various sorts differing. It is essential that the matter in suspension be removed, not only to make the wine look brighter, but also to insure that it will keep sound. Fining may be effected mechanically by filtering the wine through sand, or other materials suitable for the purpose, or it may be done with albuminoid substances whose action is mainly chemical. Albuminoid substances when applied to the wine, form a glutinous film, the result of coagulation caused by the tannin and acids. This film, after a few days, gradually falls to the bottom of the cask, carrying with it all matter held in

suspension which affects the limpidity of the wine. The best fining, and more particularly for delicate and old wines, is the white of eggs. Two eggs, after the yolks are removed, diluted in a quart of wine, in which a quarter of an ounce of salt has been dissolved, will afford sufficient fining material for from forty to fifty gallons. Gelatine or isinglass acts much in the same way, but rather more vigorously, though not influenced by the acids to the same extent as albumen. Fining is also useful in correcting wines that contain too much tannin, as it removes a considerable portion. On the other hand, it may remove too much tannin from wines that contain but a small proportion of that material, unless special provision is made to replace what is lost.

Aroma of Wines.—Every wine should possess a grateful odour and a pleasant flavour for the palate. The odoriferous qualities are mainly due to essential oils contained in cells which line the interior of the skins. Some Grapes have these oils more pronounced in their development than others, and this is especially the case with the "Muscat" section, which are remarkable for their peculiar flavours. These essential oils supply what is known as the aroma to both fruit and wines. The strength and character of these flavouring materials may vary considerably according to local conditions, such as climate, character of the season, ripeness of the Grapes, and nature of the soil. Though special aromas are peculiar to particular varieties or classes of Grapes, yet they will be higher or lower according to the local influences named, and may also be materially affected by defective fermentation, or excess of tannin or other matter in the wine. What is known as the "bouquet" is produced by volatile ethers, and more especially acetic ether formed by the action of alcohol upon the acids. As this action goes on very slowly, these odoriferous ethers generally exist in greater proportions in old than in new wines; to some extent these compounds are also influenced by the slowness or quickness of the fermenting process. The "bouquet" of wines is volatile and unstable, and is easily dissipated by exposure to the air. This will account for the falling off in flavour so noticeable with some wines soon after the corks have been drawn from the bottles, or when decanted.

Maturing Wines.—The object for keeping wine in casks for two or more years before bottling it, is to allow the necessary latent or silent fermentation by the action of oxygen obtained from the air. When the wines are racked off, a considerable proportion of the carbonic acid gas escapes, and at the same time air is absorbed. The influence of the air is of great importance to the future of the wine, and will make itself felt more or less till the supply is completely shut off through the use of bottles. It is essential that this action should be very slow, and therefore, it is necessary to keep the casks well filled with wine, to prevent air from entering them in excess. This secondary fermentation not only acts upon the sugar contained in the wine, but also upon the acids which are decomposed to some extent, and the colouring matter which is gradually precipitated. When the silent fermentation is complete, and the time for this must necessarily vary according to the

character of the wine and the treatment it receives, the process of maturing is finished by bottling it off. If left too long in the cask there may be a falling off in aroma or colour, which the maker must be careful to guard against. The bottles must necessarily be securely fastened, and only new and sound corks should be used. Cellars for storing should be dark and cool, and the more regular the temperature can be kept the better. Some of the lighter wines attain the highest degree of perfection in seven or eight years, but the stronger kinds may improve up to twenty years old or over.

Condensed Must.—A practice has been introduced within the last few years, and is now followed to a great extent in some parts of Europe, of condensing must by evaporation. Under this system it is materially reduced in bulk, and can be more readily exported to other countries, than wine in its natural state. In many of the principal wine making districts of Europe the produce of the local vineyards fall short of the requirements, and has to be supplemented by supplies from other countries. Condensed Must serves the purpose equally well as a made wine, and there is less cost in carriage, as also generally a saving in customs charges. The process is carried on upon exactly the same lines as in condensing milk. By evaporation in vacuum pans the bulk of the water is removed while the sugar and other essential components remain. When the process is complete the Must is reduced to a thick mass, having the appearance of treacle. This material when filled into casks or jars will keep good for years, and may be fermented at any time by the application of water. The saving in bulk by condensation is about two thirds. When fermented it is necessary to mix Grape skins with the Must as these afford the required tannin, colour, and flavour. Therefore it is usual in exporting to send tightly packed skins of the same variety, in the proportion of one barrel to six of Must. When unfermented, condensed Must is said to yield a pleasant non-alcoholic beverage that may be used without scruple by the most rigid teetotalers. Possibly the condensing of Must may be found to offer advantages in some parts of Australasia.

Varieties.

There are a very large number of Grapes in cultivation both for dessert and wine-making purposes, but the kinds suitable for drying are comparatively few. A limited number is all that are required for any purpose, and growers will do well not to plant too many sorts. The following list embraces all the more noteworthy kinds :—

Aleppo (*Chasselas Panaché, Morillon Panachê, Raisin Suisse, Striped Muscadine, Variegated Chasselas*).—A singular French variety, remarkable for its variegated berries, which are mostly striped with white, red, and black in distinct lines. Bunches medium-sized, loose. Berries roundish, medium-sized, and thin skinned. Flesh juicy and well flavoured. Ripens medium early, and is good for dessert or wine.

Alicante (*Black Lisbon, Black Portugal, Black Palestine, Black Spanish, Black St. Peter's*—An excellent and showy late table Grape, supposed to be of Spanish origin. Bunches large and usually set well. Berries large, oval, jet-black, with a blue bloom, and a rather tough skin. Flesh tender, juicy, with a flavour similar to the black Hamburgh. Ripens late, will hang well, and is also a good wine Grape.

Aramon (*Burchardt's Prince, Plant Riche, Ugni Noir*).—A popular French wine Grape. Bunches large, long, tapering, and well set. Berries large, round, black, and thick skinned. Flesh tender, juicy, and moderately well flavoured. Ripens rather late, is very prolific, and yields a good light wine. Extensively cultivated in the south of France.

Aucarot.—A popular French wine Grape, which is similar in appearance and quality to the *White Burgundy* (*Pinot Blanc*).

August Frontignan (*Muscat d'Août*).—An early table variety of French origin. Bunches medium sized. Berries deep purple, round, inclining to oval. Flesh rich and juicy, with a slight Muscat flavour. Valuable for its earliness.

Barbarossa (*Brizzola, Rossea*).—An excellent Spanish dessert Grape. Bunches medium sized, shouldered. Berries above medium size, thin skinned, pale red, with a grey bloom, and slightly oval. Flesh juicy, sweet, with a very rich Chasselas flavour. Ripens at mid-season.

Baxter's Sherry.—A popular white Grape of uncertain origin. Bunches large and rather loose. Berries large, oval, yellowish-green, and thin skinned. Flesh juicy and sweet. A prolific bearer, and makes a strong wine. Ripens about mid-season.

Black Champion (*Champion Hamburgh*).—An English table variety of excellent quality. Bunches large and thickly set. Berries deep black, with a blue bloom, large, oval. Flesh slightly firm, very juicy, sweet, well flavoured, and has but few seeds. Ripens several days earlier than the Black Hamburgh.

Black Cluster (*Auvergne, Black Morillon, Burgundy, Early Black, Morillon Noir, Pinot Noir*).—A hardy and prolific wine Grape, which is extensively cultivated in France and Germany, and has received a considerable amount of attention in Australia. Bunches rather small, closely set, compact, and tapering. Berries deep blue-black, small, roundish-oval, and rather thick skinned. Flesh juicy, sweet, with a vinous flavour. Ripens at mid-season, and is chiefly used as a wine Grape.

Black Corinth (*Currant Grape, Passolina, Zante*).—A small seedless Grape, which yields the "currants" of commerce. Bunches small and compact. Berries very small, and sometimes irregular in size, black, round, and thin skinned. Flesh sweet and highly flavoured. Ripens after mid-season. Being of strong growth the plants require plenty of room, and should be pruned with long shoots. Though some suppose that the Zante is a distinct variety, yet it is in every respect identical with the Grape under notice.

Black Damascus (*Damascus, Worksop Manor*).—A good late table Grape of English origin. Bunches large and loose. Berries large, round, but sometimes irregular in size. Skin thin, deep black. Flesh juicy,

sweet, and richly flavoured. Ripens very late, and best adapted for warm districts.

Black Frontignan (*Black Frontignac, Black Muscat, Muscat Noir*).—A useful Muscat variety. Bunches medium sized, clylindrical, and compact. Skin brownish-black. Berries medium sized and round. Flesh juicy and luscious. Ripens after mid-season, makes a rich wine, and can also be used as a table Grape.

Black Hamburgh (*Black Hambro, Brown Hamburgh, Hampton Court, Red Hamburgh*).—A well-known and popular table Grape, and can also be utilized for wine. Bunches large, heavily shouldered, and well set. Berries large, regular, globular to oval, with a rather thick brownish-black skin. Flesh very juicy, and well flavoured. Ripens medium early, is very hardy, thrives well in most localities, and is an excellent bearer. Yields a pleasant light wine.

Black Malvasia.—A strong growing, hardy variety of uncertain origin. Bunches medium large and loose. Berries large, oblong, reddish-black. Flesh juicy, sweet, and highly flavoured. Ripens medium early, is an excellent table Grape, and makes a strong luscious wine.

Black Morocco (*Black Muscatel, Morocco, Mogul, Red Muscatel*).—An excellent late-keeping table Grape. Bunches large and loose. Berries oval, large, but often irregular, with a thick reddish-brown skin. Flesh firm, sweet, improves in flavour after hanging for a time, when it becomes very rich. Has but few seeds, and may be utilized to advantage as a raisin Grape. Ripens very late.

Black Muscadine (*Black Chasselas, Chasselas, Chasselas Noir*).—An excellent table Grape, and may be utilized for making a fruity wine. Bunches medium sized, compact, and regular. Berries medium sized, round, inclining to oval, with a purplish-black skin covered with a blue bloom. Flesh juicy, sweet, with a slight musky flavour. Ripens about mid-season.

Black Prince (*Boston, Pocock's Damascus, Langford's Incomparable*).—A well-known and excellent English table variety, which may also be turned to account for making wine. Bunches large, long, loose, and generally without shoulders. Berries large, oval, with a thick purplish-black skin covered with a deep blue bloom. Flesh tender, very juicy, sweet, and richly flavoured. Ripens immediately after the Black Hamburgh.

Black Tripoli (*Frankenthal*).—A good variety, very similar in the appearance of the fruit, flavour, and other respects to the Black Hamburgh, but not identical.

Bowood Muscat (*Tynningham Muscat*).—An excellent table Grape of English origin, and a seedling from Muscat of Alexandria, which it resembles to a great extent, but it is supposed to set more regularly, and the wood is shorter jointed. Ripens after mid-season, and is a good raisin Grape.

Buckland Sweetwater.—A very good early table Grape of English origin, and yields a light wine. Bunches large, well shouldered, and closely set. Berries large, round, inclining to oval, with a thin pale amber skin, and few seeds Flesh very juicy, sweet, and well flavoured. Ripens early, is very hardy and prolific.

Cabernet Sauvignon (*Carbinet, Navarre, Petit Cabernet, Vidure, Vinidure*).—An excellent and popular French wine Grape. Bunches small to medium size, conical, shouldered, loose, and rather long. Berries small, round, with a thick black skin, and covered with a blue bloom. Flesh juicy, with a vinous flavour. Ripens at mid-season. This variety is extensively grown in France, where it is considered to be one of the best red wine Grapes, and it is also a favourite in Australia.

Calabrian Raisin (*Raisin de Calabre*).—A very late table variety that will hang for a long time. Bunches very large, often over twelve inches in length, tapering, and slightly shouldered. Berries large, round, pale yellow. Skin thick but transparent. Flesh moderately firm, sweet, and well flavoured. Ripens late, bears freely, and makes a good pudding raisin.

Canon Hall Muscat.—An English table variety, and a seedling from Muscat of Alexandria. Bunches large, loose, and more tapering than those of the parent. Berries as large, but rounder. Flesh firm and sweet, but not quite so highly flavoured as the Muscat of Alexandria. Ripens after mid-season, is hardy and prolific, and a very good raisin Grape.

Carignane (*Catalan*).—A useful and popular French red wine Grape. Bunches large and compact. Berries medium sized, oblong, with a reddish-black skin. Flesh juicy and brisk. Ripens at mid-season, and is an abundant bearer. This variety is extensively cultivated in France, and is regarded as a first-class wine Grape.

Carmenere.—A French wine Grape very similar to, if not identical with, *Cabernet Sauvignon.*

Carmenet (*Cabernet Franc, Cabernet Gris, Gros Cabernet*).—Another French wine Grape which is very similar to *Cabernet Sauvignon*, but the berries are larger and have thinner skins. The finest Claret is made from Grapes of the Cabernet class.

Centennial.—This is a handsome white table Grape, raised in the Bendigo district, Victoria, and said to be a sport from *Waltham Cross.* The bunches are very large, long, tapering, and well shouldered. Berries very large, oblong, yellowish-green. Flesh juicy, medium firm, and well flavoured.

Champion Muscat (*Champion Hamburgh Muscat, Muscat Champion*). —A first-class English table Grape, raised from Mill Hill Hamburgh, fertilized by Canon Hall Muscat, and possesses the desirable properties of both parents. Bunches very large and well shouldered. Berries large, roundish, with a black skin covered with a light bloom. Flesh tender, juicy, and rich, with a distinct Muscat flavour. Ripens after mid-season.

Chaptal.—A French table Grape of excellent quality Bunches large. Berries large. round, inclining to oval, with a pale yellowish-white skin. Flesh juicy, sweet, and highly flavoured. Ripens late, and bears very freely.

Chasselas Musqué (*Musk Chasselas, Muscat Muscadine, Tokay Muscat*). —A table Grape of first-rate quality, and one of the richest flavoured belonging to the Chasselas section. Bunches medium sized, shouldered, long, tapering, and rather loose. Berries above medium size, round, with

a pale amber skin covered with a thin white bloom. Flesh juicy, sweet, with a high Muscat flavour. Ripens at mid-season, bears freely, and will make a good wine.

Chasselas Rose de Fallaux (*Chasselas de Negrepont, Chasselas Rose Jalabert*).—A very good table and wine Grape. Bunches medium sized, long, and compact. Berries large, round, somewhat flattened, with a tough pale red skin. Flesh juicy, sweet, with a slight but distinct Muscat flavour. Ripens about mid-season, and is a great bearer.

Chasselas Royal.—An excellent table Grape of English origin, suitable also for wine. Bunches medium sized, thick, and short, with shoulders. Berries large, round, with a pale amber skin. Flesh juicy and richly flavoured. Ripens about mid-season, and is very prolific.

Chasselas Vibert.—An early table and wine Grape belonging to the Sweetwater section. Bunches medium sized, long, cylindrical, and well set. Berries large, round, with a thin pale amber skin. Flesh tender, juicy, sweet, and well flavoured. Ripens several days before Golden Chasselas, is very hardy and prolific.

Cinsaut.—This variety is very similar to *Ulliade*, if not identical with it.

Citron Frontignan (*Muscat Citronelle*).—An excellent French table and wine Grape. Bunches small and cylindrical. Berries medium sized, quite round, with a tender greenish-white skin covered with a thin bloom. Flesh firm, very juicy, with a Frontignan aroma and distinct Citron flavour. Ripens at mid-season, and bears freely.

Clairette (*Blanquette*).—A hardy and prolific French variety. Bunches medium sized. Berries pale green, small, oval. Flesh juicy and well flavoured. An excellent and popular wine Grape in France, and also a good table variety. Ripens rather late, and keeps well.

Cornichon (*Finger Grape, White Cucumber, Bec d'Oiseau*).—The common name of this variety is derived from the peculiar shape of the berries. Bunches medium sized, round, and loose. Berries very long, tapering at both ends. There are two varieties, one with green and the other with reddish berries. Flesh firm, juicy, and pleasant, and a thick skin covered with a grey bloom. Ripens very late, and is useful on that account as a dessert Grape.

Dolcetto (*Bignona, Nebbiola*).—A hardy and useful Italian variety. Bunches medium sized, pyramidal, and long. Berries medium sized, black, with a rich bloom, and thick skin. Flesh juicy, with a pleasant vinous flavour. Ripens medium early, is very prolific, and makes a good red wine.

Doradillo (*Jean Blanc, Plateado, Plateadillo*).—A useful Spanish Grape. Bunches large, conical, and shouldered. Berries large, oval, pale amber, and thin skinned. Flesh firm, sweet, and richly flavoured. Ripens late, is very prolific, a fine dessert Grape, and makes a good light wine.

Duchess of Buccleugh.—A first-class English table Grape, said to have originated between Chasselas Musqué and Muscat of Alexandria. Bunches large, long, tapering, well set, and shouldered. Berries medium sized or over, round, yellowish, with a grey bloom. Flesh tender, juicy,

with a rich Muscat flavour. Hardy, prolific, and ripens about mid-season.

Duke of Buccleugh.—An excellent English table Grape. Bunches well formed, large, compact, with broad shoulders. Berries very large, round, of a deep amber. Flesh juicy, with a flavour somewhat similar to the Black Hamburgh. Ripens rather early, and is one of the largest-berried white Grapes.

Dutch Sweetwater (*Perle Blanche*).—An old, well-known, and useful early variety. Bunches above medium size, shouldered, loose. Berries large, but some badly developed, pale green, covered with a grey bloom. Flesh tender, very juicy, and well flavoured. Ripens early, a good dessert Grape, and makes a fair light wine.

Early Ascot Frontignan (*Muscat Frontignan*).—A good early table Grape. A seedling from Muscat Hatif de Saumer, crossed with Chasselas de Musqué. Bunches medium sized and well shouldered. Berries medium sized, round, deep amber. Flesh firm, juicy, with a Muscat flavour. Ripens medium well.

Early Black Frontignan (*Muscat Précoce d'Aout*).—A highly-flavoured early French Grape. Bunches medium-sized, compact. Berries black, medium sized, and round. Flesh juicy, sweet, with a rich Muscat flavour. Ripens very early, is a good dessert and also a wine Grape.

Early Black July (*Black July, July Grape, Madeleine Noir, Morillon Hatif, Raisin Précoce*).—A very early French Grape, and chiefly valued on that account. Bunches small and cylindrical. Berries black, with a thick bloom, small, and round. Flesh juicy, but not highly flavoured. Ripens very early, is a saleable table Grape, and makes a good light wine.

Early Malingre (*Madeleine Blanche de Malingre, Précoce de Malingre, Précoce Blanc*).—A very early French white Grape which comes in about the same time as the Early Black July. Bunches medium sized, somewhat loose. Berries yellowish-green, medium sized, roundish-oval. Flesh juicy, but not highly flavoured. Valuable as a table Grape from its earliness only, and makes a fair light wine.

Early White Malvasia (*Grove End Sweetwater, Early Leipzic, Early Chasselas, Early Keinzheim, Mornas Chasselas, White Melior*).—A useful early Grape of the Chasselas class. Bunches medium size or over, loose, tapering, and occasionally shouldered. Berries, thin skinned, greenish-yellow, and round. Flesh juicy, sweet, and well flavoured. Ripens early, is a good table Grape, and makes a light wine of good quality.

Esperione (*Aspiran, Espiran, Turner's Black, Verdai*).—A good French wine Grape, and also an excellent table variety. Bunches large and shouldered. Berries large, purplish-black, with a thick bloom, and round. Flesh rather firm, juicy, and fairly well flavoured. Ripens about mid-season, and is a good bearer.

Fintindo.—An Italian Grape belonging to the Black Hamburgh class, but ripens some days earlier. Bunches large, compact, and shouldered. Berries large, round to slightly oval, reddish-black. Flesh juicy, sweet, and well flavoured. A useful table Grape, and will make a good light wine.

Folle Blanc (*Picpouille Blanc, Plant Madame*).—A white Grape largely used in France for making brandy. Bunch medium sized and close. Berries medium size, round, light green. Makes a somewhat poor wine which is mostly used for blending with stronger kinds. Plant robust and prolific.

Frontignan (*Frontignac, Muscat Frontignan, Muscat*).—Several varieties are included under the names of *Frontignan* or *Muscat*, all of them possessing a peculiarly rich musky flavour. They differ only in colour, and have medium sized, compact, cylindrical bunches. Berries round, medium sized, thin skinned, juicy, and highly flavoured. See *Black, Red*, and *White Frontignan.*

Furmint, (*Formint, Tokay*).—A Hungarian variety, and the kind used chiefly in the production of the celebrated Tokay wine. Bunches small to medium size. Berries golden yellow, round, rather small, and often without seeds. Flesh juicy and sweet. Ripens at mid-season.

Gamay.—A wine Grape extensively cultivated in the vineyards of France. Bunches medium sized and compact. Berries black, with a blue bloom, medium sized, round to slightly oval. Flesh juicy, but low flavoured. Ripens about mid season, very hardy and prolific. There are several sub-varieties which do not differ materially, and all yield wine of comparatively low quality as a rule, though under specially favourable conditions better results are sometimes attained.

Gouais (*Burger Blanc, Ebling*).—This variety is also extensively cultivated in French vineyards. Bunches medium sized and compact. Berries yellowish-green, thin skinned, rather large, and round. Flesh juicy, but poor in flavour. Ripens about mid-season, and is a very great bearer. Makes a wine of poor quality, but useful for blending with kinds that have an excess of tannin.

Golden Chasselas (*Amber Muscadine, Amiens, Chasselas Blanc, Chasselas Doré, Chasselas de Fontainebleau, Royal Muscadine*).—This is one of the finest and best Grapes belonging to the Chasselas section. Bunches large, compact, and shouldered. Berries thin skinned, pale amber, large, round, inclining to oval. Flesh tender, juicy, and very highly flavoured. Ripens at mid-season, is hardy and prolific. A first-class and popular dessert Grape, and makes an excellent strong wine.

Golden Champion.—An English table Grape of excellent quality. Bunches large, well shouldered, and tapering. Berries deep amber, very large, ovate to round. Flesh firm, juicy, and highly flavoured. Ripens medium early, hardy, strong, and prolific.

Golden Hamburgh.—A first-class English table variety. Bunches large, shouldered, loose, and branching. Berries thin skinned, pale yellow, large, and oval. Flesh tender, very juicy, sugary, and richly flavoured. Ripens at mid-season, and bears freely.

Grenache (*Roussilon*).—An excellent and popular French wine Grape, which is extensively cultivated in the vineyards of Southern Europe. Bunches large and compact. Berries thin skinned, red, with a grey bloom, medium sized, round, inclining to oval. Flesh juicy and well flavoured. Ripens about mid-season, bears freely, and yields a strong

rich wine. There is also a white sub-variety, which differs only in the colour of the skin.

Gros Colman.—A showy black English table variety. Bunches very large, round, and compact. Berries of an unusual size, being often as large as small plums, thick skinned, purplish-black, and round. Flesh very juicy, sweet, but not highly flavoured. Ripens after mid-season.

Gros Guillaume (*Pennington Hall Hamburgh, Seacliffe Black*).—An excellent table Grape, which sometimes passes under the names of Barbarossa and St. Peter's, but incorrectly. Bunches very large, shouldered, compact, and tapering. Berries large, round, inclining to oval, deep black, with a thin bloom. Skin tough but not thick. Flesh tender, juicy, and well flavoured. Ripens very late, will hang for some time after it is ripe, and bunches may be kept for several weeks. Improves in flavour after being kept a while. Being tough skinned it packs and carries well, and is a good market Grape.

Gros Maroc (*Marocain*).—A very good French table Grape. Bunches large, long, and shouldered. Berries reddish-purple, with a heavy bloom, thick skinned, large and oval. Flesh tender, juicy, and richly flavoured. Ripens about the same time as the Black Hamburgh, is hardy and prolific.

Ingram's Hardy Prolific.—An excellent free-bearing table Grape of English origin. Bunches large, long, tapering, without shoulders. Berries medium sized, well set, black, with a blue bloom, and perfectly oval. Flesh rather firm, juicy, sweet, and richly flavoured, with a slight Muscat aroma. Ripens at mid-season, and is remarkably prolific.

Jura Black Muscat (*Muscat Noir de Jura*).—A very good table Grape. Bunches medium sized, long, and tapering, with slight shoulders. Berries purplish-black, with a thin bloom, above medium sized, and oval. Flesh tender, very juicy, with a rich flavour and slight Muscat aroma. Ripens at mid-season, and a prolific bearer.

Lady Downe's (*Lady Downe's Seedling*).—A valuable late table Grape of English origin, raised from the Black Morocco, fertilized with a Chasselas. Bunches large, rather loose, and shouldered. Berries above medium size, black, thick skinned, and roundish-oval. Flesh firm, juicy, sweet, rich, with a faint trace of Muscat in the flavour. Ripens late, will hang a long time without shrivelling, of vigorous habit, and a free bearer.

Madresfield Court Black Muscat.—An excellent and popular English table Grape. Bunches large and long. Berries large, bluish-black, and oval. Flesh juicy, sweet, and highly flavoured. Ripens late, hangs well, is hardy and prolific.

Malaga.—This name is applied to several varieties, some of which differ widely in appearance and flavour. It is one of the synonyms for the *Muscat of Alexandria.* See *Red* and *White Malaga.*

Malbeck.—A popular French red wine Grape, which is extensively cultivated in French, German, and Swiss vineyards. Bunches large, branched, and somewhat loose. Berries above medium size, red, with a violet bloom, and round. Flesh juicy, and fairly well flavoured. Ripens about mid-season, is hardy, and generally bears freely. Largely used in making French Claret wine.

Malvasia (*Malvosie*).—Several varieties are known under this name which differ only in colour. They are in flavour somewhat similar to the Frontignan class, and make a rich sweet wine. See *Black Malvasia.*

Marsanne.—A French variety very similar in appearance and quality to the *White Hermitage*, but has somewhat smaller berries, which are thicker skinned.

Mataro (*Catalan*, *Esparte*, *Lambruscat*, *Mourvédre*).—A red wine Grape supposed to be of Spanish origin, which is popular, and grown to a large extent in Southern Europe. Bunches medium sized, closely set, with light shoulders. Berries medium sized, black, with a thick bloom, and round. Flesh juicy, but not well flavoured. Ripens rather late, is very hardy, and a great bearer. Makes a very good wine.

Merlot (*Plant Medoc*).—A popular French variety which is hardy, strong in habit, and very prolific. Bunch medium sized, long, and conical. Berries bluish-black, small, and round. Makes an excellent light wine of the Claret class. Ripens medium early, and a good variety for cool districts.

Miller's Burgundy (*Fromenté*, *Meunier*, *Miller Grape*, *Morillon Taconné*, *Pinot Meunier*).—A good and popular French wine variety, and is also an excellent table Grape. Bunches medium sized, short, and compact. Berries rather small, thin skinned, black, with a blue bloom, and round, inclining to oval. Flesh tender, juicy, sweet, and highly flavoured. Ripens after mid-season, is hardy and prolific. Extensively cultivated in France as a wine Grape. It is distinguished from other kinds by its white downy leaves, and hence it has obtained the name of Miller Grape.

Mondeuse (*Maldoux*, *Monteuse*, *Persaigne*, *Savoyanne*).—A hardy French Grape that will thrive in almost any soil, and is very prolific. Bunches medium sized or larger. Berries blue-black, medium sized, slightly oval. Flesh juicy and somewhat acid. Ripens medium late, and in France is a favourite Claret Grape. There is a white variety known as *Mondeuse Blanc* which differs only in the colour of the fruit.

Morrastel (*Mourrastel*, *Perpignan*).—This variety is almost, if not quite, identical with the *Mataro.*

Morrillon.—Several varieties are known under this name, which differ but little except in the colour of the fruit. See *Black Cluster*, *Miller's Burgundy*, and *Pinot Blanc Chardonay.* The *Morrillon* varieties are largely used in making Champagne.

Mourisco.—An excellent Portuguese variety. Bunches large and pyramidal. Berries large, black, oval, and well flavoured. Flesh juicy and sweet. Makes a rich strong wine, and is also a good table Grape.

Mrs. Pince's Black Muscat.—An excellent English table Grape. Bunches, large, shouldered, well set, and tapering. Berries medium sized, purplish-black, with a thin bloom, perfectly oval, with thick tough skins. Flesh rather firm, sweet, moderately juicy, with a rich Muscat flavour. Ripens late, will hang well, is very hardy, and bears freely. Makes good raisins.

Muscat de Saumer (*Early Saumer Frontignan*, *Muscat Hatif de Saumer*, *Précoce Musqué*).—A good early table Grape, ripening about

the same time as the Early Black July, from which it was raised. Bunches small, shouldered, and very compact. Berries medium sized thin skinned, pale green, with an amber tinge, round, sometimes flattened. Flesh firm. juicy, sweet, with a rich and distinct Muscat flavour, very early, and bears freely.

Muscat of Alexandria (*Alexandrian Muscat, Charlesworth Tokay, Muscat Escholata, Muscat Gordo Blanco, Muscat Grec, Muscat of Jerusalem, Muscat Romaine, Tottenham Park Muscat*).—A well-known and popular table and raisin Grape, which is supposed to have originated in Western Asia. Bunches large, long, shouldered, and loose. Berries pale amber, thick skinned, mostly large, but often irregular in size. Flesh firm, not very juicy, but very sweet and richly flavoured. Ripens after mid-season, hangs well, is vigorous in habit, and bears freely in the warmer districts, but not so well in the cooler regions, where the bunches are more irregular. One of our best raisin Grapes, and has been planted extensively during the last few years in Australia. Makes also a fairly good but somewhat strong wine. Some people are under the impression that Muscat Gordo Blanco is a distinct variety. but this is not the case

Muscat Hamburgh (*Black Muscat of Alexandria, Red Muscat of Alexandria, Snow's Muscat Hamburgh*).—A very highly flavoured English table Grape. Bunches large, shouldered, and loose. Berries large, but often irregular in size, deep black, with a blue bloom, tough, but not thick skinned, roundish-oval to oval. Flesh very juicy, sweet, with a peculiarly rich Muscat flavour. Ripens rather late, and sets best in the warmer districts. The richest flavoured of all the Muscat Grapes.

Palomina Blanche (*Listan*).—A good Spanish variety somewhat similar in appearance to the *Golden Chasselas*. Bunch medium to large, and cylindrical. Berries medium sized, oval, and in colour a rich amber. Makes an excellent wine, and is also a useful table Grape.

Panse Jaune (*Grosse Panse, Raisin de Panse*).—A Spanish variety largely grown in the Malaga province for making raisins. Bunch large, long, and tapering. Berries thick skinned, amber, transparent, large oval, with a thick bloom. Flesh firm, sweet, and well flavoured. A good raisin and table Grape, but is somewhat uncertain except in medium warm districts. Somewhat similar in appearance to the *Muscat of Alexandria*.

Parsley-leaved Chasselas (*Ciotat, Malmsey. Muscadine, Raisin d'Autriche*).—An excellent and prolific variety with fruit very similar to the Golden Chasselas, and ripens about the same time. Foliage peculiar, somewhat like the leaves of parsley, hence the name. Makes a rich wine.

Pedro Ximenes.—A largely cultivated and popular Spanish wine Grape. Bunches medium sized, shouldered, long, and conical. Berries medium sized, thin skinned, pale amber, and oblong. Flesh juicy, sweet, and well flavoured. Ripens after mid-season, makes strong growth, and bears freely. Makes a full-bodied wine.

Pinot.—Several excellent French wine Grapes are classed under the name of *Pinot* which, in some cases, is interchangeable with *Burgundy* and *Morrillon*. See *Black Cluster, Miller's Burgundy*, and *White Burgundy*.

Pinot Blanc Chardonay (*Auvergnat, Epinette, Morrillon Blanc, Plant Doré*).—An excellent sub-variety of the *White Burgundy*, which it resembles to a great extent, but differs somewhat in foliage, and is considered superior by many growers. This variety is used to a large extent in France in making Chablis wine.

Pinot Gris (*Auvergnat Gris, Beurot, Fromentot*).—A popular variety with fruit similar in size. form, and quality to *Miller's Burgundy*, but the berries are of a reddish-pink colour instead of being black.

Pulsart (*Blussart, Mescle, Plant d'Arbois Poulsart*).—This is a vigorous French variety. Bunch medium size, long, shouldered, loose. Berries dark, thin skinned, medium sized. oval. Flesh juicy and fairly well flavoured. Ripens at mid-season, and makes an excellent wine.

Purple Constantia (*Black Constantia, Purple Frontignan, Violet Frontignan*).—A first-class table Grape, and also makes an excellent full-bodied wine. Bunches large, long, and tapering, with small shoulders. Berries dark purple, with a blue bloom, large. and round. Flesh juicy, sweet, with a rich Muscat flavour. Ripens about mid-season, and bears freely.

Raisin des Dames (*Ladies' Raisin*).—A very good French table and raisin Grape somewhat similar to the Muscat of Alexandria, but with paler berries. Bunches large, shouldered, and rather loose. Berries pale yellow, thick skinned, large, and oval. Flesh firm, juicy, sweet, and rich. Ripens after mid-season, hangs well, and bears freely.

Red Chasselas (*Chasselas Rouge, Red Muscadine*).—A good French Grape, suitable either for the table or wine. Bunches medium sized, loose, and shouldered. Berries thin skinned, red, medium sized, and round. Flesh very juicy and well flavoured. Ripens at mid-season, and is a great bearer. Makes a good light wine.

Red Frontignan (*Grizzly Frontignan, Muscat Gris, Muscat Rouge, Red Muscat*).—A highly flavoured French wine Grape, but may also be used as a table variety. Bunches medium sized, and generally cylindrical, with small shoulders. Berries medium sized, skin thick, pale red, and round. Flesh rather firm, juicy, sweet, with a rich Muscat flavour. Ripens about mid-season, and does best in warm districts. Makes a strong full-bodied wine.

Red Hermitage (*Shiraz, Schiraz*).—A very popular and excellent wine Grape, said to have been originally obtained from Persia. Bunches medium sized, long, and compact. Berries rather small, bluish-black, rather thick skinned, and oval. Flesh juicy and well flavoured. Ripens after mid-season, is verp hardy. bears freely and regularly. Extensively grown in France, where it forms the base of the celebrated Hermitage wines, and is widely cultivated in Australia.

Red Malaga.—This variety, which is known in some parts of Australia simply as *Malaga*, is of somewhat uncertain origin. Bunches large, shouldered, and loose. Berries large, oval, dull red, thick skinned. Flesh firm, sweet, and well flavoured. A good raisin Grape, and excellent table variety, and as it packs and carries well, a

suitable kind for export. Ripens after mid-season, and may be kept for a considerable time.

Red Prince.—A very useful and showy table Grape. Bunches very large, long, and well shouldered. Berries large, brownish-red, round to roundish-oval. Flesh juicy, tender, and pleasantly flavoured. Ripens after mid-season, is very hardy, and bears freely. Makes a fairly good light wine.

Riesling (*White Riesling*).—A well-known and excellent German wine Grape. Bunches medium sized and compact. Berries thin skinned, amber green, rather small, round to oblate, and closely set. Flesh tender, sweet, and very juicy. Ripens after mid-season, is very hardy and prolific. A favourite variety in France and Germany for Hock wines, and popular with Australian cultivators.

Royal Ascot.—An excellent English table Grape. Bunches medium sized or over, compact, with shoulders. Berries black, with a thick bloom, medium sized, round to oval. Flesh rather firm, juicy, with a flavour somewhat similar to Black Hamburgh. Ripens at mid-season, is hardy and prolific.

Royal Vineyard.—A first-class late English table Grape. Bunches large, well set, and generally long and tapering. Berries large, pale amber, thin skinned and transparent, roundish-oval. Flesh firm, crackling, sweet, and highly flavoured. Ripens very late, hangs well, and bears freely. Might prove a good raisin Grape in the warm districts.

Semillon Blanc (*Chevrier, Columbier, Goulu Blanc*).—An excellent and popular French wine Grape somewhat similar in appearance and quality to the *White Sauvignon*, but preferred by some growers as being more prolific. Bunch medium sized and close. Berries medium large, round, yellowish-green, thin skinned. Flesh juicy and pleasant. A leading variety for Sauterne wine.

Shepherd's Riesling.—A fine sub-variety of the Riesling which is superior to the ordinary kind in having larger and better flavoured Grapes. The bunches are also finer. Ripens same time as the Riesling, and is a first-class wine Grape, and fairly good for the table.

Sherry (*Xeres*).—A Spanish Grape. Bunches compact, very large, being often from four to six pounds in weight with ordinary treatment. Berries yellowish-green, thin skinned, large, round, and closely set. Flesh juicy, sweet, and well flavoured. Ripens about mid-season, is very hardy and a prolific bearer, but suffers much from wet weather. A fairly good table Grape, and excellent for wine.

Sweetwater (*Chasselas Royal, Early Sweetwater, White Muscadine*).—An old, well-known, and popular Grape. Bunches medium sized, compact, and regular. Berries yellowish-green, medium sized, and round. Flesh juicy and sweet, but not very highly flavoured. Ripens medium early, is very hardy and prolific. A very good table Grape, and makes an excellent wine.

Syrian (*Jews, Palestine*).—An excellent late Grape from Western Asia, and said to be the kind mentioned in the Bible as being brought by the Israelites from the land of Canaan, the bunches of which

were so large that two men were required to carry them. Bunches very large, conical, and broad shouldered. Berries thick skinned, tawny-yellow, large, and oval. Flesh firm, crackling, moderately juicy, and highly flavoured. Ripens late, hangs well, and bears abundantly. Would probably prove a good raisin Grape in the warm districts. Bunches are commonly from six to ten pounds in weight, and have in England been grown over twenty pounds, the bunch measuring over twenty-one inches in length, with shoulders nineteen and a-half inches across.

Terret.—Several sub-varieties pass under this name that differ only in the colour of the fruit, which is respectively black, white, and red. Bunches large and conical. Berries large, oblong. Flesh juicy and well flavoured. All the kinds make a good light wine.

Thompson's Seedless.—A Grape is cultivated under this name in America to some extent, but there appears to be some doubt as to whether it is a distinct variety or merely a form of the *White Corinth* (*Sultana*). It is said to have been introduced to America from Turkey, and is described as being very similar to the *Sultana*, but to have longer bunches, and to be somewhat sweeter. This Grape is also said to make a raisin equal in quality to the *Sultana*, and to be very prolific.

Tinto (*Tinturier*).—A hardy wine variety, and one of the few Grapes that yield a red juice. Bunches small and compact. Berries red, small, and round. Flesh very juicy and low flavoured. Ripens after mid-season, a moderately good bearer, and does fairly well in the cooler regions. Makes a wine of rather low quality.

Traminer (*Fromente, Rouselet*).—An excellent German wine variety. Bunch medium size, conical. Berries medium sized, ovoid, light red. Flesh juicy and slightly acid. Hardy and prolific. Makes a good wine of the Hock class.

Trebbiano (*Erbalus, Maccabeo, Trebbiano Bianco, Trebbiano Vero, Ugni Blanc*).—An excellent late Italian table Grape. Bunches very large, broad shouldered, and well set. Berries yellowish-green, thick skinned, medium sized, and oval to round. Flesh firm, crackling, sweet, and richly flavoured. Ripens very late, hangs well, and an excellent bearer. Might prove a serviceable raisin Grape in the warmer districts.

Trentham Black.—An excellent table Grape. Bunches very large, well shouldered, and tapering. Berries black, with a thin bloom, large, and oval. Flesh melting, very juicy, sweet, and richly flavoured. Ripens at the same time as the Black Hamburgh, but will hang much longer. Hardy, vigorous, and a good bearer.

Trovêren Frontignan (*Trovêren, Muscat Trovêren*).—A French variety somewhat similar to the White Frontignan, but with finer bunches and berries. Bunches large, well set, and compact. Berries pale amber, large, and round. Flesh firm, juicy, with a rich mild Muscat flavour. Ripens about mid-season, and is fairly prolific. A good table Grape, and makes a rich full-bodied wine.

Ulliade (*Boudales, Œillade, Prunelas, Ulliade Noir*).—A very good and useful table variety and an excellent wine Grape. Bunches rather

large, loose, and shouldered. Berries purple-black, thin skinned, large, and roundish-oval. Flesh firm, juicy, and well flavoured. Ripens about mid-season, is very hardy, and an excellent bearer.

Verdal (*Aspiran Blanc*).— A late wine Grape of French origin which is both hardy and productive. Bunch medium size, short, and heavily shouldered. Berries medium size, slightly oval, thick skinned, yellowish-green. Flesh juicy and not very sweet. Makes a light wine of high quality, and is also a good table Grape.

Verdeilho (*Madeira Wine Grape*).—A well-known and popular wine Grape. Bunches medium sized or under, compact, and well set. Berries thick skinned, yellowish green, below medium size, sometimes unequal, and roundish-oval. Ripens about mid-season, and is a moderately good bearer. This Grape is extensively cultivated in the south of Europe, where it forms the base of the celebrated Madeira wine. It is also grown to some extent in Australia, and has the character of being very subject to the oidium.

Verdot.—A popular French variety, and one of the principal Claret Grapes. It belongs to the *Cabernet* section, and is very similar in appearance and quality to the *Sauvignon* variety, but is considered to be somewhat inferior in bouquet. Bunch somewhat smaller than *Cabernet.* Berries round, black, thick skinned, small, with rather large seeds. Flesh juicy and vinous. Ripens medium late, and a free bearer.

Waltham Cross.—A first-class English table Grape. Bunches very large, long, tapering, and well shouldered. Berries pale amber-yellow, very large, oblong-oval. Flesh firm, solid, and richly flavoured. Ripens rather late, hangs well, and bears freely. Might prove a good raisin Grape in the warmer districts.

Wantage (*Flame-coloured Tokay, Lombardy, Red Rhenish, Red Taurida*).—A very hardy and prolific Grape. Bunches very large, closely set, and well shouldered. Berries pale red, large, and round. Flesh juicy, sweet, and fairly well flavoured. Ripens at mid-season, is robust and very prolific.

West's St. Peter's (*Black Lombardy, Poonah, Raisin des Carmes, Raisin de Cuba*).—An excellent and handsome late table Grape. Bunches large, well shouldered, and tapering. Berries deep black, with a heavy bloom, large, and roundish-oval. Flesh tender, very juicy, with a fine rich flavour. Ripens very late, hangs well, is robust, hardy, and bears heavy crops

White Burgundy (*Pinot Blanc*).—A good French wine Grape, and one of the best in its class. Bunches small to medium sized, compact, and cylindrical. Berries yellowish-green, small, roundish-oval. Flesh juicy and moderately sweet. Ripens medium early, is hardy and prolific. Very popular as a wine Grape in France, and cultivated to some extent in Australia.

White Corinth (*Corinthe Blanc, Stoneless Round-berried, Sultana, White Currant, White Kishmish*).—A highly-flavoured seedless Grape that yields the Sultana raisins. Bunches small, shouldered, and loose. Berries pale amber, rather small, and round. Flesh firm, moderately juicy, and highly flavoured. Ripens at mid-season, is very strong in

habit, and bears heavy crops. A profitable Grape for the warmer districts, but requires plenty of room for growth, and must be pruned long.

White Frontignan (*Muscat Blanc*, *Raisin de Frontignan*, *White Constantia*, *White Muscat*).—Bunches medium sized, without shoulders, compact, and cylindrical. Berries yellowish-green, medium sized, and round. Flesh rather firm, juicy, sweet, with a rich Muscat flavour. Ripens about mid-season, and is an abundant bearer. A good table Grape, and makes a strong full-bodied wine.

White Hermitage (*Roussanne*).—A favourite French wine Grape. Bunches medium sized and compact. Berries thick skinned, deep amber, small, and round. Flesh juicy, with a vinous flavour. Ripens about mid-season, is hardy and very prolific. Cultivated to a large extent in European vineyards, and is popular with many growers in Australia. Makes a high-class wine.

White Lisbon (*White Hamburgh*, *White Portugal*, *White Raisin*).—A showy white table Grape. Bunches large and somewhat loose. Berries yellowish-white, large, and oval. Flesh firm, crackling, not very juicy, sweet, and well flavoured. Ripens late, will hang for a long time, and keeps well. Hardy, vigorons, and prolific. A good table Grape, and can be dried for raisins. This Grape is exported fresh in large quantities from Portugal to England and other parts of Europe, and the supplies extend for several months.

White Malaga.—An excellent Spanish table and raisin Grape. Bunch large, loose, and well shouldered. Berry very large, oval, thick skinned, yellowish-green. Flesh firm, sweet, and richly flavoured. Plant strong and prolific in medium warm districts. Ripens rather late, bears packing and carriage well, and suitable for exporting.

White Nice.—A valuable and popular white Grape Bunches very large, well shouldered, and loose. Berries pale amber, tough, but thin skinned, large, and roundish. Flesh rather firm, juicy, sweet, but not very highly flavoured. Ripens about mid-season, is vigorous in habit, and a great bearer. This variety often produces very large bunches, and British gardeners have grown them over twenty pounds in weight.

White Sauvignon (*Sauvignon Blanc*).—An excellent French wine Grape. Bunches rather small and compact. Berries yellowish-green, thin skinned, transparent, medium sized, roundish-oval Flesh juicy and well flavoured. Ripens at mid-season, is hardy, robust, and prolific. Extensively cultivated in France, and makes a choice wine.

White Tokay (*Tokay*).—A vigorous and productive variety of uncertain origin. Bunches medium large, compact, and well shouldered. Berries yellowish-green, medium sized to large, round, thin skinned. Flesh juicy and well flavoured. Makes a good wine and is an excellent table Grape. Ripens medium late.

Wortley Hall.—An excellent and popular table Grape of English origin. Bunches large and showy. Berries large, black. Flesh sweet, juicy, and well flavoured. Ripens about mid-season.

Zinfandel.—A Hungarian variety that has proved to be a serviceable wine Grape in some parts of America, and may prove useful in this part

of the world. Bunches large and shouldered. Berries deep black, medium sized, round. Flesh juicy, and somewhat acid until dead ripe. Makes a strong wine of the Port class.

Table Varieties Suitable for Keeping and Exporting.

Alicante
Black Morocco
Bowood Muscat
Calabrian Raisin
Canon Hall Muscat
Cornichon
Doradillo
Gros Guillaume
Gros Maroc
Lady Downe's
Madresfield Court Black Muscat
Mrs. Pince's Black Muscat
Muscat of Alexandria
Panse Jaune
Raisin des Dames
Red Malaga
Royal Vineyard
Syrian
Trebbiano.
Waltham Cross
White Lisbon
White Malaga

Varieties Suitable for Drying.

Black Corinth (Currant)
Black Morocco
Bowood Muscat
Calabrian Raisin
Canon Hall Muscat
Muscat of Alexandria
Raisin des Dames
Red Malaga
Syrian
Trebbiano
Waltham Cross
White Corinth (Sultana)
White Lisbon
White Malaga

Varieties for the Principal Classes of Wines.

As previously stated, the character of each class of wine depends mainly upon the kind or kinds of Grape from which it is made. The varieties are, in fact, the foundations of the wines, and are absolutely essential. But cultivators must bear in mind that varieties will, more or less, give different results according to the character of climate and soil, for which due allowance must be made. Kinds that yield light wines in the cooler regions will, as a rule, give much stronger ones when grown in warmer districts. The varieties that are chiefly used in producing the light wines of France, Germany, and other parts of Europe will, therefore, not necessarily give the same results in Australasia unless under similar conditions of climate and soil. In Australasia, however, there is such a wide range of climate that suitable regions can be found for producing wines of every class that has made a reputation in Europe. It is also probable that in time other classes of distinct and superior wines will be developed, which will become equally popular with those now in existence. The following list shows the varieties chiefly used in Europe for the different classes of wine :—

Burgundy.—The wine known under this name is made from various kinds belonging to the *Burgundy* or *Pinot* section.

Chablis—*White Burgundy* and kindred varieties.

Claret.—*Cabernet* (all kinds), *Carmenet*, *Clairette*, *Gamay*, *Malbeck*, *Merlot*, *Mondeuse*, and *Verdot*. *Cabernet Sauvignon* and *Malbeck* are the staple varieties used in making the famous Claret of Chateau Lafitte, Chateau Margaux, and other leading brands.

Champagne.—This wine is made from varieties of the *Burgundy* class, which includes the kinds known as *Aucarot*, *Morrillon*, and *Pinot* both dark and white. The black varieties are, however, more generally preferred than the white.

Hermitage.—*Red Hermitage (Schiraz)* and *White Hermitage (Roussanne)*.

Hock.—*Black Hamburgh*, *Black Prince*, *Riesling*, and *Traminer*.

Madeira—*Verdeilho*.

Muscat or *Frontignan.*—The various sub-varieties of the *Frontignan* class, as also other sorts having a strong Muscat flavour.

Port.—*Grenache*, *Mataro*, and *Zinfandel*.

Sauterne.—*Semillon* and *White Sauvignon*.

Sherry.—*Baxter's Sherry*, *Golden Chasselas*, *Mourisca*, *Palomina*, *Pedro Ximenes*, *Sherry*, and *Verdeilho*.

Tokay.—*Furmint* and *White Tokay*.

Varieties of Wine Grapes best Suited for Particular Climates.

Cool Regions.—*Aucarot*, *Burgundy* (varieties), *Cabernet* (varieties), *Carmenet*, *Clairette*, *Gamay*, *Merlot*, *Mondeuse*, *Pulsart*, *Sauvignon*, and *Verdot*.

Cool to Medium Warm Regions.—*Black Hamburgh*, *Carignane*, *Furmint*, *Grenache*, *Malbeck*, *Morrillon* and *Riesling*.

Warm to Medium Warm Regions.—*Aramon*, *Esperione*, *Frontignan*, *Doradillo*, *Malvasia*, *Mataro*, *Morrastel*, *Ulliade*, and *Verdeilho*.

Any Region.—*Baxter's Sherry*, *Chasselas* (varieties), *Gouais*, *Red* and *White Hermitage*.

Varieties of Wine Grapes for Particular Soils

Limestone.—*Burgundy* (varieties), *Malbeck*, *Malvasia*, *Mondeuse*, and *Pulsart*.

Gravelly.—*Cabernet* (varieties), *Carmenet*, *Merlot*, *Sauvignon*, and *Semillon*

Granitic.—*Gamay*, *Grenache*, *Pedro Ximenes*, *Red Hermitage*, *Riesling*, and *White Hermitage*.

Any Kind of Soil.—*Aramon*, *Black Hamburgh*, *Carignane*, *Dolcetto*, *Doradillo*, *Gouais*, *Frontignan*, *Furmint*, *Verdeilho*, and *Verdot*.

All varieties of Grapes will thrive fairly well in loamy or sandy soils of moderate depth, and more especially when resting upon open clay or gravelly sub-soils.

American Species.

American Grapes are quite distinct from the varieties of *Vitis vinifera*,

and are represented by several species, which differ considerably in habit, foliage, form, flavour of the fruit, and in other respects. They are vastly inferior to the European varieties for wine or as table Grapes, and are useless for other purposes. With the exception of a very few varieties, they have a peculiarly strong harsh musky flavour, which is commonly termed "foxy," and, therefore, can never rank upon an equality with other Grapes. Notwithstanding this drawback, however, they are largely cultivated in the United States, chiefly on account of their being more hardy than the varieties of *Vitis vinifera*, and being better able to withstand severe cold weather. The Americans turn them to account for wine to a large extent, but the produce is vastly inferior to that obtained from the European Grapes. There are no great inducements to plant American Grapes in Australasia for their fruit, as a better class will give more satisfactory results. Possibly, however, they might prove serviceable, owing to their hardiness, in some of the colder regions, where the climate is too severe for the choicer kinds. They have within the last few years been introduced to some extent into European vineyards as "Phylloxera-resisting" stocks for varieties of *Vitis vinifera*. It must be understood that the American species are by no means proof against this destructive Grape pest, but, on the other hand, they are much affected by it. They have, however, the power of being able to bear the attacks of "Phylloxera" without receiving radical injury. In this part of the world we shall probably also have to make use of these resistant stocks in the future, and cultivators should turn their attention to them. There are many species of American Grapes, and some of these have numerous varieties, more or less cultivated in the United States, but a limited selection of those that are most prominent and distinct will be sufficient for practical purposes.

Vitis Æstivalis (*Summer Grape*(.—A hardy and fairly strong species, embracing numerous varieties, producing variable bunches of small thin skinned berries. Flavour less harsh and "foxy" than most other kinds. It is widely distributed through the eastern and central regions of the United States. The more prominent varieties are Black July, Box Grape, Missouri, Birdseye, Norton's Virginia, and Warren.

Vitis Arizonica. –A strong hardy species indigenous to Arizonica, and extending to California. Bunches small. Berries small, and have a fairly pleasant flavour. Said to be a useful stock for *Vitis vinifera*, but can only with certainty be raised from seed, as cuttings are difficult to root.

Vitis Berlandieri.—A robust species said to furnish a good stock for the ordinary varieties. Bunches small and close. Berries black, round, with a rather sharp flavour.

Vitis Californica.—A Californian species which appears to be closely allied to *Vitis Arizonica*.

Vitis Candicans (*Mustang Grape*).—A strong growing species that bears freely, but the bunches are small. Berries large, black, with a harsh unpleasant flavour. It is indigenous to Florida and Texas, and flourishes in a warm dry climate.

Vitis Cinerea.—A vigorous spreading species, bearing small bunches.

Berries small, black, with a sharp acid flavour. This species, which has an affiinity with *Vitis Arizonica*, is indigenous to the regions of the Middle and Lower Mississippi.

Vitis Cordifolia (*Chicken Grape*, *Frost Grape*, *Winter Grape*).—A very strong growing species, bearing small bunches. Berries small, black to amber, and sharply acid. Ripens very late. Found from Canada to Florida.

Vitis Labrusca (*Fox Grape*).—This species embraces a large number of varieties, several of which rank among the best sorts of American Grapes. The varieties differ considerably in the size and form of the bunches and colour of the fruit. The general characteristics, however, are medium to large bunches, tough thick skins, with pulpy berries, having a strong musky flavour. Growth less vigorous than some other species, but fairly robust. One variety, the Isabella, is the best-known American Grape in Australasia, where it has been cultivated for at least a quarter of a century to the writer's knowledge. It is very hardy, productive, and often bears a good second crop. The bunches are medium sized, and the berries purple-black, large, oval, and having a flavour similar to the Black Currant. Ripens at midseason, makes a moderately good wine, and is excellent for jam or jelly. Among the other varieties the most notewothy are Catawba and Concord, both of which are popular in America. Widely distributed from Canada to Florida.

Vitis Riparia (*River Grape*, *Sand Grape*).—This species includes several varieties that are popular American Grapes. The characteristics of the species are a slender but widely spreading growth, with small bunches and berries, and tough sharply acid pulp. As a matter of course, however, the varieties differ to some extent. The more prominent varieties are Clinton and Taylor. Indigenous to the northern and central regions of the United States to the Rocky Mountains.

Vitis Rubra (*Cat Vine*).—A robust species bearing small bunches of rather insipid Grapes. Indigenous to Illinois and adjoining States, and grows naturally upon deep alluvial soils that border rivers or creeks.

Vitis Rupestris (*Rock Grape*, *Sugar Grape*).—An inferior species, and a light and irregular bearer. Bunches and berries small, with a harsh flavour. Indigenous to the region from Missouri to Texas.

Vitis Vulpina (*Vitis Rotundifolia*, *Bullace Grape*, *Bullet Grape.*)—A very vigorous and distinct species, which is peculiar to the Southern United States. The principal variety is the Scuppernong, which has a strong growth, and is found in its native habitat climbing to the tops of tall trees. It differs from any other kind of Grape in bearing its fruit upon older instead of the young wood. Bunches small and loose, with from four to six berries upon each. Berries large, round, dark red, and thick skinned. Flesh pulpy, with a strong aromatic flavour. Plant very hardy and a free bearer, but will not thrive in a cold region.

Hybrid varieties.—A large number of hybrid varieties have been raised in America by crossing the native Grapes with *Vitis vinifera* Some of these are of fairly good quality, but none are of sufficient value to be worthy of cultivation in Australasia, as European varieties will give far better results.

Australian Species.

Several species of *Vitis* are indigenous to Australia that yield edible fruits, which, however, are vastly inferior to the European or even American kinds. Possibly they might be improved by cultivation, and several are worthy of attention as ornamental plants. Baron von Mueller in his *Select Extra Tropical Plants*, directs attention to several species.

Vitis acetosa.—An evergreen species of somewhat herbaceous habit indigenous to Carpentaria and Arnheim's Land. Berries from purple to black, not large, edible. Plant vigorous, but suffers from slight frosts, and is only suitable for warm regions. The whole plant is pervaded with acidity, and the leaves have proved useful in cases of scurvy.

Vitis Baudiniana (*Cissus antartica*, *Vitis antartica*).—A robust, woody, evergreen, climbing species indigenous to Eastern Australia as far south as Gippsland. Berries globular, small, black, edible, and produced freely.

Vitis hypoglauca (*Cissus australasica*, *Gippsland Grape*, *Native Grape*). —A very strong evergreen climbing species which attains a great size with age. It is found in Eastern Australia from Queensland as far south as Gippsland. The fruit is black, and the size of small Cherries.

Vitis opaca (*Burdekin Vine*, *Cissus opaca*).—An evergreen species indigenous to Queensland. Berries juicy, but somewhat pungent. This species has large tuberous roots. like yams, which are eaten when boiled.

Other Species.

There are several Asiatic and African species of *Vitis* which yield edible Grapes, and many of these may, if fairly tried, prove serviceable in the tropical portions of Australia. Baron von Mueller recommends trials of the following:—*Vitis indica*, a species with small edible berries indigenous to mountain districts in Ceylon and India; *Vitis Blumeana*, *Vitis lævigata*, *Vitis mutabilis*, *and Vitis thyrsiflora*, species from the mountain districts of Java, with palatable berries as large as small Cherries; *Vitis imperialis*, from Borneo; *Vitis auriculata* and *Vitis elongata*, from the mountain regions of Coromandel, each producing large juicy berries; *Vitis quadrangularis*, a species extending from Arabia to India and Central Africa has also large edible fruits; *Vitis Schimperiana*, an African species extending from Abyssinia to Guinea, with edible berries, said to be similar in appearanc to bunches of *Frontignac* Grapes. Other species might also prove useful acquisitions for the tropical regions of Australia.

GRAPE PEAR.

This is one of the common names for the fruit of *Amelanchier Batrgapium*, a handsome deciduous tree indigenous to North America which attains a height of about thirty feet. It belongs to the Pomea or Apple section of the natural order Rosaceæ. The fruit of this and other species is also known in America as "June Berries," and the tree passes under the name of "Shadbush." This tree is very prolific, and bears in great

abundance small dark purple fruit, which has a pleasant sub-acid taste, and ripens early in the summer. It is a very hardy tree, and will thrive in almost any kind of soil even though it may be of a poor character. Being a native of cool regions it is best adapted for elevated or mountain districts, but it may be grown successfully in moderately cool localities. Several other species yield fruits that are utilized more or less. As the trees are very ornamental when in flower, and the foliage is cheerful, they may be utilized in shrubberies effectively. Propagation may be readily effected by seeds which should be sown in the autumn, covering them an inch and a-half in depth. Plants can be easily obtained from layers, which should be put down before growth begins to start in the spring. Cuttings of the last season's wood will also strike freely if put in early in the spring.

GUAVA.

History and Uses.

The fruit known as Guavas is obtained from various species of the genus *Psidium*, all of them being natives of Central and South America or the West India Islands. According to the botanical dictionaries the scientific name is derived from *Psidion*, the Greek term for the Pomegranate. There are no records as to the origin of the common name Guava. The Guavas belong to the natural order Myrtaceæ, or the Myrtle family, and all are handsome evergreen trees or shrubs, worthy of being cultivated for ornament, irrespective of the value of their fruit. Though the name has been taken from the Greek, the family, as a matter of course, was quite unknown to ancient nations, and was not brought under the notice of European cultivators till long after the discovery of the American continent. They have not received so much attention in the south of Europe, where the conditions are favourable for their growth, as they deserve ; bnt in the West Indies and some parts of South America they are highly appreciated and extensively used in a fresh state and also preserved as jelly.

Guavas are deserving of more attention in Australasia than they receive at the present time, as their fruit is wholesome, and the trees, owing to their compact growth and handsome dark evergreen foliage, may be utilized with advantage in shrubberies. The species yielding useful fruits are numerous, but the hardiness and value of many of these are, as yet, but imperfectly known, and the species generally cultivated are but few. Of these, again, the majority are too tender for cultivation in Victoria, New Zealand, and Tasmania, though they thrive to perfection in the northern colonies. where the summer heat is greater.

Species.

The most desirable species is *Psidium Cattleyanum* (commonly known as the Black, Purple, and Cattley's Guava), a native of South America,

introduced to Europe in 1818. This species is more hardy than any other of the family, as far as is known, and will thrive in any part of Australia where the frosts are not severe. It is very prolific, bears large and certain crops from an early age, the fruit being deep purple berries about an inch long having a pleasant sub-acid flavour which is peculiarly their own. The fruit is cooling and refreshing when eaten fresh, and furnishes a very popular jelly which is greatly in demand. This kind will, under favourable conditions, attain a height of from twelve to fifteen feet, but its growth is somewhat slow, and for some years after it is planted this species may be classed as a shrub. It will bear freely from the height of two feet upwards, and its bright green foliage and compact habit of growth are strong recommendations as an ornamental plant for the pleasure garden.

Psidium pyriferum is the Yellow or White Guava, a species highly prized in the west Indies and other tropical countries, where its fruit is largely used fresh and for jelly. It is, however not sufficiently hardy for cultivation except in the warmer parts of Australia, and it thrives well in Queensland and the northern coast districts of New South Wales and the Northern Territory. The fruit is about the size of a hen's egg, and the pulp varies in colour from cream to reddish according to the variety.

Yellow Guava.

Psidium pomiferum (the Apple or Red Guava) has a fruit somewhat similar in size and shape to the Pomegranate, with reddish flesh and a very sharp acid pulp which renders it unfit for the dessert, though it is excellent when made into jelly. This species is too tender for cultivation except in the warmer parts of Australia. Both this and the previously mentioned species attain the height of from fifteen to twenty feet.

Possibly many other species of Guava will be found suitable for cultivation in Australasia and deserving of attention. Several are commended by Baron von Mueller in his work, "*Select Extra-Tropical Plants.*" They are as follows :—

Psidium acidum.—A native of the higher regions of the Amazon in South America. Fruit pale yellow, the size of a small Apple. Attains a height of about thirty feet.

Psidium Araca.—Extending from the West Indies to Southern Brazil and Peru, and found in high and dry localities. Fruit greenish-yellow, and of high quality.

Psidium arboreum.—A Brazilian species with highly flavoured fruit the size of a large Cherry.

Psidium chrysophyllum.—A South Brazilian species known in its native country under the name of *Guabiroba do Mato.* Fruit the size of a small Cherry, and tree attains a height of about thirty feet.

Psidium cinereum.—Another Brazilian species yielding palatable fruit.

Psidium cordatum.—A species attaining the size of a tree. This is the Spice Guava of the West Indies.

Psidium cuneatum and *Psidium grandifolium* are both robust Brazilian species which bear fruit as large as Cherry Plums.

Psidium incanescens and *Psidium lineatifolium* are shrubby species from Brazil, which attain a height of eight or ten feet. The fruit of both is of good quality, and about the size of a large Cherry.

Psidium malifolium is a species from Uruguay with fruit about an inch in diameter.

Psidium polycarpon.—A small shrubby species from Brazil to Guiana and Trinidad. Produces in great abundance, and almost continuously, highly flavoured yellow berries the size of a large Cherry.

Psidium rufum.—A shrubby hardy species from the mountain regions of Brazil, which attains a height of about ten feet. Fruit the size of a large Cherry, and very palatable.

Cultivation.

The Guava will thrive in any ordinary good land, but the best soil is an open sandy loam, containing a fair proportion of vegetable matter. In preparing the ground, let it be well stirred to the depth of at least fifteen inches unless naturally very light and open, when a simple ploughing or digging will suffice. Drainage must also be provided when necessary, as water stagnating at their roots is very injurious to the plants. The trees may be planted from eighteen to twenty feet apart. During the first two or three years they require some attention in pruning, so as to obtain strong growth in certain directions. After that the trees will require but little pruning, all that is necessary being to regulate the growth when too thick and to stop or remove rank or misplaced shoots.

The ground should be kept as free from weeds as possible, and covered with a mulching before the hot weather sets in. As the trees are strong feeders, care must be taken not to let the soil get impoverished, and a dressing of manure occasionally will be of great assistance. Shelter from strong winds will be of great service to the Guava, as with all other evergreens, and if it does not exist naturally should be provided for by the planting of breakwinds.

Propagation.

Propagation is readily effected by seeds, cuttings, and layers. Seeds grow freely, and the plants usually come true, but about three years will elapse before they are ready for planting out. They may be sown at any time of the year, but autumn or spring is the best. Cover the seed half-an-inch deep. Cuttings of the current season's growth, when the wood is fairly ripe, will strike freely in sand or light soil in a frame or under a hand-glass. Plants can be obtained readily from layers put down early in the autumn or spring.

HACKBERRY.

This is the American name for the fruit of a hardy deciduous tree belonging to the order Urticaceæ, known as *Celtis occidentalis*, which attains a height of from seventy to eighty feet, and is indigenous to the eastern portions of North America. The fruit is also known as the Sugar Berry. The fruit is a small drupe, which has a sweet pleasant flavour. It is a handsome tree, and may be planted to advantage in shrubberies and parks, but it is only suitable for the cooler regions of Australasia. Another species, *Celtis australis*, is the Lotus tree of Southern Europe, North America, and Asia, whose small sweet fruit is largely used. It attains a height of forty or fifty feet, makes a slow growth, but lives to a great age, and in Europe there are trees supposed to be fully a thousand years old. Though called Lotus. this tree must not, however, be confounded with another which passes under the same name (*Ziyyphus Lotus*), which is a species of Jujube. Neither must it be confounded with the sacred Lotus of the ancient Egyptians, which is supposed to be the fruit of an aquatic plant (*Nelumbium speciosum*). *Celtis orientalis*, a small evergreen tree from India, yields a small black fruit that has a sweet pleasant flavour. Trees of this species also exude, in large quantities, an edible gum somewhat similar to that obtained from the Cherry and Plum. This species requires warmer regions than either the Hackberry or Lotus. Other useful species are *Celtis Sellowiana* from Argentina, which grows to the height of about forty feet, and *Celtis sinensis (Celtis Japonica)*, a hardy, deciduous, robust tree, known in Japan as the "Henoki." The fruit of both species is pleasant, but rather small. All the large species yield useful hard-grained wood, which is used to some extent by turners, cabinet makers, and for musical instruments. Propagation in the case of all the species is readily effected by seeds, which should be planted an inch and a-half deep, or layers put down early in the spring.

HANCORNIA.

This is a small evergreen tree belonging to the order Apocynaceæ, or Dogbane family, indigenous to Brazil and other warm regions in South America. Botanically it is known as *Hancornia speciosa*. The fruit is as large as medium-sized Plums, and has a very pleasant flavour. It is vernacularly known as "Mangaihas," and greatly appreciated in its native regions. The tree is also valuable commercially for its "Caoutchouc," or "Rubber" which it yields in large quantity, and of excellent quality. The Hancornia can only be grown successfully in the warmer parts of Australia, where there is no trouble from frosts. It is suitable for many parts of Queensland, the northern coast river districts of New South Wales, ond similar regions. In congenial localities it is worthy of attention, both as a fruit and "rubber" yielding tree, and also as an ornamental plant. Propagation is effected by seeds, which should be

covered an inch and a half deep, or layers put down early in the spring or late in the autumn.

HAWBERRIES.

Though they are not "berries" according to strict botanical rules, the writer has taken the liberty of coining the term "Hawberries" for the fruits of various species of *Cratægus*, as it is expressive and more euphonistic than the word "Haws." The *Cratægus* belongs to the natural order Rosaceæ, and most of the species are more familiarly known under the names of Hawthorn, Quick, and Whitethorn, and they are chiefly used as hedge plants, for which they are admirably adapted, being low in growth and liberally furnished with strong thorns or spikes. The fruit of all the kinds is edible, but as regards most of the species it is too small and insipid to have any commercial value. Several species, however, bear larger and more serviceable fruits, which are utilized more or less. *Cratægus Azarolus*, a species indigenous to South Eastern Europe and Western Asia, yields somewhat large, meally, and pleasantly acidulous fruit, which is utilized in a fresh state and also for preserving. The fruit of this species is used to some extent in Italy under the name of "Azarole." In the United Kingdom it is commonly known as the "Welsh Medlar." *Cratægus æstivalis*, a species indigenous to the eastern portions of the United States, produces rather small but juicy and palatable fruit having an acid flavour. This fruit in America is commonly known as the "Apple Haw." *Cratægus Aronia*, a robust bushy species, widely dispersed through Southern Europe and Western Asia bears large, palatable, fleshy, deep red fruit. *Cratægus Mexicana (Mespilus Mexicana)* is a handsome shrubby species from Mexico, with edible fruit about an inch long. All the species of *Cratægus*, with one or two exceptions, are deciduous shrubs or small trees, and most of them bear white flowers, though in a few cases the blossoms are purple, pink, crimson, or scarlet, and there are varieties with double flowers. Any of the species make serviceable ornamental plants, and when in bloom are specially attractive. They are best adapted for cool and comparatively moist regions, and will thrive in any ordinary good soil. Propagation is easily effected by seeds, which should be sown in the autumn or early winter, covering them an inch deep. Cuttings strike freely if put in early in the spring, and plants can be obtained readily from layers put down at the same period of the year. If necessary, species and varieties may also be propagated by budding and grafting. Various species of *Cratægus* are sometimes used as "stocks," upon which Apples and Pears are grafted, but the practice is less common than it was formerly. These "stocks" have a dwarfing tendency, and generally speaking are less durable than Apples or Pears.

HAZEL.

History and Uses

This plant yields the small nuts known respectively under the names of

Hazel, Filbert, and Cob, and is known to botanists as *Corylus avellana*. It belongs to the natural order Amentaceæ (Cupuliferæ of some botanists), or the Catkin-bearing family. The generic name comes from the Greek *Korys* (a helmet), in allusion to the calyx covering a greater part of the fruit. The specific name is derived from Avellino, a town near Naples, where the plants at one time grew in great abundance. By the early Romans the fruit was called Nux Avellano. It is not quite certain how the name Hazel originated, as authorities differ considerably. According to some, the word came from the Saxon, and signified a head-dress, in allusion to the fruit being covered with a husk. Others assert the word is derived from the German *hæs* (a behest), from the circumstance that a Hazel stick was commonly used in driving cattle or compelling slaves to work. The Hazel bears unisexual flowers, or the male and female separately. First to appear are the male blossoms, or catkins, the fine yellow dust upon them being the fertilizing pollen. The female blossoms are of a pinkish colour, very small, and growing close to the sides of the shoots.

Corylus avellana embraces a number of sub-species, all of which are deciduous shrubs or small trees. They are indigenous to most parts of Europe, and are abundant in the woods and hedgerows of the United Kingdom. From this section we obtain our ordinary Barcelona, Filbert, and Cob nuts, the classes known to growers. Some have supposed that a distinct species *(Corylus maxima)* is the source of the Red Filbert, but there is no clear evidence that such is the case. The Filbert class, which comprises a number of varieties, is distinguished from the others by the nuts being oblong in shape, like finger nails, and covered with long husks. The word Filbert is simply a corruption of full beard, a name originally given in allusion to the length of the beards or husks. The Cob section embraces varieties that have round and broad nuts with short husks, that generally separate more freely than in the Filbert class. Cob is an old English word meaning thick. Other species of Corylus utilized for their nuts are:—*C. America*, a native of North America, of low habit, and bearing small, hard-shelled fruit; *C. colurna*, a species indigenous to Eastern Europe and Northern Asia, which bears freely, and yields large nuts that are pleasantly flavoured. This is the tallest of the species, and will attain a height of fifty or sixty feet. *C. pontica*, which produces fruit somewhat similar to the Barcelona nnts, is largely grown in Turkey and other parts of Eastern Europe. *C. rostrata*, a low-growing species indigenous throughout North America, has small but very sweet and pleasantly flavoured nuts. Possibly some of these species might prove serviceable if fairly tried, but intending cultivators for profit had better confine themselves to varieties of *Corylus avellana*.

The cultivation of the Hazel should prove a profitable industry in suitable localities. A considerable quantity of nuts are consumed in Australasia, but at present the greater portion has to be imported. If the local supply was larger the consumption would probably greatly increase, and if at any time there should be a surplus in the colonies a market can be readily found elsewhere. Though the Hazel is not a timber tree in the strict sense of the term, yet its wood is valuable and used for

many purposes in Europe. It furnishes hoops for casks, and makes excellent walking sticks, fishing rods, and handles for tools. Hazel wood is used in large quantities for making crates or baskets. It is also extensively used in Europe for making charcoal of superior quality used in the manufacture of gunpowder. *Corylus colurna*, owing to its more robust growth, will yield the largest Hazel wood, and might prove worthy of cultivation for this purpose.

Cultivation.

The Hazel thrives in a comparatively cool and fairly moist locality, and the most favourable conditions for successful cultivation exist in the more elevated regions or the gullies and slopes of mountain ranges. Plants, however, will adapt themselves to various climatic conditions, and may be grown with more or less success in many districts, excepting the warmest and driest. Any ordinary good soil will suit the Hazel, but the best is a light loam with a gravelly

Nut Weevil.
(*Balaninus nucum.*)

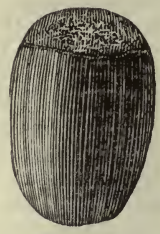
Showing Insect natural size, and Grub emerging

Insect Magnified.

sub-soil. When the ground is very rich there is often a tendency to an over-luxuriant growth of wood at the expense of the crop of fruit. In preparing land for the Hazel it is advisable, as with other fruits, to stir deeply, and more especially in heavy soils. Drainage must also be provided for if necessary, as, though the plants require moist ground, yet they cannot thrive if the water stands in it for any length of time. Planting may be done at any time during the winter, but July is the most favourable period. The plants should stand about ten feet apart in the rows, so as to give them ample room for development. The best mode of training is to form the heads upon single stems about eighteen inches high. In pruning the young plants the growth should be so arranged as to form compact and well-balanced heads. After the heads are perfect the branches should be thinned

out every winter when too numerous, and those that are left must be shortened back according to their growth. This mode of pruning keeps the plants dwarf and compact, and insures an even distribution of the bearing wood. It is not, however, advisable to shorten back too hard, as this practice causes a tendency to over-luxuriant woody growth. In England the custom in pruning is to keep the centres of the plants open, but in this part of the world, owing to the greater power of the sun, it is better to have them closer. On the other hand, growth should not be allowed to get too dense, and the fact of the nuts being borne on the extremities of the shoots is proof that light and air are important essentials. Sometimes, owing to an over-rich soil or other local circumstances, the plants have a tendency to make an over-luxuriant growth of wood, and produce but little fruit. When such happens to be the case root pruning will generally have a remedial effect. When properly managed the Hazel will yield heavily and remain productive for a number of years. In Kent, England—a county noted for nuts, and where there are a large number of plantations—a ton and a-half of nuts per acre is often obtained in one crop.

Types of Nuts.



Filbert.

Cob

Propagation.

Propagation is effected by seeds, suckers, layers, and grafts. When raised from seed the varieties are uncertain, and will often differ materially from the parent plant. The nuts should be sown in the autumn, covering them about two inches deep. The following winter the young plants should be set out in rows thirty inches apart, leaving half that space between them in the lines. In the following year the young plants may be set out permanently. The most common method of propagation is by suckers, which are freely produced and furnish fairly good plants. These may be taken off at any time when the plants are at rest, taking care to lift a fair proportion of roots with them. Strong plants are easily and quickly produced from layers, which should be put down during the winter, and will be ready for shifting the next season. Cuttings may be put in at any time between the fall of the leaf and the starting of growth in the spring. It, however, takes much longer to obtain strong plants by this method than from either layers or suckers. Grafting is practised for rapidly increasing choice varieties, the substitution of better kinds for inferior ones, and inducing early maturity. Probably cultivators will find that seedlings grafted with reputable varieties

will, as in the case of other fruits, prove more durable plants than those obtained from suckers or layers.

Varieties.

A number of varieties are in cultivation, but for all practical purposes a few are sufficient. The following list embraces the most desirable sorts:—

Aveline de Provence.—This is the Barcelona nut of commerce. Nuts small, rather pointed, with thick shells. Plant of moderate growth, but a heavy cropper, and nuts ripen late in the season. Greatly inferior to the Cob and Filbert nuts.

Cosford (*Thin-shelled*).—This is one the finest varieties belonging to the Filbert section, and is one of the most profitable for cultivation. The nut is large, oblong, remaining in the husk. Shell very thin, and easily broken. Kernel large, full, and well flavoured. Plant of moderate growth, erect in habit, very prolific, and bears in clusters of from three to five. An early variety.

Daviana (*Duchess of Edinburgh*).—A useful and popular variety, named in honour of the celebrated scientist Sir Humphry Davy. Nuts large, roundish ovate, with smooth husks rather long. Shell thin, pale brown. Kernel large and well flavoured.

Downton (*Atlas*).—This is an excellent nut belonging to the Cob section. Nuts large, broad, and parting freely from the husk. Shell dark brown, thick, and hard. Kernel large, full, and well flavoured. Plant strong, upright, and produces its fruit at mid-season. This variety is said to have originated from an African species (*Corylus Algierensis*).

Duke of Edinburgh (*Princess Royal*).—A very good variety belonging to the Filbert section. Nuts large, ovate oblong. Husk as long or longer than the nut. Shell dark brown, moderately thin. Kernel large, plump and well flavoured.

Eugenia.—An excellent variety belonging to the Filbert section. Nuts very large, oblong. Husk the full length of the nut. Shell bright light brown. Kernel large and well flavoured.

Frizzled Filbert (*Cape Nut*).—A distinct and useful variety. Nuts very long, oblong in shape, and somewhat flattened. The husks are much longer than the nuts, and are deeply toothed and reflexed, having a frizzled appearance, hence the name. Shell pale brown and thick. Kernel large, full, and well flavoured. Plant moderately robust, very prolific, and bears in clusters of four or five. A very late variety.

Lambert's Filbert (*Filbert Cob, Kentish Cob, Spanish Nut*).—This is one of the best Filberts. Nuts large, oblong, furrowed, somewhat compressed, and remaining in the husk. Shell pale brown, thick. Kernels full and well flavoured, but are better after they have been gathered a few months. Plant of medium growth, very prolific, and a certain bearer. Ripens at midsummer. Nuts of this variety have been kept sound for four years in England.

Merveille de Bollwyller.—A German variety belonging to the Cob section. Nuts large, broad, round at the base but tapering somewhat to

the point. Husks of medium length. Shell light brown, rather thick. Kernel large and sweet. Ripens at mid-season. Plant hardy and very prolific.

Norwich Prolific.—A serviceable variety belonging to the Cob section. Nut large, roundish. Shell pale brown, thin. Kernel plump and of good quality. Plant strong, hardy and very prolific.

Nottingham Prolific (*Dwarf Prolific, Pearson's Prolific*).—A hardy useful variety belonging to the Cob section. Nuts medium sized, short, and thick. Shells rather thick. Kernel full and sweet. Plant vigorous,—very prolific, and bears freely when young. Ripens medium early.

Purple Filbert (*Purple-leaved*).—An old and favourite variety remarkable for its reddish-purple foliage. Nut rather small, ovate. Shells thick and hard. Kernel full, covered with a thin purple skin, and highly flavoured. Plant fairly vigorous and bears freely. This variety may be planted with advantage in shrubberies, as its fine dark foliage is very effective.

Red Filbert (*Red Hazel*).—An old and popular variety, from which the *Purple Filbert* has originated. Nuts ovate, rather small. Shells hard and thick. Kernel full, covered with a thin red skin, and very sweet. Plant moderately strong, but an abundant bearer.

Webb's Prize Filbert.—This is an excellent and comparatively new variety, raised by Mr. Webb, of Berkshire, England, who devoted many years to the special cultivation of nuts. Nuts large and long. Shell thin. Kernel full, covered with a white skin, and well flavoured. Plant vigorous and prolific.

White Filbert (*Wrotham Park*).—This is an old and well-known variety, similar in growth and other respects to the *Red Filbert.* Nuts ovate, rather small. Shell thick and hard. Kernel full, covered with thin white skin, and very sweet. Plant moderately strong, and bears freely.

HERBERT VALE CHERRY.

The fruit known under this name is the product of an evergreen small tree or shrub known botanically as *Antidesma Dallachyanum*, belonging to the order Stilaginaceæ. It is indigenous to the Rockingham Bay and other northern coast districts of Queensland. The fruit is light-coloured, the size of large Cherries, and is produced in racemes or bunches. It has a sharp piquant flavour, somewhat similar to the Red Currant, and makes a very good preserve. This may be fairly regarded as one of the best of our native Australian fruits. The Herbert Vale Cherry will only thrive in the warmer portions of Australia, and requires a rich soil and shelter. Several other species of *Antidesma* from India and Africa yield edible fruits, and may be utilized in warm regions. Propagation is effected by seeds, which should be covered an inch and a-half deep, or layers put down in the autumn or spring. Ripened cuttings of the last season's wood with their leaves on will strike in sand under shelter.

HICKORY.

History and Uses.

The Hickory is closely allied to the Walnut, both being formerly classed as one genus, but by modern botanists they have been separated. Botanically the genus is known as *Carya*, the ancient Greek name for the Walnut. There are a number of species, all of them being natives of North America, where they are widely distributed. In America several species are highly valued for their nuts, which are extensively used in a fresh state, and also utilized for oil, of which their kernels contain a large proportion. All the species yield valuable timber, which is useful for a variety of purposes, and is extensively used in America. The trees are hardy, will adapt themselves to various local conditions, and most of the species will thrive where the Walnut succeeds. Being compact in habit and ornamental, the Hickories would probably prove effective and useful for landscape planting or as street trees in some localities. Though at present the family is scarcely known in Australasia, it is worthy of attention from cultivators. All the species require precisely the same treatment in cultivation as the Walnut, and are propagated in a similar manner. For full details refer to article on the Walnut.

Species.

The following list comprises the principal species ;—

Carya alba (Shelbark Hickory),—This species was formerly known as *Juglans alba*, or the White Walnut, and is one of the most useful of the family. The trees are strong, shapely, attain a height of eighty or ninety feet, and yield in great abundance the most popular kind of Hickory nuts. These nuts are not quite so large as English Walnuts, are lighter in colour, have smoother shells, and yield a larger proportion of oil. The wood, which is somewhat similar to English ash in appearance, is very tough and elastic, and suitable for a variety of purposes. In America it is extensively used by agricultural implement makers, by coachbuilders for poles and shafts of carriages, for hoops, and a number of other purposes where wood is required to withstand severe and sudden strains.

Carya amara (Bitter Nut or Swamp Hickory).—This species grows in low moist ground, and has a very bitter taste, hence its common names. The nuts are small and covered with thin white shells, which are readily broken between the fingers. They are produced in great abundance, but are of no value except for oil and feeding pigs. The tree grows seventy or eighty feet high, and the wood is of fair quality and may be utilized for several purposes, but is inferior to that produced by many of the other species.

Carya aquatica (Water Bitter Nut).—This is a low-growing tree which flourishes in swamps, where the other kinds will not exist. It produces freely small, reddish, thin-shelled nuts, which are intensely

bitter, and is of no use except for making oil. The wood is greatly inferior to most of the other kinds.

Carya microcarpa (Balsam Hickory).—Under favourable conditions this species attains a height of from seventy to eighty feet, and is a handsome well-furnished tree. The nuts are small, with very thick shells, and the kernels have a pleasant flavour. The wood is pale, heavy, compact, and strong, and is utilized to a considerable extent in America.

Carya oliviformis (Pecan Nut).—This is a handsome species which grows to the height of sixty or seventy feet, and makes a more rapid growth than other kinds. The nuts, which are produced in great abundance, are smaller than Walnuts, and have smooth and very hard shells, the kernels being sweet and pleasant. They are largely used in America for eating, and are an important article of commerce. The wood is compact, heavy, cross-grained, and durable, and it possesses great strength and elasticity. It is used extensively in America for furniture, implements, and a variety of other purposes.

Carya porcina (*glabra*)—(Hog Nut).—This species attains a height of from seventy to eighty feet, and forms a stately tree. The nuts, which are freely produced, have smooth, thick, and very hard shells, the kernels being sweet and pleasant, but somewhat difficult to extract. They are in some parts of America extensively used for feeding swine, and hence the common name of the nut. The wood is of a reddish colour, very hard and tough, and extensively used in America by coachbuilders and for making tool handles.

Carya sulcata (Furrowed or Shagbark Hickory).—This species thrives best in land where there is always plenty of moisture, growing to the height of seventy or eighty feet. The nuts have deeply indented or furrowed shells, hence the common names, and the kernels have a pleasant flavour. The wood is pale, tough, durable, and utilized for many purposes.

Carya tomentosa (Mocker Nut, White Heart Hickory).—This species grows seventy to eighty feet high, and prefers a somewhat drier soil to most of the other kinds. The nuts, which are freely produced, are small, nearly quadrangular in shape, and have very thick shells. The kernels are sweet and well flavoured, and contain a large proportion of oil, but they are not readily extracted from the shells owing to the strong partitions inside. Owing to the existence of this peculiarity the name Mocker Nut has originated. The wood is heavy, durable, and remarkable for elasticity and strength. It is used to a large extent in America for furniture, and by coach and implement makers.

HIMALAYAN APPLE.

This name has been given to the fruit of *Spondias mangifera*, a deciduous small tree from India, where it is found in the lower regions and ascending the Himalayas to the height of five thousand feet. It belongs to the natural order Anacardiaceæ. The fruit is about the size of a medium-sized Lemon, and has a pleasant flavour somewhat similar to

an Apple. The Himalayan Apple may be grown successfully in all parts of Australasia where the frosts are but slight, and in congenial localities is worthy of cultivation as an ornamental plant. Propagation is effected by seeds, which should be planted an inch and a-half deep, layers put down early in the spring, or well-ripened cuttings of the previous season's wood.

The fruits known as "Hog Plums" in the West Indies are furnished by various species of *Spondias*, and more especially by *lutea* and *purpurea*. The Tahite Hog Plum is the fruit *Spondias cytheria*, a handsome, large, evergreen tree of spreading habit. The fruit is smooth, a golden yellow, the size of a large Plum, produced in clusters, and having a fleshy pulp and large seed. The flavour is aromatic and somewhat like the Pine-Apple.

HONEYBERRY.

The fruit known under this name is the product of *Melicocca bijuga*, a small evergreen tree belonging to the order Sapindaceæ. The generic name is derived from *mel*, honey, and *coccas*, a berry, in allnsion to the sweetness of the fruit. It is indigenous to the West Indies and Central America, where it ascends to elevated regions. The fruit is round, black, and about the size of Damsons. It has a sweet pleasant flavour, and is largely cultivated in the West Indies, where it is commonly known as the Jamaica Bullace. Several other species of *Melicocca* yield sweet edible fruits, and may be classed as "Honeyberries." All of them also yield edible seeds which, when roasted, have a flavour similar to Chestnuts. The whole of the species being natives of warm regions will not succeed where the climate is cold. They will thrive in tropical or semi-tropical regions, and may also be grown successfully in other parts of Australasia where there is no trouble from frosts. The Honeyberry thrives best in a rich, light, loamy soil, and requires shelter from strong winds. In congenial localities it is well worthy of attention as a fruit tree, and also as an ornamental plant. Propagation is effected by seeds, which grow freely, and should be planted an inch and a-half deep. Plants may also be readily obtained from layers, and ripened cuttings of the young wood will root in sand or light soil.

HUCKLEBERRY.

History and Uses.

The fruits known in America under the name of Huckleberries include several species of *Gaglussacia* and *Vaccinium*, which were formerly classed as one genus, but have now been divided by botanists into separate genera. Both belong to the order Ericaceæ or Heath family, though some botanists class them as Vaccinaceæ. There are numerous

species, both of *Gaglussacia* and *Vaccinium*, some being indigenous to Europe and Asia, but the great majority are natives of America. They are mostly low-growing shrubs, but a few species attain the dimensions of small trees. The fruits of several species are highly appreciated in the United States and Canada, where they are known as Huckleberries, Blueberries, or Dangleberries, according to the various species. The

Swamp Huckleberry.

fruits are pleasant to eat, are excellent for cooking and preserving, and they are turned to good account by drying. An excellent wine can also be made from the berries of any of the species.

Cultivation and Propagation.

Huckleberries can only be cultivated successfully in the colder parts of Australasia, and they are specially suitable for alpine regions. In suitable localities they are well deserving of attention, as the plants are prolific, require but comparatively little care, and a demand for the fruit is certain wherever it is known. Then again, as the berries are firm they stand package and carriage better than many other small fruits, and can be sent long distances to market without difficulty. Provided the climate is suitable, Huckleberries will adapt themselves to a variety of soils, and while some of the species are found growing naturally in swamps there are others that are indigenous to high and dry ground. Cultivators of this fruit must, therefore, in making a selection of kinds, give the preference to those species that are likely to be best adapted for the local conditions. In making a plantation the plants should be arranged in rows, allowing them to stand from nine to twelve feet apart, according to the growth of the species used. But little pruning is required except to keep the plants shapely. Propagation may be easily effected by seeds, which, however, being very small, require some care in treatment. They should be sown thinly in finely-prepared soil, covering them about a quarter of an inch deep. It will be advisable to afford the protection of a frame or box, so as to avoid risk from heavy rains, sun, and wind. The following season the young plants may be planted out. They will come into bearing in three or four years. Plants, however, are most readily obtained from layers, which should be put down early in the spring.

Species.

The fruits of various species vary to some extent in colour, shape, and quality, but all are palatable and useful. The following list includes the leading American species :—

Black Huckleberry (*Gaylussacia resinosa*).—A deciduous low shrub growing to the height of three or four feet. It is indigenous to North Eastern America, and grows naturally in swampy ground. Fruit black, without bloom, and has a pleasant flavour.

Blue Dangleberry (*Gaylussacia frondosa*).—A deciduous species growing from four to six feet high, indigenous to North Eastern America, and found in swampy land. Fruit dark blue, covered with a thick bloom, sweet and pleasant.

Canadian Blueberry (*Vaccinium Canadense*).—This species is widely distributed through the North Eastern portion of the United States and Canada, its habitat being low-lying ground. It is a dwarf deciduous shrub, very hardy and prolific. The berries are blue, very large, and possess a somewhat aromatic flavour. This is a popular kind for cooking, preserving, and drying.

Dwarf Blueberry (*Blue Huckleberry, Vaccinium Pennsylvanicum*).—This is a deciduous dwarf species growing from two to three feet high, indigenous from Maryland northward. It has blue fruit which is produced in great abundance. This species is much prized in America for its earliness.

Swamp Blueberry (*High-bush Huckleberry, Vaccinium corymbosum*).—A robust deciduous species growing from six to twelve feet high, widely distributed in North East America, and common to swampy ground. Fruit rather large, bluish-black, and covered with bloom. Flavour sweet but sprightly. Ripens late in the season, and in America is considered to be one of the best Huckleberries.

Many other species of *Gaylussacia* and *Vaccinium* yield fruits that may be classed as Huckleberries, and possibly some of them might prove serviceable if tried. The more prominent are as follows:—*Vaccinium cæspitosum*, a deciduous dwarf species with blue berries, found in North America as far as Labrador; *Vaccinium leucanthum*, a robust species forming a small tree, with blackish berries, from the mountain regions of Mexico; *Vaccinium myrtilloides*, a dwarf bushy species producing large berries known vernacularly as Bluetts, indigenous to North Eastern America, including Canada and Labrador; *Vaccinium occidentale*, a species growing about eight feet high, with small dark blue berries, indigenous to North West America from California to British Columbia; *Vaccinium ovafolium*, a low, somewhat straggling species with large blue berries, indigenous to North West America from California to Oregon. *Vaccinium ovatum*, a species growing from six to eight feet high, with small, dark blue berries, indigenous to North West America from California to British Columbia.

INDIAN FIG.

This is a common name for the fruit of several species of *Opuntia*, a robust and hardy genus of the order Cactacea or Cactus family. The fruit is also known familiarly as the Prickly Pear. With the exception of the common species *(Opuntia vulgaris)* and one or two others they are natives of the West Indies, Mexico, and South America, where they thrive in the hottest and most barren regions. They have no leaves but thick flattened fleshy stems, which are superposed one upon another. The fruit is from one to two inches in length, pear or egg shaped, and is in colour from green to yellow or red, according to the species. The stems are plentifully furnished with sharp spines, and the fruit is covered by numerous tufts of smaller ones. This peculiarity makes the plants very formidable when grown as hedges, as no animals will face them. On the other hand, however, the numerous small spines upon the fruit, which causes trouble in handling and preparing, materially prevents its use. The fruit when ripe is juicy, well flavoured and pleasant to eat (when pared). It makes a good jam and jelly, and forms an excellent pickle. The fruit also makes an excellent vegetable when boiled in the same way

as a vegetable marrow. The juice, when extracted by pressure, is fermented and made into an intoxicating drink by the Mexicans.

The more common species is *Opuntia vulgaris*, which is widely dispersed through the south of Europe, Africa, and Asia, and has become well established in Australia where it is grown in many places as a hedge plant. The fruit of this species is extensively used in Italy, where it covers large tracts of the barren lava slopes of volcanic mountains, and it is commonly sold in the markets. The other prominent species whose edible fruits are used are *Opuntia Ficu-sindica* and *Opuntia Tuna*, both from South America. In this part of the world Indian Figs, or Prickly Pears, are generally looked upon as noxious plants as they are apt to spread with great rapidity, are difficult to keep within bounds, and are not easily destroyed. In fact, these plants have become a pest in many localities, and special legislation has been adopted to deal with them. But notwithstanding the drawbacks to their cultivation, these plants will prove useful to settlers in the hot, dry, interior districts, where there is a liability to long and severe droughts. These plants will flourish under such conditions, and will yield a plentiful supply of palatable fruit, also, when cooked, a nourishing vegetable when no others can be obtained. It is scarcely necessary to give directions as regards cultivation and propagation, as all the species will thrive in any soil, even the most barren, and every piece of stem thrown down will root and make a plant.

Other Edible Cactus Fruits.

Several species of the genus *Cereus* yield palatable fruits which are known as Strawberry Pears. The fruits vary in size from a large Gooseberry to an Orange, according to the species. They have a better flavour than the Indian Figs, and are very palatable and nutritious. Some of the species have a robust upright growth of several feet, while others have procumbent or trailing stems. The principal fruit-bearing kinds are *Cereus Englemanni*, a dwarf species with scarlet flowers, from Utah; *Cereus Quixo*, a tall hardy species, from Chili; and *Cereus Thurberi*, a strong tall species, from Mexico and Arizona.

Strawberry Pear

INDIAN HILL-GOOSEBERRY.

This is the Anglo-Indian name for the fruit of *Myrtus tomentosa*

(*Rhodomyrtus tomentosa*), an evergreen shrub or small tree belonging to the order Myrtaceæ, or Myrtle family. It is indigenous to mountain regions in India, China, and Ceylon to an elevation of over 8000 feet. It is plentiful in the Nielgherry Hills, where the fruit is much appreciated, and hence the popular name. The fruit is dark purple and somewhat similar to a Gooseberry in size and appearance. When ripe it has a sweet and somewhat aromatic, but palatable, flavour when eaten fresh, and it makes an excellent jam and jelly which are similar to that made from the Guava. The Hill-Gooseberry may be grown successfully in most parts of Australia, excepting the very cold and also arid tropical regions. It is a compact growing, handsome, ornamental plant, and is well worthy of a place in the shrubbery, independent of its value as a fruit producer. The plant is fairly hardy, and will adapt itself very readily to various conditions of soil and situation, but will not thrive in land that lacks effective drainage. Propagation is most rapidly effected by layers put down late in the summer or early in the spring. Plants may be also readily obtained from seeds, which should be covered an inch and a-half deep, and cuttings from the ripened wood of the current season's growth will strike in sand if protected from sun and wind.

INDIAN PLUM.

The fruit known under this name is furnished by an evergreen, small, thorny tree or shrub known botanically as *Flacourtia cataphracta*, belonging to the order Flacourtiaceæ. It is also known as the Puneala Plum. Another species, *Flacortia Ramontchi* (*Flacourtia sapida*), yields what is known as the "Batoka Plum." It also passes under the name of Madagascar Plum. Both are natives of India, and the latter is also indigenous to Madagascar. They have white flowers and Plum-like fruits which are sweet but somewhat acrid, though both make a very good preserve. Both species will only thrive in those parts of Australasia that are not troubled with frosts. They will thrive in any ordinary good soil, and in congenial localities are worthy of attention as ornamental plants. They also make excellent hedges. Several other species yield fruits of more or less value and all are useful ornamental trees or shrubs. The more prominent are *Flacourtia inermis*, known in India as Tomi Tomi, a medium sized tree, but whose fruit is inferior to that of the species previously named. *Flacourtia sapida* is, as regards appearance and fruit, very similar to the last named species. *Flacourtia sepiara* is a shrubby species growing six or eight feet high, with small and inferior fruit. It is thickly covered with strong sharp thorns, and makes a formidable hedge. The wood of the tree kinds is valuable, being close grained, takes a fine polish and is durable. In India it is used for a variety of purposes. Plants are easily obtained from seed, which should be planted an inch and a-half deep, layers, or ripened cuttings of the last season's growth, which strike freely in sand or light soil.

JACK.

The Jack, or Jaca, fruit is furnished by *Artocarpus integrifolia*, a large evergreen tree closely related to the Bread Fruit, and belonging to the order Urticaceæ. It is a native of India, and resembles the Bread Fruit Tree to a great extent in its fruit and mode of growth. The names Jack or Jaca are said to be corruptions of the Sancrit "*Tchackka*," which signifies the name of the fruit but not the tree. The fruit is very large, often measuring from twelve to eighteen inches across, and weighing from forty to fifty and, exceptionally, seventy to eighty pounds. It has a coarse, warted, thick skin, and the pulpy mass within contains a large number of seeds, which are the true fruits. The pulp is eaten raw or prepared in various ways, and the seeds. when roasted, are somewhat similar in flavour to Chestnuts. The milky juice, in India, is believed by the natives to abate swellings when mixed with vinegar, and the leaves are considered to be good for cutaneous eruptions. Both the root and the juice are said to be useful in cases of diarrhœa. The wood of the Jack, which is at first pale but afterwards becomes like mahogany, is valuable and used for making picture frames and a variety of purposes. The mode of bearing is somewhat curious, as at first the fruit is produced upon the branches, afterwards upon the trunks, and when the trees get very old it also grows from the roots.

Jack.

Cultivation and Propagation.

The Jack, being a native of tropical regions, can only be successfully cultivated in the warmer parts of Australia, and it cannot be expected to thrive south of Brisbane. It is a serviceable tree in congenial localities, and is also worthy of attention as an ornamental plant. A rich, deep, and moderately moist soil suits it best, and shelter from strong winds is essential to the well-being of the trees. There are a number of varieties which differ more or less in size, quality, and period of ripening. One of the most popular varieties in India is one called the Honey Jack. The varieties ripen in succession, and the fruit lasts in season for a considerable time. Propagation is readily effected from seeds, which should be planted an inch and a-half deep. Plants may also be readily obtained from suckers that spring from the roots.

JUJUBE.

History and Uses

The fruits known as Jujubes are obtained from several species of *Zizyphus*, shrubs or small trees with hooked spines belonging to the natural order Rhamnaceæ. *Zizyphus vulgaris*, a small tree, is widely dispersed through Southern Europe, North Africa, and Western Asia to China, and it ascends the Himalayas to the height of over 6000 feet. It has scarlet fruit about an inch long, having a pleasant flavoured pulp and is known as the European Jujube. The fruit is eaten fresh and also in a dried state. When fresh the fruit is somewhat acid, but after being dried it becomes much sweeter. *Zizyphus Jujuba* is a small evergreen tree which is dispersed through India, China, tropical Africa, and extends

Jujube.

to North Eastern Australia. The fruit varies from red to yellow, according to the variety, and is somewhat similar to a Plum. In Queensland it has received the name of Torres Straits Plum owing to its being found growing naturally in the north east districts. The fruit is somewhat mealy, but pleasantly flavoured, and is largely used both fresh and in a dried state in India and China. *Zizyphus Lotus*, an evergreen shrub, is the Lotus or Lote-bush of the classics, from whence the Lotophagi were named. It is a native of Africa, but is widely dispersed in the European countries that border the Mediterranean Sea. The fruit is somewhat smaller and less sweet than the common Jujube, but it has an agreeable sub-acid flavour, and large quantities are used both fresh and dried in the countries where it is found. *Zizyphus mucronata* is an evergreen shrub of medium growth indigenous to South Africa. It has rather small, yellow, farinaceous berries which, when dried and pounded, yield a meal which is made into a sort of bread that is both palatable and nourishing. *Zizyphus Ænoplia*, an evergreen shrub, has been called the Australian Jujube because it is found in Carpentaria and other northern coast districts. It is, however, also indigenous to India and other parts of Asia. The fruit is somewhat small, but has a pleasant acid flavour. *Zizyphus Parryi* is a species indigenous to California. It bears small fruits of fair quality about the size of Damsons. Among other species deserving attention for their fruits the following are mentioned by Baron von Mueller :—*Zizyphus Joazeiro*, a Brazilian species suitable for arid regions ; *Zizyphus mistal*, a fine tree from Argentina ; *Zizyphus rugosa*, a small and comparatively hardy tree from Nepaul and other mountainous parts of India ; and *Zizyphus sinensis*, a species from China and Japan.

Cultivation and Propagation.

The Jujube can only be cultivated successfully in the warmer parts of Australia, or in temperate regions that are not affected by frosts. Some species, however, are much more hardy than others, and cultivators have some scope in being able to select according to their requirements. As fruit-bearing plants the principal species of Jujube are well worthy of attention in congenial localities. In countries where it is known, there is a considersble demand for the fruit, and there is no reason why it should not be equally popular in the Australasian colonies. It is a fruit specially worthy of attention for drying, and when prepared by this means it is probable that an export trade can be found for surplus produce. The trees will do in any fairly good soil, but they thrive best in a rich sandy loam, deeply worked and well drained. Shelter is also essential to the well-being of the plants. In making a plantation for fruit the trees should be arranged from twenty to thirty feet apart, according to the growth of the species used. Independent of their value as fruit trees, any of the species of Jujube may be used to advantage as ornamental plants for shrubberies and gardens as they are both handsome and effective. Propagation is most readily effected by seeds, which grow freely, and should be planted about an inch deep. Plants are readily

obtained from layers, and cuttings of the ripened wood of the current season's growth will root in sand if protected from sun and wind.

JUNIPER.

The Juniper family embraces a large number of species, many of which yield valuable timber that is utilized for various purposes, and edible fruits are obtained from several. The genus belongs to the order Coniferæ, and is very closely related to the Cypress family. The succulent cones (commonly called berries) of *Juniperus communis*, or Common Juniper, a dwarf shrubby species indigenous to the United Kingdom and other parts of Europe, are used largely for flavouring gin. The oil made from the fruit is also used medicinally. *Juniperus drupaceæ*, a species indigenous to Syria and other parts of Western Asia, yields a sweet edible fruit, known as the Plum Juniper, which is highly esteemed in its native regions. It is a compact handsome species, and attains a height of about thirty feet. The Common Juniper will only thrive in the cooler regions of Australasia. The Plum Juniper may be cultivated over a wider range, and will flourish in all excepting tropical or dry interior districts. It is a handsome ornamental tree, and worthy of a place in the shrubbery. Propagation is most generally effected by seeds, which should be planted an inch deep. Cuttings will strike in sand if well sheltered, but this means for raising plants is slow and somewhat uncertain.

KAI APPLE.

This is a tall evergreen shrub belonging to the order Bixaceæ, and known botanically as *Aberia caffra*. It is indigenous to Caffraria and Natal, as also other parts of South Africa, the fruit being highly appreciated by the natives of those countries. The fruit is the size of a small Apple, in colour is a rich golden yellow, and has a palatable flavour when used fresh, and is excellent when cooked or preserved. It has rich green foliage, and is worthy of cultivation as an ornamental plant, independent of its value as a fruit. As the plant has strong spines it is also very suitable for hedges. It will thrive in any part of Australasia excepting regions where frosts are severe. Propagation is readily effected by either seed, layers, or ripened cuttings of the current season's wood.

KOLA NUT.

This is the name for the seed of *Sterculia acuminata*, an evergreen tree that attains the height of thirty or forty feet, and belongs to the order Sterculiaceæ. It is indigenous to West Africa, where it is considered to

be a valuable tree. The flowers are white, and the fruit is produced in follicles of several nut-like seeds which are brown and about the size of pigeon's eggs.. These seeds also pass under the name of Goora Nuts. The negroes use them generally, as when chewed they are supposed to allay thirst, ward off hunger, prevent fatigue, and promote digestion. In fact, these seeds are supposed to have stimulating properties similar to those attributed to the "Coco" from South America. The chewing of these seeds is also said to enhance the flavour of anything that may be eaten directly afterwards, and to make even putrid water agreeable. This tree is only suitable for tropical or sub-tropical regions, but would probably prove serviceable in hot interior districts, where it is worthy of a trial. Several other species yield edible seeds, one of the principal being *Sterculia quadrifida*, which is indigenous to Northern and Eastern Australia. It bears freely black seeds which have a nutty taste, and is known to aboriginals as the "Calool." *Sterculia Carthaginensis*, from Brazil, *Sterculia nobilis*, from India, and *Sterculia urens*, from the same country, are all fine, handsome, evergreen trees that bear palatable Almond-flavoured seeds, and may be planted with advantage in congenial regions. Trees of this family will thrive in any fairly good soil. Propagation is most generally effected by seeds, which should be planted about an inch deep.

LEMON BERRY.

This is the vernacular name in California for the fruit of *Rhus integrifolia*, a robust evergreen shrub indigenous to that country and Mexico. The genus *Rhus* belongs to the Anacardiaceæ, or Cashew Nut, family, and embraces a large number of species. Most commonly the genus is known as "Sumach," and several species yield commercial "tannin" in considerable quantities, while some are remarkable for their strong poisonous properties. The species under notice bears deep red berries that are very sour, and these are encrusted with a white oily substance that is even more acid, which crystalises upon the surface. These berries are used to some extent when fresh, and also after being dried, for making an acid drink in the same way as the Lemon is used, hence the common name. This drink is said to be pleasant and refreshing, and the Mexicans credit the fruit with some medicinal virtues. *Rhus ovata*, another Californian species, is known in its native country as the "Sugar Tree." It is an evergreen shrub, but less robust than the "Lemon Berry," and is found growing in desert mountain regions. The berries are also smaller, and though they are similarly covered with a white substance, they are sweet like sugar, hence the cammon name. The fruit with its coating is said to make a pleasant drink, either when fresh or dried. The coating, when dried, has the consistency of beeswax, and is said to have been formerly gathered by the Indians, and stored as food. These people also eat the fruit of *Rhus trilobata*, vernacularly known as the "Squaw Bush," which has a pleasant though rather sharp acid flavour. Plants are readily obtained from seed which should be covered

to the depth of an inch. Layers root freely if put down in the autumn or spring, and cuttings of ripened wood of the current season will strike in sand, if protected from the weather.

LIMONIA.

This is a genus of evergreen shrubs or small trees belonging to the order Aurantaceæ, and closely allied to the Lemon and Lime. The most prominent species is *Limonia acidissima*, a shrub growing from six to ten feet high, indigenous to India, where it is found up to an elevation of 4000 feet. It has small, white, and very fragrant flowers and yellowish-red globular fruit about the size of a Cherry. The pulp is flesh-coloured and intensely acid. It is used in its native regions in a fresh state owing to its supposed medicinal qualities. The fruit is also considered to be an excellent tonic when dried, and to be useful in cases of fever and small-pox. The other species do not differ materially except in the case of *Limonia scandens*, which is a climbing species from China. All the species of Limonia are fairly hardy, and may be grown successfully in all but the coldest districts in Australasia, and they will thrive in any fairly good soil. Propagation is easily effected by seeds, which should be covered an inch deep, or layers. Cuttings will also root freely in sand if protected from the weather.

LI-TCHI.

History and Uses.

Li-tchi, or Leechee as it is often written, is the Chinese name for the fruit of *Nephelium Li-tchi* (*Dimocarpus Li-tchi*, *Euphoria Li-tchi*), an evergreen medium-sized tree belonging to the order Sapindaceæ. It is a native of Southern China, Cochin China, and the Philippine Islands, and with the Chinese is considered to be one of their most useful fruits. The fruit is nearly round, from an inch and a-half to two inches in diameter, and has a tough, brittle, chocolate brown rind, or skin, which is covered by wart-like protuberances. The fruit is borne in large bunches, and each contains a considerable number. When ripe the fruit is filled with a white and nearly transparent jelly-like pulp, in which lies a rather large, shining, brown seed. In flavour the fruit is sweet, pleasant, and refreshing when used fresh, and is popular with the Chinese. It is also extensively used in a dried state by the Chinese, and large quantities in this form are exported to Europe, where it is highly appreciated. The fruit is dried whole in the same way as small Plums, and when the process is complete it is black and very similar in appearance to Prunes.

Cultivation and Propagation.

The Li-tchi may be cultivated successfully in regions ranging from

the tropical zone to medium warm districts in Australia as far south as the Hunter River. It is specially well adapted for regions where a strong moist heat prevails during the summer—such conditions as exist in the coast districts of Queensland and New South Wales. Possibly, this tree would also be well adapted for Northern Australia. The Li-tchi flourishes in any rich open soil, which should be deeply worked, and shelter is essential to the well-being of the trees. In making a plantation the trees should be placed in rows, not less than twenty-four feet apart, as they will require that space for free development. Independent of its fruit, the Li-tchi is worthy of being cultivated for ornamental purposes in localities where it will thrive, as it has beautiful Laurel-like foliage, handsome white flowers, and makes a very effective tree for shrubberies. Propagation may be easily effected by seed or layers. Seed should be sown in rich light soil, covering it an inch and a-half deep. Layers should be put down late in the summer or early in the spring.

LONGAN.

This is the Chinese name for the fruit of *Nephelium Longanam* (*Dimocarpus Longan*, *Euphoria Longana*), an evergreen tree which attains a height of about forty feet under exceptional circumstances, and is indigenous to Southern China and India. The tree is very similar in appearance to the Li-tchi, but the fruit is smaller, varying from an inch to an inch and a-half in diameter. In flavour it is very similar, but is generally preferred by the Chinese to the Li-tchi, as they consider it to be sweeter and to possess medicinal qualities. Most Europeans, however, rather prefer the Li-tchi on account of its larger size and its more showy appearance. The fruit of the Longan is used in precisely the same way as the Li-tchi, and the same remarks will apply as regards cultivation and propagation.

LONGAN.

LOQUAT.

HISTORY AND USES.

Botanically the Loquat is most generally known as *Eriobotrya aponica*

and it belongs to the large natural order Rosaceæ, or the Rose family. The generic name comes from *erion* (wool) and *botrys* (a bunch of grapes), in allusion to the woolly appearance of the fruit and its mode of growth. It was formerly called *Mespilus japonica*, and by some botanists it has been recently re-named *Photinia eriobotrya*. It is a native of Japan and China, and derives its common name from the first named of these countries. This fruit appears to have been confined to its native countries till near the end of the last century, when it was introduced to England under the name of the Japanese Medlar, which it retained for a considerable time. The Loquat was introduced to New South Wales in the early days of that colony, and is a well-known and popular fruit in the neighbourhood of Sydney and in other coast districts. In the other colonies it has not received so much attention as it deserves, considering its useful qualities. As a fruit-bearing tree it is valuable, being very prolific, and seldom failing to produce a crop when growing under fairly favourable conditions. When eaten fresh and fully ripe the fruit is refreshing and grateful to the palate. For culinary purposes it is excellent, and it makes a very palatable jam. The fruit can also be preserved by drying after the seeds are removed, and if carefully prepared will keep for years. Fruit intended for drying should be thoroughly ripe, as otherwise its flavour is not fully developed. Drying may be effected by halving the fruit and exposing to the sun, or it may be done more quickly, if desired, by artificial heat. Independent of its value as a fruit producer, the Loquat is a handsome evergreen tree, and well adapted for planting in ornamental grounds or shrubberies. The foliage is distinct and striking, and makes an effective contrast with many other ornamental trees and shrubs. The Loquat is also effective as a shelter tree on the boundaries of vineyards and orchards, while at the same time it yields a return in its crops of fruit.

Cultivation.

The Loquat may be grown successfully in those parts of Australasia that are not subject to heavy frosts. Though the trees will stand three or four degrees of frost with impunity, yet a lower temperature will not suit them, and they are better adapted for the warmer districts than cold ones. They are also likely to thrive better on sloping ground, where they will get the full benefit of the early morning sun, than when growing in low-lying localities, where the frosts and winter fogs are heavy. Loquats will thrive in any ordinary good soil of moderate depth, but they delight in a rich sandy loam. In preparing the land stir the ground deeply, as deep cultivation is of material importance to the well-being of the trees, which require a good root bed. It is also essential that the land should be drained, if necessary, as the trees are rather impatient of an excess of water standing at their roots. The best time for planting, when trees in a suitable condition can be obtained, is early in the autumn, when the ground is warm, so that the plants get the advantage of a quick start, and are able to get fairly re-established before the cold weather sets in. Trees, however, should not be

shifted till their summer growth has fairly hardened, as when too soft and tender it is apt to die back. If trees cannot be planted in the autumn it will be advisable to wait till early in the spring, as they are apt to suffer severely if shifted during the winter. It is a mistake to transplant these trees in June or July, as is too frequently done. As with Oranges and other evergreens, special care must be taken in transplanting Loquats not to let the roots be exposed to a dry atmosphere. If planted in orchard fashion the trees should stand twenty-four feet apart to allow room for full development; when planted for breadwinds they should stand about twelve feet apart. Young trees must be pruned freely to secure strong growth in the required directions. Mature trees will require but little pruning, all that is necessary being the removal of dead, rank, and misplaced shoots, and thinning out the branches when too much crowded. The ground at all times ought to be kept as free as possible from weeds, and the surface soil should be mulched to the distance the roots extend before the hot weather sets in. The Loquat is a strong-feeding tree, and to keep it in good heart an occasional dressing of manure must be given unless the soil is naturally rich. When trees are neglected in this respect their growth becomes weak and straggling, and they soon cease to yield payable crops of fruit.

Propagation.

Strange to say, though the Loquat has been cultivated for a long period in Australasia it has been greatly neglected, so far as naming and perpetuating superior varieties as in the case of all other cultivated fruits. The trees now grown, as a rule, are simply seedlings, whose fruit may be either inferior or superior, and, as with all other kinds, there will be no certainty as to its quality until the plant bears. Sometimes there is a large proportion of flesh in proportion to the size of the seeds, and, consequently, the fruit is superior. On the other hand, very often the seeds are disproportionately large, and they are only thinly covered with flesh, when the fruit may be considered to be inferior. It is quite easy for cultivators to make selections from the finest and most useful fruits, and perpetuate them by budding and grafting. Were this plan to be adopted, inferior kinds would soon be made to give place to varieties known to possess the best qualities. Grafting may be easily effected, but the writer has found that budding is a still better means of propagation. Seedlings are readily obtained, and will be ready for working in their second year. Seeds should be sown soon after the fruit is ripe, covering them to the depth of two inches. Plants can be readily obtained from layers, but these, as a rule, do not make such strong trees as seedlings.

MAMMEE.

History and Uses.

This is the native Indian name for the fruit of *Mammea Americana*,

a large and handsome tree belonging to the natural order Guttiferæ. It is an evergreen, has large and handsome foliage, attains a height of sixty or seventy feet, and has a spreading head. It is a native of the West Indies and tropical South America. The flowers are white, and the fruit, which is also known as the "Mammee Apple" and "Wild Apricot," is somewhat similar in size, shape, and colour to a large russet Apple. It has a thin skin, which peels off readily, and the pulp is somewhat like that of an Apricot, having a rich and delicious flavour. Each fruit contains two or three seeds, which are resinous and intensely bitter. The Mammee is generally cultivated in the West Indies, where it is a very popular fruit. It is eaten fresh or when cut in slices and soaked in wine or syrup. The fruit is also excellent when preserved in sugar.

MAMMEE.

Cultivation and Propagation.

Being a native of warm regions, the Mammee, as a matter of course, can only be cultivated successfully in those parts of Australasia where the climatic conditions are somewhat similar. This tree would be suitable for such parts of Queensland, Northern Australia, and the South Sea Islands where great heat and moisture prevail during the summer. It is well worthy of attention as a fruit tree in localities where the climatic conditions are favourable, and also for ornamental purposes, as its foliage is handsome and attractive. The Mammee also makes an excellent shade tree, and is, therefore, very suitable for street planting in regions where it will thrive. The Mammee will thrive in any ordinary good soil, but does best in a rich sandy loam. In a plantation the trees should stand not less than forty feet apart in order that they may have room for free development. Propagation is most generally effected by seeds, which should be planted two inches deep. Plants may also be obtained from cuttings of the ripened shoots of the current season's growth, with the leaves unshortened, which will strike in sand if protected from the weather.

MANGO.

History and Uses.

The Mango holds the same position among fruits in the tropics as

the Apple does in cooler regions, and is widely cultivated. It is a handsome evergreen tree of spreading habit, and attains a height of fifty or sixty feet under favourable conditions. Botanically the Mango is known as *Mangifera indica*, and it belongs to the order Anacardiaceæ, or the Cashew Nut family. It is indigenous to the warmer regions of Asia, but has been widely distributed, and is now generally cultivated in most countries situated within or near to the tropics. The flowers are a greenish-yellow, and the foliage is somewhat similar to the Walnut. There are numerous varieties whose fruits differ considerably in shape, size, colour, and quality. In form the fruits vary from round to kidney shape, and some are compressed or flattened. The fruit varies greatly in size, according to the variety, and range from four ounces to a pound and a-half in weight. There is also a wide range as regards quality, some varieties producing luscious fleshy fruit; with others it is coarse and stringy, and sometimes it has an unpleasant turpentine flavour. In colour the ripe fruit varies, according to the kind, from pale to dark green, and lemon yellow to deep orange, and the best sorts yield a grateful odour. The fruit contains a comparatively large seed, to which the pulp adheres somewhat firmly. The Mango is generally admitted to be one of the most palatable fruits when eaten fresh, and it is extensively used in this way in countries where it is grown. It can be turned to good account as jam and jelly, and makes an excellent sweetmeat when preserved in sugar or spirits, and also when dried. The unripe fruit is also used to a great extent as a pickle, and the Mango Chutnee of India has a world-wide reputation. Medicinally the resinous juice of the tree is in India considered to be serviceable for dysentry. The wood of the Mango is rather soft, and soon decays when exposed to wet, but in India it is utilised for a variety of common purposes. It is said to improve with the age of the trees.

MANGO.

CULTIVATION.

The Mango can only be cultivated successfully in those parts of Australasia classed as tropical and sub-tropical regions, or in specially suitable localities along the Pacific Coast a few miles

further south. But the Mango is much more hardy and cosmopolitan in its habits than many other tropical fruits. The Mango may be grown successfully in any ordinary good soil, but it thrives best in a rich, deep, sandy loam. It is essential that the ground should be well prepared, and effective drainage provided, if necessary, as the Mango cannot thrive in a wet soil. Effective shelter must also be provided, when necessary, as the trees and crops are apt to suffer severely when fully exposed to high winds. Permanent trees should be planted not less than thirty feet apart so as to allow space for free development. It will be some years, however, before the trees fully occupy this amount of space, and temporary ones may with advantage be planted between. By adopting this plan not only can a better return be obtained from the land, but the temporary trees will act as nurses in affording shelter to the others. The best time for planting is in the autumn, but if that is impracticable it should be done early in the spring. While young the trees should have their growth regulated from time to time so as to bring them into the desired forms, but when mature they require but little in the way of pruning. The trees will usually begin to bear in three or four years from the time of planting, and afterwards they generally yield regular and payable crops. Weeds should never be allowed to make much headway in a Mango plantation, and, as far as practicable, the surface soil ought to be kept loose by frequent stirrings. This is more especially necessary in the case of irrigated land, which is apt to cake hard after each watering. Mulching is very serviceable in Mango culture, and a coating about four inches thick of straw, grass, or litter should always be applied early in the summer. Mangoes, being strong feeding and heavy bearing trees are exhausting to the soil, and manure may be used with advantage from time to time in moderate dressings. Mangoes are somewhat liable to the attacks of "scale" insects, but these pests, if not allowed to make too much headway, can generally be kept down by using the ordinary remedies. (See vol. 1, page 84).

Gathering and Packing the Fruit.

The Mango season in Australia lasts for several months, according to the varieties grown and the localities. When required for home use the fruit should be left upon the trees till it is fully coloured in order to obtain it in the highest degree of perfection. If wanted for export the fruit must necessarily be gathered somewhat earlier, or just as it begins to turn colour. It should be handled carefully so as to avoid bruising, and packed securely in medium-sized cases in such a way that there will be no shifting till the fruit reaches its destination. If properly packed and handled fruit should keep in good condition for at least a month if stored in a cool place. A limited trade is already carried on from Queensland to the other colonies, as also from the northern coast river districts of New South Wales, which is likely to assume much larger proportions in the future. This trade has been materially kept back by growers sending fruit insufficiently ripe and lacking in the rich flavour

required in the Mango. Though the fruit may often be seen in the shops of Sydney, Melbourne, and other cities, yet a real good specimen is rare, and, consequently, but few people are induced to purchase. In fact, the samples offered are too often quite insipid, and people who try them are disappointed and disgusted. There is no reason why Mangoes of the finest varieties in the best possible condition should not be obtainable in any part of Australasia ; and this fine fruit, if it could be had in perfection, would be in great demand.

Propagation.

As with other cultivated fruits, desirable varieties of the Mango must be propagated by budding, grafting, layering, and cuttings. Budding and grafting are the quickest and most effective methods. The most suitable stocks are two-year-old seedlings, though yearling plants may be used if others are not available. Grafting should be done in the spring when growth becomes active, and budding about mid-summer. Various methods of grafting may be adopted to suit the size of the stocks and other local conditions. Inarching is also a somewhat popular method for propagating Mangoes. For full directions as regards budding, grafting, and inarching see articles under those headings in vol. 1. Seeds should be sown as soon as they are available, covering them an inch and a-half deep. The following season the young plants should be arranged in nursery rows, where they must remain till " worked."

Varieties.

The varieties in cultivation are numerous, but a few kinds are sufficient for practical purposes. Among the sorts introduced to Australia the following varieties have given satisfaction :—

Alphonzo.—A free bearing variety with reddish-orange, nearly heart-shaped fruit, weighing about eight ounces. The flesh is sweet, luscious, and slightly aromatic, being a little fibrous next to the seed.

Bengale.—A prolific variety with pale yellow fruit, weighing about eight ounces. Flesh luscious, with a rich perfume, and somewhat fibrous near to the seed.

Dohdohl.—This is a variety with very large fruit which often ranges from a pound to a pound and a half in weight. The fruit is oval, somewhat compressed, and in colour is dark green, with brownish stripes and dots. The flesh is rather fibrous, and the flavour fairly good, but this variety in quality is greatly inferior to others. Better for preserving than eating when fresh.

Gratissima.—This is a prolific variety with bright yellow, cone-shaped, but slightly curved, fruit, weighing about eight ounces. Flesh very sweet and luscious, with a pleasant aromatic flavour, and nearly free from fibre.

Gumpohr.—A moderately prolific variety with medium-sized pale green or lemon coloured fruit. The flesh is rich, slightly aromatic, and somewhat fibrous near the seed.

Sangier.—A variety with bright yellow medium-sized fruit. Flesh sweet, fragrant, and luscious.

Strawberry.—This is a robust and very prolific variety with olive green fruit, flushed with crimson on the sunny side, and weighing about three quarters of a pound. Flesh sweet, aromatic, and luscious, with a little fibre next to the seed. Experience has proved this to be one of the finest varieties grown in Australia.

MANGOSTEEN.

History and Uses.

The Mangosteen, or Mangostan as it is sometimes written, is the fruit of *Garcinia Mangostana*, a handsome evergreen tree of moderate size, belonging to the natural order Guttiferæ, or the Gamboge family. It is indigenous to Java, Sumatra, and the Molucca, or Spice, Islands. The fruit is as large as a medium-sized Orange, and has a thick, succulent, reddish-brown rind, covered with warts or tubercles, with a crown of rays at the apex. The inside consists of a white juicy pulp that has a delicately acid and particularly rich sweet flavour, which has been likened to a combination of Strawberry and Pine-Apple. From its whiteness and grateful flavour the pulp has also been likened to perfumed snow. The pulp is divided into a number of sections by thin partitions in a somewhat similar manner to the Orange. The Mangosteen is generally admitted to be one of the finest tropical fruits, and is highly appreciated in countries where it grows naturally, or can be cultivated. It reaches the highest degree of perfection when allowed to get fully ripe upon the tree, and is best when eaten quite fresh. The fruit is not only palatable and refreshing, but is considered to have a medicinal value in cases of fever and other complaints, and may be freely eaten with safety by persons suffering from any disorder. An astringent juice obtained from the rind is considered to be an excellent specific in cases of dysentry.

Mangosteen.

Several other species of Garcinia yield serviceable fruits, which are utilized more or less in their native countries. The principal of these is *Garcinia cornea* or Horny Mangosteen, a rather tall evergreen tree indigenous to mountain regions in Java. The vernacular name is derived

from the colour of the wood, which resembles horn and is tough, hard, and heavy. The fruit is excellent, though not so good by a long way as the Mangosteen proper. *Garcinia celebica*, an evergreen tree indigenous to the Celebes and Macassar, yields a fruit known as the Celebes Mangosteen. It is somewhat larger than the Mangosteen proper, but in quality is greatly inferior. *Garcinia pendunculata*, a robust evergreen tree which attains a height of fifty or sixty feet, has rich yellow fruit which often reaches two pounds in weight. The fruit is intensely acid, and in India is used by the natives in localities where it grows as a substitute for the Lime. It is a native of Southern India. *Garcinia picturata*, another Indian evergreen species which becomes a tall robust tree, yields fruit whose seeds supply an oil, which is used to a large extent as a substitute for "ghee." *Garcinia purpurea*, also a robust evergreen tree indigenous to Southern India, is known as the Mate Mangosteen. The fruit of this species is smooth, and both skin and flesh are of a deep purple colour. In flavour the pulp is somewhat acid, but agreeable, though vastly inferior to the Mangosteen proper. The seeds yield an oil from which is made an article of food in India known as Kakum butter.

Cultivation and Propagation.

The Mangosteen and its kindred species, being natives of the tropics, can only be cultivated successfully in warm and moist regions. Probably suitable localities may be found for them in the northern coast districts of Queensland and North Australia. It is perfectly useless, however, to attempt the cultivation of these trees unless the climatic conditions are favourable. In suitable localities the Mangosteen is well worthy of attention as a fruit, and should be generally cultivated. It will thrive in any fairly good soil, but does best in a friable sandy loam, which should be worked deeply, and drainage provided when necessary. Shelter must be provided when it does not exist naturally, as the trees will not stand exposure to strong winds. The trees in a plantation should stand not less than twenty feet apart, in order to allow room for free development. As ornamental trees the Mangosteen and other species of *Garcinia* may be planted with advantage in congenial localities, as their bright evergreen foliage is very attractive. Propagation is most usually effected by seeds, which should be planted an inch and a-half deep. Plants, however, may, if necessary, be readily obtained from layers, and ripened cuttings of the current season's wood may be rooted in sand if protected from sun and wind.

MANILLA TAMARIND.

This name has been given to an evergreen tree belonging to the natural order Leguminosæ, known botanically as *Inga dulcis*, whose fruit is somewhat similar in appearance to the real Tamarind (*Tamarindus indica*). The tree attains the height of about thirty feet, has finely cut

foliage similar to an Acacia, and bears yellowish-green flowers. The fruit is produced in pods, or beans, two or three inches long, which contain a sweet edible pulp that is both pleasant and wholesome. It is used to some extent by the natives of Manilla and other places in the Philipine Islands, hence the common name. It is also known as the "Sappan" tree. Though the Manilla Tamarind is now freely dispersed through the Philipine Islands and other parts of Asia, it is supposed to have come originally from Mexico. The wood is hard, fine-grained, and suitable for a variety of purposes. A somewhat similar fruit, both in appearance and quality, known as the Sweet Tamarind, is obtained from *Inga edulis*, a very closely allied species. Both species will thrive in regions ranging from tropical to medium warm, and are worthy of attention both as fruit-bearing and ornamental plants. They also make excellent hedges. Propagation is most readily effected by seeds, which should be planted an inch and a-half deep. Plants may also be obtained by cuttings of ripened wood of the current season's growth.

MARMALADE PLUM.

This name has been given to the fruit of *Lucuma mammosa* (*Achras mammosa*), a handsome evergreen tree of medium size belonging to the order Sapotaceæ, and a native of South America. The fruit is as large as an Egg Plum, and the pulp tastes somewhat like marmalade, hence the common name. Sometimes the tree is called Marmalade Tree. Several other species of *Lucuma* yield rich and palatable fruits. The Marmalade Plum and its kindred species can be grown successfully in sub-tropical regions, as also in other localities in the warmer districts where there is no trouble from frosts. They are all handsome trees with fine foliage, and are worthy of being cultivated either for ornament or fruit in congenial localities. Any fairly good soil is suitable, but the trees should be sheltered from high winds. Propagation is most generally effected by seeds, which should be planted an inch and a-half deep. Plants may also be obtained from layers, and cuttings from the ripened wood of the current season's growth will strike in sand if protected.

MARMALADINAH.

This is the vernacular name for *Alibertia edulis* (*Melanopsidium nigrum*), an evergreen tree of medium growth indigenous to Brazil and other tropical parts of South America. It belongs to the natural order Rubiaceæ (Cinchonacæ of some botanists). The tree has handsome foliage, creamy white flowers, and pleasantly flavoured Plum-like fruit. Being a tropical tree the Marmaladinah can only be cultivated successfully in the warmer portions of Australia, where it is well deserving of attention both for its fruit and as an ornamental plant. Naturally this tree flourishes in the driest regions of tropical America, and, therefore,

would probably prove suitable for many of the warm interior portions of Australia. The tree will adapt itself to almost any soil or situation, provided there is effective drainage. Propagation is easily effected by seeds, which should be planted an inch and a-half deep. Layers will root readily, and ripened cuttings of the current season's growth will strike in sand if protected from the weather.

MEDLAR.

History and Uses.

This fruit is not cultivated to any great extent, and is not likely to be used extensively, but many people are partial to it, and it is worth a place in an orchard. Botanically it is generally known as *Mespilus germanica*, and it belongs to the natural order Rosaceæ. The name comes from *mesos* (a half) and *pilos* (a bullet), in allusion to the peculiar form of the fruit. Some modern botanists have discarded the name Mespilus, and call the tree *Pyrus germanica*, which, in English, means German Apple. The tree is closely allied to the Apple, but the fruit is harder, more austere, less juicy, and cannot be eaten till it is well advanced towards decay. When the fruit arrives at this stage it is highly appreciated by many, but on the other hand, the Medlar is by no means generally popular. Medicinally the fruit is considered to be wholesome and slightly laxative. The Medlar is indigenous to the south of Europe and Western Asia, being a middle or small-sized tree covered with spines in its wild state. It seems to have been naturalised throughout the greater part of Europe, but its use has always been limited, and no traditions exist respecting it as is the case with most other fruits that have been long known. The Medlar is of slow growth in comparison with the Apple and the Pear, but under favourable conditions it will live to a great age. The wood of the Medlar is very hard and durable, and is utilized to some extent in Europe by turners and cabinet makers.

Cultivation.

The Medlar will thrive in many parts of Australasia, excepting tropical regions, and will do in any ordinary fair soil. In preparing the ground for this fruit stir deeply, and provide for drainage where necessary. If planted in orchard fashion the trees should be placed about eighteen to twenty feet apart. As, however, two or three trees will generally be sufficient in a garden, they may often be planted with advantage in odd corners, where they will not interfere with other kinds. They may also be planted with advantage in miscellaneous shrubberies, as their bright foliage and fruit make a fine contrast with many other trees. But little pruning is required, all that is necessary being to regulate the growth of young trees and to thin out the heads of older ones when the branches are too numerous. The ground should be kept as free from weeds as

circumstances will permit, and the surface soil ought to be mulched early in the summer to conserve the moisture as much as possible.

Propagation.

Propagation may be effected by seeds, cuttings, layers, budding, and grafting. Seeds are slow to vegetate, and often do not germinate till the second year. Cuttings strike freely, but they do not make such good trees as can be obtained by other means. The same remark will apply to plants raised from layers. Grafting and budding are the most generally practised methods of propagation, as the strongest plants are obtained by these means. The stocks may be either seedling Medlars or whitethorns, the latter affording very good trees. Unlike most other cultivated fruits, the varieties of Medlars are not numerous, and, consequently, a selection is easily made.

Varieties.

The varieties are as follows :—

Dutch (*Broad-leaved Dutch*, *Large Dutch*).—This is the kind most generally cultivated, as the fruit in size is greatly superior to that of the other sorts. It is sometimes two and a-half inches across, and very much flattened. The eye is very wide and open, and unequally rent, sometimes to the circumference of the fruit. In flavour the fruit is good, but somewhat inferior to the Nottingham.

Nottingham (*Narrow-leaved Dutch*, *Small-fruited*).—This kind is in size considerably smaller than the Dutch, but is more highly flavoured. Its fruit is usually about one and a-half inches in diameter, and turbinate.

Stoneless (*Sans Noyau*, *Sans Pepins*).—This is a very small-fruited variety, in shape resembling the Nottingham, but somewhat inferior in flavour. It is rarely more than one inch in diameter, and quite free from seeds or woody core.

MELON.

History and Uses.

Melons, strange to say, are usually classed with vegetables, which is probably owing to the fact that they are annuals, and generally cultivated as kitchen-garden plants. They are, however, justly entitled to a prominent position among other fruits. The plants are known botanically under the name of *Cucumis*, and they belong to the natural order Cucurbitaceæ, or Cucumber family, which also embraces the Pumpkin, Gourd, Squash, and Vegetable Marrow. The name Cucumis comes from *curvus* (crooked), in allusion to the form the fruit of the Cucumber usually assumes when growing naturally.

The Rock, or Sweet, Melon is known as *Cucumis melo*. Melo is the

Greek word for Apple, and is the source of the common name. It is supposed to be a native of India or Persia, but as it has been widely distributed in Asia, Africa, and the south of Europe from a remote period in the world's history, it is somewhat doubtful as to where the Melon originated. History informs us that the Melon has been a popular fruit from time immemorial, and that it was highly appreciated by the nations of antiquity. Report says this fruit was first taken to Italy from Armenia by the Roman general Lucullus about seventy years before the Christian era. According to their writers the Melon was a fruit highly prized by the ancient Romans. Both Pliny and Columella inform us that the Emperor Tiberius was particulary fond of Melons, and they describe contrivances by which they were procured for him at all seasons of the year. These were buildings or pits heated with fermenting materials upon a similar principal as the hot beds of modern gardens. This appears to have been the earliest record of plants being grown in artificially-heated structures. Shortly after the Melon was taken to Europe a distinct kind either originated in, or was introduced to, a village a short distance from Rome, called Cantalluppi, and became very popular. This kind is supposed to be the source of the Cantaloupe section, which is quite distinct from the others. From Italy the Melon soon spread to various parts of Europe, and in the warmer countries it quickly became popular. There is no authentic record of the Melon being introduced to England before towards the end of the sixteenth century. When first grown in that country the plant was generally known as the Musk Melon, from the peculiar and agreeable scent of the ripe fruit. This name, however, has been discarded for some years, and when it is necessary to distinguish the fruit from others of the same family, it is usually called the Sweet, or Rock, Melon.

The Sweet Melon is an annual, and naturally a climber when it has the opportunity, but failing that it becomes a trailer. It has fruit richer in flavour and more luscious than that of any other plant belonging to the same natural order. In Arabia, Persia, and other parts of Asia Melons are an important item of diet, and are extensively used as food by the natives of those countries for several months in the year. They also supply a liquor, which is a popular beverage in the countries named, where its use is general. This liquor is obtained by piercing the fruit when fully ripe, and making a hole to the centre of the pulp. The opening is then securely stopped with wax, and the fruit allowed to remain on the stalk for three or four days, when the liquor is ready for use. A palatable liquor can be obtained from the fermented juice of the Melon, and when this is distilled it yields a strong spirit.

Cultivation.

Rock Melons can be grown successfully in any good garden soil, but they thrive best in a rich, open, sandy loam. They are strong feeders, and require plenty of nourishment; therefore, well-rotted manure should be freely used when the ground is prepared. It is advisable to work the ground deeply and thoroughly, and, when necessary, drainage must be

provided for. A common plan is to make holes three or four feet in diameter, and from fifteen to eighteen inches deep, filling them up again with manure and soil. This method is not to be commended, and more especially in stiff retentive land, as the holes, though filled in, will after heavy rains be so many tanks of water, greatly to the detriment of the plants. The better plan is to work the whole of the ground, and put in drains where they are required. In loose sandy or gravelly soils, where the water can soak away freely, there is no particular objection to the system of making holes. As the plants are very tender, it is useless to sow or plant in the open ground till all danger from frost has passed. In the warmer parts of Australia a commencement may be made about the latter end of August, but in the cooler districts it will be safer to wait till several weeks later. In all cases it will be advisable to give a little protection till the young plants are firmly established.

The most usual mode of sowing is to put in from six to nine seeds three or four inches apart, covering them about an inch deep. Between each of these clusters a space of nine or ten feet is left. When the first pair of rough leaves make their appearance the plants are reduced in number to the three strongest. If required, those that are removed may be transplanted, as the plants, when young, bear shifting very well. Some growers prefer rows of single plants, leaving them about two feet apart in the lines. If early plants are required they may be obtained by putting seeds in pots or boxes filled with rich soil, which may be placed in a hot bed. As soon as the first pair of rough leaves make their appearance the young plants should be potted off singly into small pots, and shifted into larger ones as growth advances. They must be kept steadily growing till the season is sufficiently advanced for planting them out. Care must, however, be taken that they do not become drawn and weakly, and in order to prevent this they should be kept near the glass, and air freely admitted when the weather will permit.

As soon as the plants begin to cover the ground their branches should be regularly distributed and fastened with pegs to keep them in their places. The surface soil should be kept loose by frequent stirrings, and ought to be covered with a mulch three or four inches deep as the branches advance in growth. It is advisable to stop the main shoots at the fourth or fifth joint beyond where a fruit has set in order to promote the growth of lateral branches. These laterals may again be stopped at two or three joints beyond the fruit. Melons and all other plants belonging to this family produce both male and female flowers, the latter being easily distinguished by the embryo fruits being attached to them. These will not mature unless fertilized by the pollen from the male flowers. This is generally effected by the aid of insects, which travel from one flower to another. Sometimes, as for instance when the plants are grown in houses or frames, it is necessary to fertilize by artificial means. This is easily effected by dusting the pollen of the male blossoms over the others with a feather or camel's hair pencil. When the female flowers are fertilized, the fruit begins to swell, and after a sufficient number have set according to the strength of the plants all blossoms

should be removed as soon as they make their appearance. When the fruits attain the size of a large hen's egg it will be advisable to place under each a piece of wood, stone, or slate to prevent them from being injured through resting upon a damp soil.

While the fruit is swelling, the plants may be freely supplied with water in dry weather. When, however, growth is complete, and the fruit is ripening, water is not required, and will do more harm than good, as it lowers the quality of the fruit. The flavour of the fruit may be also materially influenced by the state of the weather at the ripening period. Bright and dry weather is more favourable to the development of high flavour than dull or wet days. Plenty of light and air are essentials in the development of high quality, and sometimes, when too numerous, the branches will require to be thinned out. Care must, however, be taken not to remove too much of the foliage, as a certain proportion should be left for shade. When exposed just before the ripening period to the full power of the sun, the fruit runs a chance of getting scorched and spoiled. In order to lessen this risk it will be advisable to place a handful of straw, grass, or similar material over each fruit. By adopting this plan the fruit will be prevented from scorching to a very large extent. Ripeness is indicated by the change of colour and the development of the rich perfume, as also by the foot-stalk cracking away from the fruit. The last-named indication is the best, as it shows that the fruit has reached the most perfect stage of ripeness.

In the United Kingdom and the northern parts of Europe the Melon is often grown entirely by artificial heat with great success. This practice is scarcely necessary in this part of the world, where the climatic conditions are more congenial to the plant. It may, however, be advisable to adopt it in the colder districts, and also when fruit is required out of the ordinary season. Plants can be grown successfully in frames or houses heated by stable manure, tan, leaves, or other material in a strong state of fermentation, or, better still, by the use of hot water.

Propagation.

Melons are usually propagated by seed, but they may be readily increased by cuttings if desirable. In saving seed the most perfect and finest fruit should be selected for the purpose. Plants of this family are readily hybridized, and varieties cannot be obtained true if others belonging to the same genera are growing near enough to have an influence. The seed will retain its vitality for ten or a dozen years, and has been known to keep good for more than twenty years. Some authorities consider new seed to be greatly inferior to the old, because they suppose plants raised from the former have a greater tendency to run to vine, and to be less fruitful than plants from older seed It is doubtful, however, whether there are any solid grounds for this supposition. Many growers prefer seed when it is four years old to that of any other age. Cuttings will strike freely if taken off below a joint and inserted an inch deep in sand or light soil. These plants, as a rule, are very prolific, but, generally speaking, they are less robust than

seedlings. This method of propagation is seldom adopted except in the case of new varieties which are required to increase quickly, or when seed cannot be readily obtained.

Classes.

Rock Melons are classed in two divisions, which are known respectively as Green-fleshed and Scarlet-fleshed. Each division embraces a large number of varieties, and these are to be found in seedsmen's catalogues. These, however, often get so mixed by natural hybridization that there is much confusion respecting them, and they are sometimes not easily recognised. Unless the seed can be saved without risk of its being affected by other members of the family growing in the same locality, a variety cannot be depended on. Owing to this difficulty seed of the most reputable varieties will often produce plants that yield fruit different in many respects to what has been expected. Taking these matters into consideration, no useful purpose will be served by giving a list of varieties.

Water Melon.

The Water Melon (known as *Cucurbita citrullus* or *Cucumis citrullus*) is a very popular and useful fruit in tropical and semi-tropical countries. It is naturally a very widely dispersed plant, and it is indigenous to Western Asia, the south of Europe, Egypt, and South America. The fruit, which often attains a considerable size, is sweet, very succulent, and cooling. It is highly prized by the natives of Egypt, Syria, Turkey, and other warm countries in Asia, Africa, and America, where it is extensively cultivated. It thrives well in the warmer parts of Australia, but it is not so well adapted for the cooler regions, though it may be cultivated successfully in these localities with a little extra care. In its cultivation this plant requires similar treatment to that recommended for the Rock Melon, but it is more hardy and vigorous, and requires more space between the plants. Growers will often, and more especially in cold late districts, find it an advantage to forward the plants by raising them in heat, and so getting a start early in the season. Too frequently the plants are late in making their growth, aud, as a consequence, the fruit is small, deficient in quality, and comes in so late that it is not properly appreciated. There are numerous varieties of the Water Melon in the catalogues, but as they readily mix they are somewhat confused. The best fruits are those that have a red or deep pink pulp, with plenty of juice. Ripeness may be ascertained by lightly pressing on the Melon with the hand, when, if mature and fit for use, the fruit will be heard to crack slightly.

MELON SHRUB.

History and Uses.

The plant known under this name is *Solanum Guatamalense*, a small

and somewhat shrubby species of a large family that is the type of the order Solanaceæ. It is, as the specific name implies, a native of Guatamala and other tropical parts of South America. The fruit is the size of a small Apple, globular, and in colour is yellow, splashed with violet. Its flavour has been described as a blending of Rock Melon and Tomato, but, as with many other fruits, a taste has to be acquired before it is relished by most people. The fruit is used to a considerable extent in its native regions, and is highly appreciated. Various other species of Solanum produce fruits somewhat similar to that of the Melon Shrub, and may be classed under the same heading. The principal of these are as follows:—*Solanum Æthiopicum*, a herbaceous species from tropical Africa, with large, red, globular fruit; *Solanum edule*, a species from Guinea, with yellow fruit the size of small Apples; *Solanum Gilo*, a species from tropical America, with round orange-coloured fruit; *Solanum macrocarpum*, a perennial herbaceous species indigenous to Mauritius and Madagascar, with globular yellow fruit the size of small Apples; *Solanum Quitoense*, a shrubby species indigenous to South America from Equador to Peru. The fruit in size, shape, and colour is somewhat similar to a small Orange. and has a rich fragrant flavour. *Solanum torvum*, a shrubby species indigenous to the West Indies and tropical America, has medium-sized, yellow, round, well-flavoured fruit. Fruit of good quality is also yielded by *Solanum Plumiera*, a West Indian species. *Solanum Topiro* and *Solanum sisymbrifolium*, the two latter from South America. An Australian shrubby species, *Solanum vescum*, called by the aboriginals "Gunyang," yields an edible fruit, but must be fully ripe when eaten, or otherwise it has deleterious properties. It is indigenous to South Eastern Australia and Tasmania.

Cultivation and Propagation.

The Melon Shrub and kindred species of Solanum are worthy of attention as fruit-yielding plants in localities suitable for their growth. They may be also classed as useful ornamental border plants, the species bearing flowers, either white or of different shades of blue, in profusion, and in succession for long periods. The high-coloured fruit of some of the species also adds to their value as ornamental plants. The species named vary to some extent in hardiness, according to the countries they come from, and, as a matter of course, those from tropical regions are more tender than others. They are specially well adapted for the warm and medium warm regions of Australia, where the Melon Shrub and other shrubby kinds will thrive with little care. These plants may be also grown successfully in the cooler parts of Australasia if treated in the same way as the Egg Plant or Tomato, *viz.*, placing them in the open ground when all danger from frost has passed. Respecting the details of cultivation and propagation, the same directions will apply in every particular to those given in the article upon the Egg Plant in volume 1.

MEXICAN BANANA.

This name has been given, in Texas and California, to the fruit of

Yucca baccata, a low evergreen shrub with long narrow foliage belonging to the natural order Liliaceæ, or Lily family. The plant is also known as the Dagger Plant, Spanish Bayonet, Datile, Wild Banana, and Wild Date. It bears creamy white, waxy, bell-shaped flowers upon a tall central spike, and these are followed by fruits the size of small Bananas and somewhat similar to them in appearance. The fruit has a sweet taste somewhat similar to a Fig, and is fairly palatable. This plant is indigenous to Colorado, Mexico, Southern California, Texas, and other parts of North America. This plant is able to withstand long and severe droughts with comparative impunity, and it is, therefore, well suited for the dry interior districts of Australia. As a fruit-bearing plant, however, it is scarcely worth cultivating, as there are far better kinds, but in some cases it may be utilized with advantage. The plant, however, yields a valuable commercial fibre, and is worthy of being cultivated chiefly on that account. It will thrive in any fairly good soil, and may be grown successfully in all but the coldest parts of Australasia. If grown for a fibre crop, the plants should stand twelve feet apart, in rows. Propagation is effected by suckers, which are freely produced from the roots of old plants.

Mexican Banana.

MISSEL.

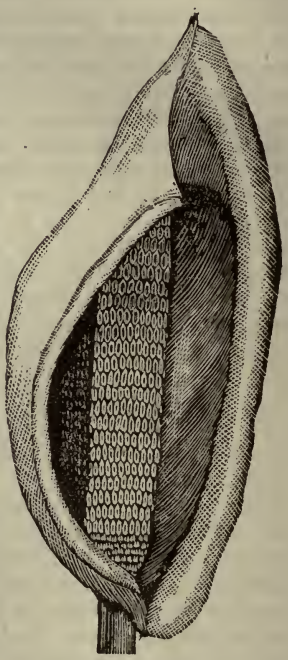
This is the vernacular name in Guiana for the fruit of *Blakea quinquenervia*, a small evergreen tree, indigenous to the West Indies and some parts of tropical America, belonging to the natural order Melastomaceæ. It has handsome white flowers and fine foliage, and, therefore, is worthy of attention as an ornamental plant. The fruit is a yellow berry, enclosed in a bell-shaped calyx. It has a rich pleasant flavour, which has been likened to that of Raspberries and cream. The Missel, being a native of warm regions, as a matter of course, can only be successfully cultivated in the tropical or sub-tropical parts of Australia. In congenial localities it is worthy of attention as a fruit tree and as a handsome ornamental plant for the shrubbery. Any fairly good soil is suitable, but the most favourable is a rich sandy loam containing a good proportion of vegetable

matter. Propagation can be effected by seeds, which should be planted an inch and a-half deep. Layers root readily, and plants may also be obtained from ripened cuttings of the current season's growth, which will strike in sand if protected from sun and wind.

MONSTERA.

History and Uses.

The fruit known under this somewhat curious name is the product of *Monstera deliciosa*, an evergreen climbing plant with handsome foliage, belonging to the order Aroideæ (Araceæ of some botanists), or the Arum family. The meaning of the generic name is unknown, but the specific one (*deliciosa*) is in allusion to the rich and grateful flavour of the fruit. The plant is a native of Mexico, Guatamala, and other parts of tropical America, and in its natural habitat attaches itself to trees by strong ærial roots. Formerly the plant was known as *Philodendron pertusum*, the generic name being derived from *Philo* (to love) and *dendron* (a tree), in allusion to its climbing habit. The plant has also passed under the name of *Tornelia fragrans*. The leaves are large and thick, borne upon long foot stalks, and much divided on the margins, as will be seen by the illustration. They are also curiously perforated with irregular holes. The flowers are large, yellowish at first, enclosed in spathe which afterwards opens partially, and eventually drops off, leaving the fruit, which has somewhat the appearance of a Pine-Apple, though longer and more slender. The fleshy fruit has a rich luscious flavour, and is highly appreciated in its native regions. The fruits mature in succession, and remain in season for three or four months. Maturity is not indicated by any change of colour, as is the case with most other fruits, but may be known by a fragrant odour and by the covering scales at the base beginning to drop off Ripeness commences at the base, and proceeds gradually after the fruit is cut Unless it is thoroughly ripe the fruit will lack perfection, and probably fail to give satisfaction. Very often persons eating this fruit are troubled by a slight tickling sensation in the throat, which is caused by minute sugar crystals, but the sensation is but momentary, and causes no trouble.



Fruit of Monstera.

Plant of Monstera.

Cultivation and Propagation.

The Monstera can be cultivated from tropical to medium warm regions in well sheltered situations. It will do well in the greater part of Queensland, the northern coast river districts of New South Wales, and other regions having somewhat similar climatic conditions. It requires a rich open soil where its roots can penetrate deeply in search of moisture. When the soil is suitable the roots will make their way for a considerable distance from the stem. As the plant is a climber it must have a support, one of the best being the trunk of a dead tree. But this kind of support is not always available, and more especially in making a regular plantation. Stout posts about nine inches in diameter and eight or nine feet long will, however, make very serviceable supports, if firmly fixed in the ground. Posts with forks or branches will, as a rule, prove more serviceable than plain ones. A somewhat shady situation during the hottest part of the day is most congenial to the *Monstera*, as when fully exposed the foliage is apt to get burned and injured. Therefore, artificial shade should be provided when it cannot be had naturally. Planting should be done late in the summer or early in the spring. The young plants should be fastened to their supports at first, but the ærial roots will soon take a firm hold. The plants are prolific, and will generally begin to bear regular crops in three or four years. It takes a long time for the fruit to reach perfection, as the crop of one season does not ripen till the next one. The plants, when growing under favourable conditions, will bear freely for many years. In addition to the value of the *Monstera* as a fruit-producing plant, it is very ornamental, and worthy of cultivation on that account in suitable localities, and also as a pot plant in colder regions. Propagation is usually effected by layers, formed by simply placing stems upon the surface of the ground. These will throw out roots at nearly every joint, and nothing more is necessary than to cut through the stems and lift the young plants when they are ready for removal.

MULBERRY.

History and Uses.

The Mulberry is known botanically under the name of *Morus*, and belongs to the natural order Urticaceæ, or the Nettle family. Morus comes from the Celtic *mor*, and signifies black, in allusion to the colour of the fruit of the common Mulberry. The family embraces a large number of species, which are widely distributed, representatives being found indigenous to Australia, China, India, Japan, Mauritius, Persia, Tartary, Turkey, North America, and South America. Most of these are deciduous trees, but some few are evergreens.

The only species that is generally cultivated for the sake of its fruit is the English, or Black, Mulberry, a tree familiar to everyone,

and to be found in most fruit gardens. This species, know *nigra*, is supposed to have originated in some part of Central Asia, and to have been taken to Greece and Rome at an early period, and in both countries it appears to have quickly become a popular fruit. The fruit was supposed to have medicinal virtues by the Romans, who used it as a remedy for diseases of the mouth, windpipe, and stomach. They also used the leaves and roots as remedies for the same complaints. The Black Mulberry is supposed to have been introduced to England at the time of the Roman conquest, but there are no records of its cultivation in that country previous to the sixteenth century. With the exception of *Morus rubra* (Red Mulberry) the Black Mulberry is the hardiest, strongest, and largest species, and its fruit is superior to that of any other kind both in size and flavour. Though the trees are slower in growth than the other species, they possess more vitality and are longer lived. There are now trees in existence in England which are known to be over three hundred years old. The Black Mulberry is a wholesome and refreshing dessert fruit, and is excellent for tarts and puddings. It makes an excellent jam or jelly, and a palatable wine can be made from the fermented juice. The fruit, when not too ripe, makes a very tasty pickle with salt and vinegar. Mulberry juice also makes a first-class vinegar. The wood is tough and durable, and in Europe is turned to good account for various purposes. The bark is tough and fibrous, and is often used for making mats and baskets. For feeding silk-worms the leaves may be utilized, but they are not nearly so valuable for this purpose as the different varieties of *Morus alba* (White Mulberry).

Morus alba (White Mulberry).—This species is indigenous to some parts of India and China, and is largely used for feeding silk-worms. The species embraces a number of varieties, which differ more or less, but all possess the same essential properties. These are known as *rosea* (rose-coloured), *multicaulis* (many-stemmed), *Indica* (Indian), *Japonica* (Japanese), *Morettiana* (Morett's), *latifolia* (broad-leaved), *Sinensis* (Chinese), *pumilius* (dwarf), *Italica* (Italian), *tortuosa* (bending irregularly). All these are simply varieties of *Morus alba*. According to records that have been handed down, the silk-worm was introduced from China to Greece by two Persian missionary monks about the year 550. But we have no account of the introduction to Europe of the White Mulberry, which is the best for feeding silk-worms, till the latter part of the sixteenth century. Probably the Chinese have always used this kind, as, according to their historical records, that nation has practised sericulture for four thousand five hundred years. China, Japan, and Italy are now the principal sericultural countries, and the industry employs a great many people. *Morus alba rosea* is the favourite variety with many Italian and French growers, who consider it to be superior to all others from the thickness of the leaves and the amount of nourishment they afford to the silk-worms. *Morus alba multicaulis* produces a large bulk of leaves, but French sericulturists consider them to be too watery and to have a tendency to provoke disease among the

worms. The White Mulberry and its varieties may be grown successfully in any ordinary fair soil, and in most localities. The fruit is comparatively useless, but the wood is durable and the bark tough and fibrous like that of the Black Mulberry. As the trees do not attain so large a size as the other species, they may be planted much closer, and are often used for hedges or breakwinds. When grown for feeding silk-worms, the production of an abundance of leaves is the chief requirement, and the trees must be treated accordingly. They may be planted in rows about ten feet apart, and trained with low stems from one to two feet high. The plants must be kept dwarf by cutting back the branches every winter to one or two buds. By keeping the heads low the work of gathering the leaves is facilitated, while the close pruning causes a strong growth of foliage

Morus rubra (*Pennsylvanica*)—(Red Mulberry).—This is a North American species of robust habit, quick growth, and larger than any other kind, often attaining a height of sixty or seventy feet. In America it is sometimes cultivated for its fruit, which is, however, though palatable, far inferior to that of the Black Mulberry. The timber is compact and durable, and may be utilized for various purposes. In cultivation precisely the same treatment is required as is recommended for the Black Mulberry.

Morus celtidifolia.—A South American species indigenous from Peru to Mexico, to an elevation of eight thousand feet, yields an edible fruit, which, however, is far inferior to the Black Mulberry. A somewhat similar species is *Morus insignis* from New Granada, and found at an elevation up to eleven thousand feet.

Morus papyrifera (*Brousonettia papyrifera*)—(Paper Mulberry).—This is a quick-growing species, indigenous to China, Japan, and some of the South Sea Islands, that might prove worthy of attention, In Japan it is cultivated extensively for making paper, in the same way as osiers are grown for the basket-makers. When the leaves fall in the autumn the young shoots of the season are cut, tied in bundles, and boiled till the bark is loosened. The bark is then slit lengthways, stripped from the wood, and soaked in water till the coloured or external part will separate. The bark is then sorted, boiled till it can be easily separated by the fingers, and thoroughly washed. After that it is placed upon tables and beaten with wooden mallets till the pulp assumes the required consistence. It is next dressed with rice starch and an infusion of Manihot roots, and then the sheets are placed one by one on flat tables in piles and subjected to great pressure. Paper made in this way is coarse but strong, and the fibre can also be used for textile fabrics. The fruit and timber are of no value comparatively. Trees of this species are naturally rather small, and if cultivated for their bark, must be planted and treated the same as the White Mulberry. In all other respects the treatment required will be the same as recommended in the following directions for the Black and all the other species.

Cultivation.

The Black Mulberry may be grown in almost any soil and locality,

but it thrives best in a rich deep loam. Though no garden is complete without this fruit, yet, as it only lasts for a short season, a few trees will generally be sufficient for practical purposes. The trees are very vigorous, and will extend their roots a considerable distance, and, consequently, care must be taken that they are not too near to other trees. If they are within range of less robust trees they become great robbers when they get large. In planting let the ground be well loosened, and provide for drainage when necessary. Planting may be done at any time between the fall of the leaf and August. For the first few years the trees will require care in keeping down weeds and mulching, but when they get large they require but little attention in these respects. Young trees must be pruned and trained so as to promote strong growth and obtain well-formed specimens as soon as possible. The fruit of the Mulberry is borne upon the young growth, as also upon spurs from older wood. Mature trees require but little pruning as a rule, all that is necessary being to remove rank shoots or misplaced branches and to thin out the wood when too crowded. Root pruning will sometimes have a beneficial effect in tne case of over-luxuriant trees that do not bear freely. Before the ripening period it will be advisable to cover the ground as far as the branches extend with clean grass, straw, or some other material, so that when the fruit falls it will be kept clean.

Propagation.

Propagation with all classes of Mulberries may be effected by seeds, cuttings, layering, grafting, and budding. Seeds are but seldom used, as trees can be raised so much quicker by other means. They should be sown early in the spring in light rich soil, covering them about a quarter of an inch deep. Cuttings strike very freely, and, as branches of any size will root, large trees may quickly be obtained by this means. It is no uncommon thing for branches ten or twelve feet long to be struck without difficulty. Ordinary cuttings are usually selected from the last season's wood, shortened to about fifteen inches long. These are planted about half their depth in the ground, previously removing the buds that would be below the surface. Layers strike freely, and this method is often adopted for rooting large branches quickly. Grafting and budding are but seldom practised, but occasionally they may prove serviceable methods.

MYRICA.

History and Uses.

Myrica is a genus of shrubs, or small trees, which form a section of the order Amentaceæ. The name is derived from *myrio* (to flow), in allusion to the habitat of some of the species, which are found on the

banks of streams. The genus includes both evergreen and deciduous species, natives of both temperate and tropical regions, and are widely distributed, representatives being found in Europe, North and South America, India, China, and South Africa. They have small drupaceous fruits, which, in several species, contain a large proportion of wax that is turned to good account commercially. Several species yield edible fruits that are used more or less in their native regions. *Myrica cerifera*, a deciduous, shrubby, North American species, is commonly known as the Candleberry, Bay Myrtle, and Wax Myrtle, owing to the large proportion of wax obtained from the fruit. This wax, which is of a greenish colour, is extracted by boiling and used in the manufacture of candles. Myrica wax is harder, heavier, and more brittle than beeswax. *Myrica cordifolia*, a South African evergreen shrub, yields a large proportion of wax. *Myrica serrata*, a dwarf evergreen shrub from South Africa, is another useful wax-yielding species, as is also *Myrica quercifolia* from the same region. *Myrica Gale* is the Gale or Scotch Myrtle, which is common in marshy land in North Britain. *Myrica rubra* is a fine ornamental species, indigenous to China and Japan, with edible fruit. It is an evergreen shrub or small tree. *Myrica Faya*, a small evergreen tree indigenous to the Azore and Canary Islands, as also Madeira, yields fruit that makes a palatable preserve. *Myrica sapida*, a handsome evergreen tree indigenous to India and Borneo, where it is found at an elevation of seven thousand feet, yields a somewhat palatable fruit which is eaten to some extent in its native regions.

Cultivation and Propagation.

The Myricas are all ornamental plants, and are worthy of cultivation on that account irrespective of any value they may have as producers of edible fruits and wax. As the various species belong to such widely different regions there need be no difficulty in making a selection suitable for any part of Australasia. Some species will flourish near to the tropics, others in cool mountain regions, and many in the medium districts. Some kinds will thrive in poor sandy or peaty land, and others flourish near to the sea coast. Propagation is easily effected by seeds, which should be planted an inch and a-half deep. Plants may be readily obtained from layers put down in the autumn or spring, and cuttings of the last season's wood for deciduous species, and the ripened current year's growth for evergreens, will strike in sand.

MYRTLE.

History and Uses.

Though Myrtles are usually regarded as merely ornamental plants, yet several species yield edible fruits that are utilized more or less.

The genus is the type of the very large order Myrtaceæ, and embraces a great many species, the majority being evergreen shrubs, while a few are small trees, and, in one or two exceptional cases, large ones. The fruits are somewhat similar to Guavas and Eugenias, which are closely allied. One of the finest kinds is *Myrtus edulis*, a handsome tree growing to the height of twenty-five feet, indigenous to Uruguay, which yields pleasantly flavoured fruit as large as a small Apricot. *Myrtus incana*, a dwarf shrub from the River Plate, yields small but pleasantly flavoured berries, which are eaten raw, and make a palatable jelly. *Myrtus mucronata*, a rather dwarf species from the same region, yields fruit the size of small Grapes, which has a pleasant flavour. *Myrtus tomentosa*, a medium-sized shrub indigenous to India and China, produces dark purple berries the size of Cherries, which have a sweet aromatic flavour. *Myrtus nummularia*, a trailing plant indigenous to South America from Chili to Patagonia, is the Cranberry Myrtle. It bears small fleshy fruit that has a sweet and agreeable flavour. *Myrtus Ugni* is a hardy shrubby species indigenous to Chili, whose small but pleasantly flavoured fruit is known as the Chilian Guava. Other species of Myrtle also yield edible fruits, and are, therefore, worthy of attention.

Cultivation and Propagation.

All the Myrtles are compact ornamental plants, and very desirable for gardens and shrubberies. The greater number of the species are fairly hardy, and will adapt themselves to a great variety of soils and climate. Some kinds again are specially well adapted for the colder regions of Australasia. Propagation can be effected by seeds, which should be covered an inch and a-half deep. Plants can be readily obtained from layers, which should be put down late in the summer or early in the spring. Cuttings of the fairly ripened wood of the current season's growth will strike in sand if protected from sun and wind.

NARRAS.

This is the aboriginal African name for the fruit of *Acanthosicyos horrida*, a curious, erect, thorny shrub belonging to the order Cucurbitaceæ, or Cucumber family. It is indigenous to Angola, Benguela, Dammerland, and other parts of South Africa. The plant grows and thrives in barren sandy wastes, and seems to be quite independent of rainfall. This is owing to its wonderfully strong roots, which penetrate many feet deep into the soil in search of moisture. The plant has no leaves but is plentifully supplied with formidable double spines, and the bushes when growing together, soon make an impenetrable thicket or hedge. The fruit is the size and colour of a large Orange, and is thickly covered with short bristles. The pulp has a pleasant acidulous flavour, and is said to be very wholesome

and nourishing. The seeds are also edible, and used extensively by the Africans. The Hottentots are very partial to the fruit, and are said to fatten when they feed upon them, as they do in localities where they grow. The plants are wonderfully prolific, and over two hundred fruits are said to have been counted upon a single bush. Probably the Narras would be found a useful plant in the dry interior districts of Australia, where the rainfall is limited, and it is worth trying. It will afford palatable fruit and nourishing food in dry arid regions where but few other plants will exist, and it may be used with advantage to bind shifting sands. On the other hand, however, care must be taken to keep the Narras plant under control, as it is of strong growth and rambling habit, and possesses great vitality, so if allowed to spread it will probably become a noxious weed like the Prickly Pear and Sweet Briar in some localities. Propagation is easily effected by seeds, which should be planted an inch and a-half deep. Plants are also readily obtained from layers and cuttings.

NATAL PLUM.

This name has been given to the fruit of two species of *Arduina*, handsome small evergreen shrubs, indigenous to South Africa, belonging to the order Apocynaceæ. The fruit is also known as the Matingola Plum. *Arduina bispinosa*, which is remarkable by the stout twin spines upon its branches, hence the specific name, has bright green foliage, and bears in profusion white highly perfumed flowers, which are produced in succession for a long period. The fruit is oval, the size of a small Plum, and has a pleasant refreshing flavour. *Arduina grandiflora* is somewhat similar, but is rather more robust, and has larger flowers. Both species will thrive in most parts of Australasia, excepting tropical regions and localities where frosts are severe. They will thrive in any ordinary good soil, and should be generally cultivated as garden shrubs. Propagation is easily effected by seeds, which should be covered to the depth of half-an-inch. Plants can be quickly obtained from layers, which root readily, and more especially if put down late in the summer or early in the spring.

NEGRO PEACH.

The fruit known under this name is produced by *Sarcocephalus esculentus*, an evergreen shrub belonging to the order Rubiaceæ, indigenous to the west coast of Africa. Its flowers are small, produced in terminal heads, and the fruit consists of a number of one-celled berries, which are united together, and assume a form somewhat similar to a Peach, though more irregular, but widely different in colour and quality. Its colour is brown of varying

shades, and the surface is covered with small tubercles. The centre of the fruit consists of a firm and somewhat dry pulp, but this becomes softer and more palatable as it approaches the outer covering, the flavour being somewhat similar to a Strawberry. The pulp, however, is somewhat fibrous, and contains many seeds. The fruit is greatly esteemed by the natives of West Africa, and hence its common name. Being a native of tropical Africa, the Negro Peach can only be grown successfully in the warmer regions of Australia. It thrives best in a rich open soil, but may be grown successfully in any fairly good ground. Plants are easily obtained from seeds, which should be covered half-an-inch deep. Propagation is also readily effected by layers, and cuttings from ripened wood of the current season's growth will root in sand if protected from the weather.

OAK CHESTNUT.

This is the vernacular name for various species of *Castanopsis*, a genus closely allied to the Sweet Chestnut, and belonging to the order Amentaceæ. They are all tall, handsome, robust trees, and the family is represented by Chinese, Californian, and Indian species. The nuts are smaller than Chestnuts and have a pleasant flavour. The Californian Oak Chestnut, or Chinquapin as it is commonly called, is *Castanopsis chrysophylla*, a fine lofty tree growing, under favourable conditions, to a height of over a hundred feet, but in very poor soils growth is often much smaller. The nuts are similar in size and shape to those of the Hazel, but somewhat more pointed, and the shell is hard. They have a sweet pleasant flavour. This species is indigenous to Western America from Oregon to Monteroy, and grows in mountain regions up to an elevation of six thousand feet. It yields excellent timber, which is used to some extent by joiners, wheelrights, aud other tradesmen. The Chinese Oak Chestnut is *Castanopsis jucunda*, a robust species with pleasantly flavoured nuts. *Castanopsis argentea*, a handsome tall species indigenous to mountain regions in India, yields pleasantly flavoured nuts. The same may be said of *Castanopsis Indica*, another Indian mountain species. Other species of *Castanopsis* are also worthy of attention. All the species yield serviceable timber as well as edible nuts, and being also handsome ornamental trees they may be cultivated with advantage. They will thrive in most parts of Australasia, the exceptions being tropical or arid interior regions. Oak Chestnuts will adapt themselves to a variety of soils, but, as a matter of course, will thrive best and attain the largest size in deep rich land. Propagation is effected by seeds, which should be planted an inch and a-half deep.

OLIVE.

History.

The Olive belongs to a family that embraces a large number of

species, all of them being evergreen trees or shrubs, which may be utilized for garden decoration. No family of plants is more widely dispersed over the world, as species are found indigenous to the south of Europe, North Africa, Cape of Good Hope, North America, Syria, India, China and Australasia. Botanically the genus is known as *Olea*, and it is the type of the natural order *Oleaceæ*. The name is derived from Elaia, the Greek for Olive. The most valuable species is *Olea europea* (known also as *Olea sativa*), from which the Olive oil of commerce is obtained. This species, notwithstanding its specific name, is supposed to have been introduced to Europe from Asia by the Greeks at a very early period. The Olive appears to have been highly valued by all the nations of antiquity, and it is frequently mentioned by their historians, both sacred and profane. According to the Hebrew traditions, when Noah was in the Ark an Olive branch was brought to him by the bird he had sent forth, as a sign that the great flood was subsiding. From this circumstance the Olive has been generally accepted as the emblem of peace by the Jewish and Christian nations. By the early Greeks the Olive was held in the highest veneration, and the oil was freely used at religious ceremonies in libations to the gods, whilst its use for dietary purposes was general. Branches of the Olive also formed the wreaths of the victors in the Olympic games. In the fables of this nation, Minerva and the Graces are represented as being crowned with Olive branches. When the festivals in honour of Minerva were held it was customary for all who attended to make contributions of Olives. Those who excelled in the public games at these festivals were crowned with wreaths of Olives obtained from the Grove of Academus, near Athens. Plato having established a school of philosophy in this locality, all places of learning were afterwards called *academies*, and hence the modern name. In the Greek mythology there is a curious but interesting account as to the origin of the Olive. According to the fable a dispute arose between Neptune and Minerva as to which of them should have the right to give a name to a new city built by Cecrops. As they could not agree the dispute was referred to a council of the gods, who decided that the contestant who produced the most beneficial gift to mankind should have the preference. Neptune, striking the ground with his trident produced a horse, and Minerva caused an Olive tree to spring from the ground. The assembled gods gave their decision in favour of Minerva, as they considered that the Olive, being the emblem of peace, was better for mankind than war, which the horse was supposed to typify. By other ancient nations the Olive was also held in high esteem, and was supposed to possess many valuable qualities. By the Hebrews, Egyptians, and Syrians the oil was extensively used for dietary and medicinal purposes. It was considered by these nations to be useful in chest diseases, cases of stone or gravel to open the urinary passages, and as an antidote for corrosive mineral poisons. Olive oil was generally used in baths, being supposed to warm the body and act as a preventative of colds. Wrestlers in the public games were also in the habit of anointing their bodies with Olive oil. According to Pliny, we learn that, excepting the Fig and Grape, no fruit

was held in such high esteem by the Romans as the Olive. There are two distinct types of *Olea europea*, one representing the plant in its wild state, and the other the improvement that has been brought about by cultivation. In its natural state the Olive is a small tree or shrub with spines on its branches, and producing but comparatively little fruit. This type is to be found in Greece and various parts of Western Asia and North Africa. The improved type is a taller and larger tree, which, under favourable conditions, will attain a heigh of thirty-five to forty feet, and whose branches are free from spines. It also bears much more freely than the wild type, the fruit being a drupe similar in shape to a damson, with a fleshy pericarp, which has a nauseous bitter taste.

Uses.

In modern medicine Olive oil is considered to be nutrient, emollient, and laxative. For chest diseases its use is often prescribed with advantage. It is freely used in the preparation of ointments, liniments and plasters. When rubbed into the skin by continued friction the oil is said to have proved a preventative of contagion from fevers and the plague. The bark, which is very bitter and astringent, is said to be an excellent substitute for Cinchona or Peruvian bark. For dietary purposes Olive oil is in great demand among the nations of Southern Europe, and it appears in some form at nearly every meal. The unripe fruit is extensively used as a pickle, and is considered to be serviceable in promoting digestion, increasing the appetite, and neutralizing the effects of intoxicating drinks. The Castile, or Spanish, soap is made by mixing Olive oil with soda. A soft soap is also made by mixing oil with potash. The wood of the Olive when it reaches maturity is hard and compact, though somewhat brittle It is of a pale reddish colour, takes a fine polish, and is used by turners and toy-makers to some extent in Europe and Asia. The flowers of *Olea fragrans*, a highly-scented species, are used in China for flavouring tea.

Olive Culture as an Industry.

Olive cultivation is a staple agricultural industry in Italy, Spain, Portugal, Greece, and the South of France, and in all those countries it affords a large amount of employment. In these countries Olive cultivation is generally regarded as a sure and profitable industry, the returns being fairly regular, and a market always open for the produce. Another advantage is that the trees will stand drought better than most other fruits, and are, therefore, specially well adapted for our interior districts. They are not liable to serious attacks from insects and other pests, and under fairly favourable conditions will attain a great age. There are now existing in Greece and other parts of Europe trees that are known to be several hundred years old, and they still yield good crops of fruit. In Italy there is a common saying that if a man desires to leave a good inheritance to his children he should plant Olive trees. From experience it has been found that in Europe the Olive can be cultivated successfully

in localities where the mean temperature averages from fifty-eight to sixty-six degrees, and that the trees are not materially injured by four or five degrees of frost. Proximity to the sea is in Europe also generally considered to be a favourable condition in the cultivation of the Olive. In may parts of Australasia the conditions for the culture of this fruit are quite as favourable, so far as regards climate and soil, as they are in the Olive-growing countries of the south of Europe. The warmer districts are specially suitable, but the Olive may be grown with success in all but the coldest regions. Though as yet this plant has received but little attention for commercial purposes, and its cultivation has hardly passed the experimental stage, yet many good specimens of oil have been produced from various localities. There is no reason why Olive culture should not prove a profitable agricultural industry if carried on under the proper conditions. A considerable quantity of Olive oil is used in Australasia, and the fruit is in demand to some extent as a pickle. Our growers ought certainly to be able to command the home market, in competition with European producers. Though labour is more costly than in Europe, yet on the other hand Australasian growers will have the counter-balancing advantage of a home market and the saving of packing and other exporting charges, which materially lower the prices to European cultivators. Then, again, it must be remembered that Olive-growing to a limited extent need not interfere with any ordinary farm industries, as the necessary work can be done chiefly at times when other crops require but little or no attention, and the fruit can be gathered with the labour of women and children.

Cultivation.

Preparation of the Land and Planting.—The Olive may be grown successfully in any fair, ordinary good, garden soil, but it thrives to perfection in a calcareous loam with a moderately dry subsoil. Stiff clay is uncongenial, and the tree, as a rule, does not do well in granite soils. Limestone formations give usually the heaviest crops, and the fruit yields the largest proportion of oil. The best situation for an Olive plantation is a gentle slope, with an aspect that allows the trees to get the full benefit of the early morning sun. Deep culture, as in the case of other trees, is essential to the Olive, and more especially if the soil is close and tenacious. When practicable the ground should be stirred to a depth of at least fifteen inches, except in very light land, when an ordinary ploughing may be a sufficient preparation. Drainage must be provided when necessary, as the Olive is very sensitive to an excess of water at its roots, and will not thrive in soddened ground. Trees may be planted at any time between April and September, the former being the most favourable month, if plants in suitable condition for removal can be obtained. When planted in the autumn, while the ground is warm from the summer heat, growth becomes at once active, and the trees get fairly started before the cold weather sets in. But it must be borne in mind that the trees are not fit for transplanting unless their summer growth has hardened, as otherwise their shoots will die back. If the trees are

not in fitting condition to be shifted in the autumn it will be advisable to wait till the spring, and on no account should planting be done during the winter months. Olive trees will, if left to themselves, attain a large size, but many growers prefer a dwarfer class, so as to facilitate pruning and gathering the fruit. If the trees are to be allowed to attain their full size they should be planted not less than twenty-four feet apart. For dwarf trees the distance should be about fifteen feet apart.

Selecting Trees.—Olive trees raised from seed will come into bearing when five or six years old, but they will not yield payable crops till four or five years later. Trees from cuttings, suckers, or layers will begin to bear much sooner than seedlings. Much, however, will depend upon the varieties, as some are longer in coming into bearing than others. There are a large number of varieties under cultivation in the Olive-growing countries of Europe. French catalogues enumerate over fifty varieties, Spanish cultivators are acquainted with as many more, and in Italy and Greece they are numerous. There are wide differences between many of these varieties in the habits, foliage, and hardiness of the trees, as also in the size, shape, and colour of their fruits. There are also material differences in the quantity and quality of the oil yielded by various sorts of Olives. As to the selection of varieties, our experience in Australasia as yet has been too limited to enable growers to say precisely which kinds are absolutely the best. Those who intend planting, however, will do well to get such kinds as have proved to be fairly good in the colonies.

Pruning and Training.—In pruning and training Olive trees it is advisable to keep the heads low, and more especially for the first two or three years. Young trees should have their growth regulated rather freely, as the principal object is a strong woody growth in particular directions. When the trees arrive at maturity but little in the way of branch pruning is required, and more especially if the specimens are to grow their full size. If low trees are required they must, as a matter of course, receive any necessary pruning to keep the heads down and the branches from extending too much. The branches should be thinned out when too numerous, and rank or misplaced shoots ought to be removed. When growing in rich soil, or if manure has been used too freely, trees sometimes have a tendency to make an over-growth of wood, but produce little or no fruit. Moderate root pruning will check this tendency, and is one of the most effective methods by which over-vigorous trees may be brought into a fruitful condition. Judicious root pruning will also materially assist in preventing trees from getting larger than the grower desires. Another method effective in inducing fruitfulness when trees are over-luxuriant is to cut a narrow half ring round the trunk in the spring.

Keeping the Land Clean and Manuring.—As with other fruits, Olive plantations should be kept as free from weeds as possible, but care must be taken to work the ground lightly, so that the roots are not disturbed to any great extent. The vigour of the trees should be kept up, if necessary, by the use of manure. Old plantations often require assistance in this way, and trees frequently suffer in growth or fruitfulness through

lack of nourishment. Lime, potash, and bone dust are excellent fertilizers for the Olive, and manures containing them are valuable. Ordinary farmyard manure is also a certain and effective material. In applying manures, either special or ordinary, it is advisable to give light and frequent dressings in preference to heavy ones at long intervals. A light yearly dressing is, for instance, better than a heavier one once in two or three years. Manuring, if necessary, should be done immediately after the fruit has been gathered. Mulching will be of great assistance to Olive trees, as, though they will stand the effects of dry weather better than most other fruits, yet they will be more thrifty when the surface soil is screened from the full effects of a burning sun and drying winds in the summer.

Making Oil.

Olives for oil should be gathered as soon as they become fully ripe, and the time for maturing will often vary considerably, according to the variety and locality. Consequently, the season for gathering in some countries extends over two or three months. The most careful Olive cultivators in Europe gather the fruit by hand, but it is a common practice in Spain and Italy to knock it off the trees with sticks. Another common practice is to wait till the fruit falls from over-ripeness. Hand picking is certainly the best, though the more expensive and least expeditious method, as it allows the fruit to be gathered in the best possible condition, and the trees are not injured. The extraction of the oil may be effected in various ways, and requires no special skill on the part of the grower. When the fruit is gathered it is usually spread out on a wooden or earthen floor two or three inches deep for three or four days, so that it can dry to some extent without heating. In this condition the fruit may be kept for two or three weeks if necessary without injury. Care must, however, be taken not to keep the fruit too long before pressing, or the oil may turn rancid. The method of extraction most generally adopted is to reduce the fruit to a pulp, after which it is placed in coarse linen sacks, and subjected to a regular and heavy pressure. In Spain the sacks are made from Esparto Grass, which has a strong wiry fibre, is cheap, and answers the purpose well. It is not advisable to fill the crushing sacks to their full capacity, as a little slackness is essential to the free extraction of the oil. After the Olives have been put through the press the cakes of pulp are broken up and subjected to a second pressure, and this process is again repeated if necessary. The juice, as it runs from the press, is received in vessels to settle. Much of the foreign matter quickly separates, the oil appearing upon the surface, and must be skimmed off from time to time The liquor should also be occasionally stirred to facilitate the rising of the oil. Some makers follow the plan of running the juice, by means of pipes, into tanks of cold water in order to obtain the oil quickly. The proportion of oil to the juice will, as a matter of course, vary to some extent according to the varieties, some being much richer than others. The degree of ripeness also has its influence, fully matured fruit being richer in oil. The proportion will

also vary between first and second, or subsequent, crushings. Upon an average. from fifty to sixty pounds of fruit are required to make a gallon of oil. Scrupulous cleanliness is essential in every operation, as the oil has a tendency to attract odours. In fact, Olive oil is one of the chief mediums used by perfume makers to extract odours from flowers. Before the oil is bottled it is usual to filter it through a layer of cotton wool so as to remove any foreign matter. Oil of the best quality is as clear as water, and is obtained by simply pressing the fruit. In the Olive-growing countries of Europe it is usual to treat the pulp. mixed with water, a second time with a greater pressure, the product being an inferior oil.

Pickling Olives.

Olives for pickling should be fully grown, but may be either green, wholly or partially ripe. They should be picked and handled with care so as to avoid bruising, and, as far as practicable, the fruit in each lot ought to be alike in size and colour. The next thing is to steep the fruit in water containing a good proportion of lime and potash to extract the bitterness. After the Olives have been steeped for twenty-four hours the water should be poured off, and its place supplied with fresh water. This process should be repeated for several days till the fruit has lost the greater portion of its bitterness. The Olives should then be placed in bottles and covered with salt and water, using the former rather freely. It will be necessary to securely fasten the bottles to keep out the air. When carefully prepared in this way, sound Olives will keep good for many years.

Propagation.

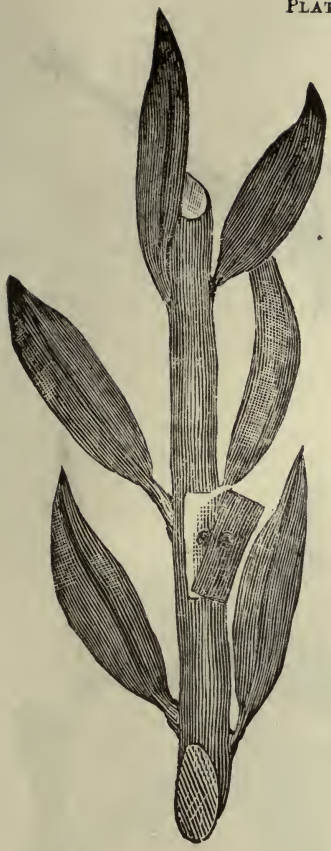
Propagation is easily effected by seeds, cuttings, layers, suckers, budding, and grafting. Raising plants from seed is a somewhat slow process, as two or three years must elapse before the seedlings are large enough to be planted out. Then, again, seedling trees take a much longer time before they yield fruit than those which have been raised by other methods. Neither can the grower make sure of his varieties from seedling plants. Seed may be sown at any time in shallow drills, covering it an inch deep. The following season the young plants should be transplanted in rows two feet apart, leaving about fifteen inches between them in the lines. Cuttings strike freely, and this method of propagation is the one most generally adopted. Branches of various sizes may be struck freely, and sometimes these large cuttings are several feet in length and their stems as many inches in diameter. The best time for putting in cuttings is in the autumn or early in the spring. Plants can be readily obtained from layers, which may be put down at any time of the year. Suckers, which are generally freely produced from the roots of old trees, yield fairly good plants, which may be taken off and planted at any time between April and September. Budding and

Cutting from Young Wood.

Plant from a Cutting of Young Wood.

grafting are serviceable methods where seedling stocks are available. These methods are also useful in enabling growers who have established trees of poor kinds to replace them with better varieties. Budding may be done at any time of the year when growth is active, and the bark can be raised freely. The work is generally done by ordinary buds, as is the case with other fruit trees. Another method. known as "Plate Budding," is to remove a square piece of bark, or plate from the stock and replace it with another one attached to the scion or bud. As will be seen by the illustration, the flap of bark from the stock is not removed, but hangs down, and after the bud is fixed it is drawn up again and tied firmly. and forms a shield for the new piece. This method is useful in protecting the newly inserted buds. Grafting may be practised in various ways, in accordance with the age of the trees and the objects in view. The most common methods are "Cleft" and "Side" Grafting. Sometimes small branches are grafted, and this method, which is also known as "Twig Budding," has advantages under certain circumstances. By this method the leaves are in great part removed, and the main portion of the wood

PLATE BUDDING.



Showing how Plate is Prepared.

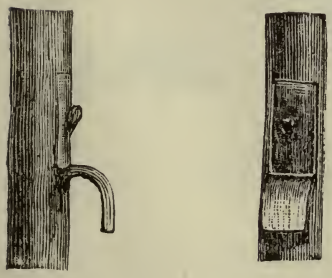
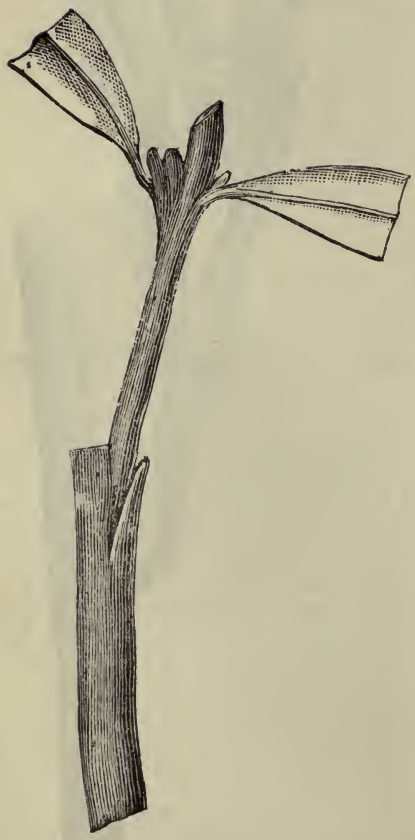


Plate Buds Fixed.

Showing how a Bud Shoot should be Supported.

BRANCH BUDDING.

GRAFTING.



Cleft Grafting.

Side Grafting.

composing the heel of the scion. The base of the scion is then inserted into a cut made in the bark of the stock as in ordinary budding. Grafting may be done when growth is active, but the most favourable time is early in the summer.

Insects and Diseases.

The Olive does not suffer to so great an extent as many other fruit trees from the attacks of insects or fungi, and it is seldom affected by disease. The only insects that cause serious trouble are various kinds of Scale, which sometimes affect trees that lack vigour through poverty of soil or other causes, but seldom attacks those that are healthy and robust.

Black or Olive Scale.

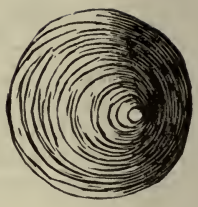
A—Branch with Insects Natural Size.
B—Insect Magnified.

One of the most troublesome of these insects is the Black, or Olive Scale (*Lecanium Olea*). Another is the White Scale (*Aspidiotus Nerii*), which is also known as the Oleander Scale. These insects not only do injury to

WHITE OR OLEANDER SCALE.

Branch showing Insects (Natural Size).

Male Scale
(Magnified).



Female Scale
(Magnified).

Fully Developed
Male Insect
(Magnified).

Fully Developed
Female Insect
(Magnified).

the foliage but also cause blotches upon such fruit as they come in contact with. They a so cause the trees to have a sooty appearance. Remedies, Kerosene Emulsion or Resin Compound, both being effective. These remedies should be applied as sprays as soon as the insects are detected. Full directions as to the preparation and use of the compounds will be found at pages 100-101, volume 1.

VARIETIES.

There are many varieties cultivated in Europe, but only a few have, as

yet, been tried in Australasia. The following list includes a number of reputable sorts :—

Angulosa (*Gallingue, Laurine*).—A French variety with medium-sized, reddish-black fruit. Fairly good for oil, and makes an excellent pickle.

Atrorubens (*Salierne, Saverne*).—An excellent French variety with violet-black fruit, covered with a thick white bloom. Length nearly an inch, oval, rounded at the base, with a pointed top. Makes a fine oil.

Atroviolacea.—A robust and very productive French variety. Fruit roundish-ovate, medium-sized, bluish-black. An excellent kind both for oil and pickling.

Atrovirens (*Pointu, Punchuda*).—This is a French variety with large oval fruit. Prolific and a good sort for oil.

Caillet Blanc.—A French variety with large, oval, pale green fruit. Very prolific, bears regular crops, and makes a first-class oil.

Caillet Rouge (*Figanier*).—A French variety with large, oval, reddish fruit. The tree does not attain so large a size as many other kinds, but bears very freely and regularly. Yields a large proportion of oil, which is of high quality.

Carrasquena (*Redouan de Cotignat*).—A fine Spanish variety with reddish-black, nearly round fruit about an inch long. Excellent both for oil and pickling.

Ceretocarpa (*Cornezuelo, Odorant, Luquoise, Luques*).—A late Spanish variety with oval, pointed fruit about an inch long. Makes an excellent oil.

Colchonuaa.—A Spanish variety with red, round, slightly pointed fruit about an inch long. Very prolific, and yields a large proportion of oil.

Columella.—A French variety with dark purple, broad oval fruit nearly an inch long, the seeds being comparatively small. Bears freely, ripens late, and yields a rich oil.

Corregiolo (*Frantajo, Grossago*).—An Italian variety with fruit about three-quarters of an inch long, obovate, rather broad at the point and narrow at the stem end. Moderately prolific, and makes a first-class oil.

Cotignac (*Pardigniere*).—A French variety with roundish-oval fruit about three-quarters of an inch in length. Yields a large proportion of excellent oil.

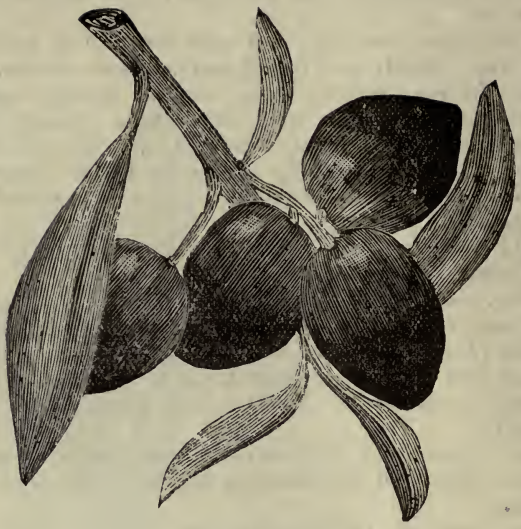
Empeltre.—An excellent Spanish variety with dark violet, ovate fruit about an inch long. Yields a large proportion of excellent oil, and a good variety for pickling.

Hispalensis (*Gordal, Ocal, Olivo Real*).—A robust Spanish variety with bluish-grey, nearly round fruit about an inch long. Chiefly used for pickling, and considered to make an inferior oil. Tree makes quick growth, and attains a large size. This variety may be used with advantage as a stock for less vigorous but better kinds.

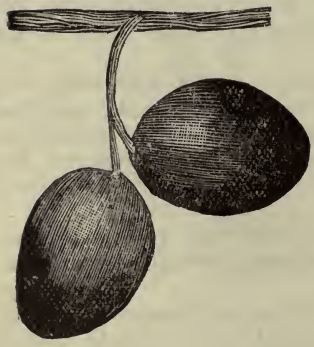
Javaluno.—A Spanish variety with bluish-grey, egg-shaped, and slightly pointed fruit over an inch in length. Ripens late, yields a large proportion of rich oil, and a good variety for pickling.

Macrocarpa.—A Spanish variety with very large, reddish-purple, ovate, pointed fruit. Ripens late, and makes a good oil.

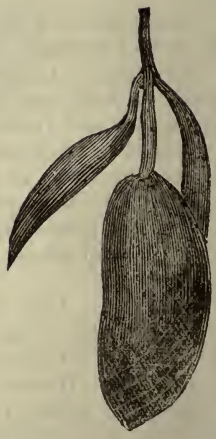
Maxima (*Madrileno, Olivo Morcal*).—A Spanish variety with large,



Atroviolacea.



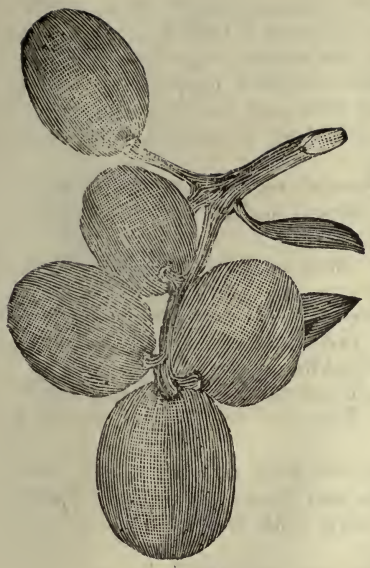
Atrorubens.



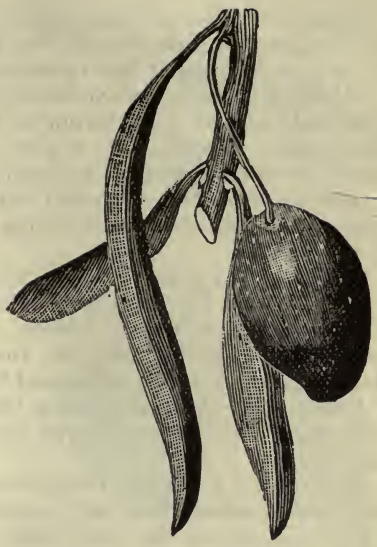
Ceretocarpa.

cordate, round fruit about an inch long. An excellent variety for pickling, and makes a fairly good oil.

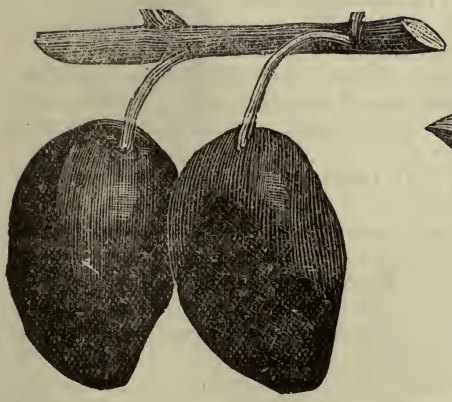
Nevadillo Blanco (*Argentata*, *Doncel*, *Moradillo*, *Ojiblanco*, *Olivo Lucio*). —A Spanish variety with pale green, broad ovate fruit about an inch long. Tree robust, bears freely and regularly, and the fruit yields a large proportion of first-class oil.



Columella.



Nevadillo Negro



Macrocarpa

Ovalis

Nevadillo Negro.—A hardy and excellent Spanish variety with purple-black, egg-shaped fruit about an inch long, having a turned point. This is a very prolific variety that ripens late, and makes a high-class oil.

Oblonga.—A variety of uncertain origin with dark purple. club-shaped fruit, broad at the point, narrow at the stem, and nearly an inch long. Tree prolific. Fruit makes a good oil, and, as it loses its bitterness quickly, is specially suitable for pickling.

Ojillo de Liebre (*Ojo de Liebre*).—A Spanish variety with violet-black, nearly round fruit about an inch long. Ripens medium early, and makes an excellent oil.

Oliviere.—A French variety with medium-sized pointed fruit. Rich in oil, and also good for pickling

Ovalis (*Acquillo, Lechin, Picholin, Saurine*).—A very prolific Spanish variety with reddish, broad oval fruit two-thirds of an inch in length. Makes a good oil, and is well suited for pickling.

Pendouliere.—A strong-growing French variety with a drooping habit. Fruit large, oval, and yields a rich oil. Tree very prolific, and attains a large size.

Pendulina.—A French variety with oval fruit, pointed at both ends, about three-quarters of an inch in length, and borne in clusters. Makes a good oil, and, as the fruit readily parts with its bitterness, is well suited for pickling.

Picudo (*Fetudilla*).—A Spanish variety with large, reddish-purple, egg-shaped, rather pointed fruit. Prolific, yields a good oil, and well suited for pickling.

Polymorpha.—A variety of uncertain origin with reddish-purple, oblique ovate, pointed fruit three-quarters of an inch in length, and borne in clusters. Ripens rather late, and well suited for pickling when ripe, as it has a firm flesh.

Pomiformis (*Ampoullean, Manzanillo*).—A popular Spanish variety with shining, black, round-oval fruit about an inch in length. Ripens rather early, makes a good oil, and is well suited for pickling, as the fruit parts with its bitterness quickly.

Racimal (*Boteillan, Boutiniere, Ribien, Rapugette*).—An excellent Spanish variety with deep violet, round-oval fruit about an inch long. Very hardy and prolific, ripens early, bears regularly, and makes a good oil.

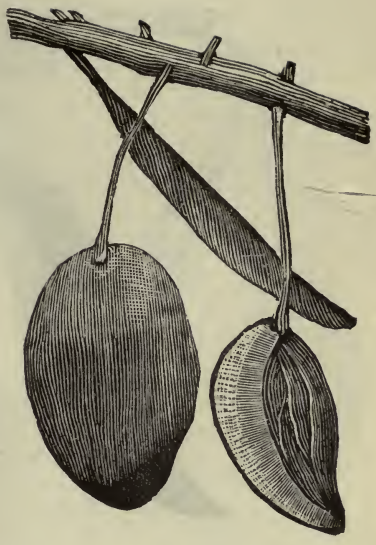
Raymet.—A French variety with reddish, large, oval fruit. Yields a large proportion of excellent oil.

Redondillo.—A Spanish variety with bluish-black, round-oval fruit about an inch long. Very prolific, and yields a rich oil.

Regalis (*Pruneau de Catignac, Sevillano*).—An excellent Spanish variety with bluish-black, round ovate fruit about an inch long. Ripens medium late, has rather firm flesh, makes a good oil, and well suited for pickling.

Rostrata (*Cayon, Rapanier, Cornaud, Corniaud, Courgnale, Cornicabra, Plant de la Fane, Plant de Salon*).—One of the leading Spanish varieties with black-red, oval, pointed fruit about an inch long. Tree hardy, prolific, large, and fruit makes a fine oil.

Oliviere.



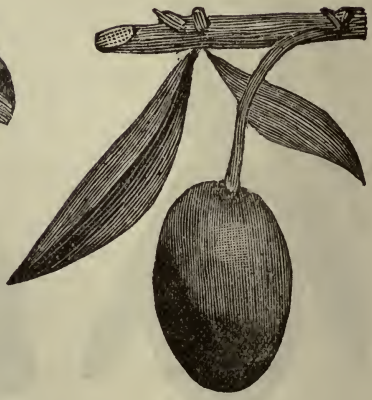
Pendoulier.

Pomiformis.

Rostrata.

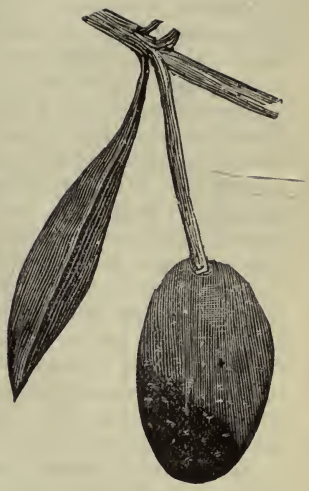
Racimal.

Rubicans.

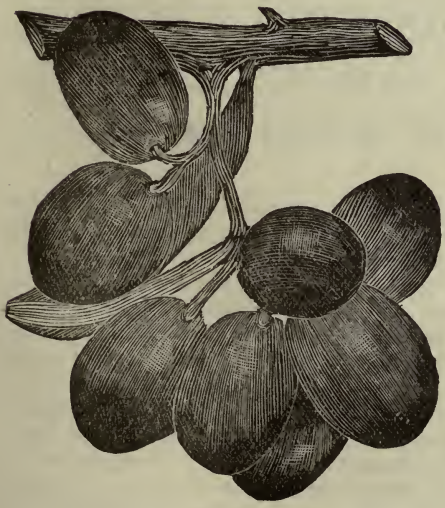


Pendulina

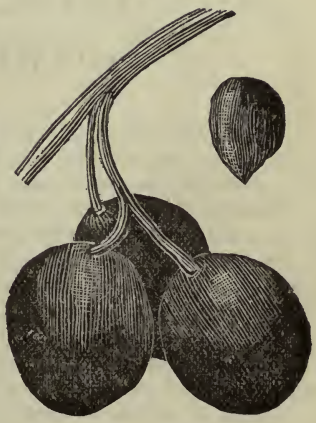
Rubra Caillon.



Variegata.



Uvaria.



Verdigo.

Rubicans (*Cayonere, Marvailletta, Rouget, Rougette*).—An excellent and popular French variety with large, reddish-purple, roundish-oval fruit. Hardy, prolific, and bears regularly. Makes a good oil, and well suited for pickling.

Rubra Caillon.—A French variety with jet black, small, oval fruit about half-an-inch in length. Hardy, very prolific, and comes into bearing at an early age. Fruit ripens early, and yields a good oil.

Uvaria.—A variety of unknown origin with dark purple, oval fruit, rounded at both ends, and about three-quarters of an inch long. The fruit is borne in Grape-like bunches, and the name is, therefore, very appropriate. Prolific, makes a good oil, and suitable for pickling.

Varal Blanco (*Blanquette*)—An excellent Spanish variety with red, roundish ovate fruit about three-quarters of an inch long. Makes a first-class oil, and well suited for pickling.

Varal Negro (*Alameno, Cayon, Nasies*).—A Spanish variety with violet-black, roundish-ovate fruit about an inch long. Yields a large proportion of rich oil. Tree very prolific, bears early, and does not attain a large size.

Variegata (*Marbrée, Pigale, Pigau*).—A very popular and widely cultivated French variety. Fruit purple, with white dots, oval, about an inch long. Makes an excellent oil, and well suited for pickling.

Verdigo (*Verdal, Verdau, Verdial*).—An excellent Spanish variety with violet-black, nearly round, but pointed, fruit about an inch in length. Hardy, prolific, ripens early, makes a first-class oil, and well suited for pickling.

ORANGE AND OTHER SPECIES OF THE CITRUS FAMILY.

Among the many valuable fruits that are cultivated in the Australasian colonies, none hold a higher position than the Citrus family. Fruit of this family is more generally popular than any other kind, and its use is common in all civilized parts of the world. Oranges are enjoyed by those who are suffering from sickness as well as by people in robust health, and very frequently they are the only fruit which can be used by the sufferers from disease. Fruit of this family will keep on the trees after it is ripe for a longer period than any other kind, and will bear carriage better. It is also less liable to injury from storms and changes of weather than most other fruits, and, owing to the thickness of the rind and the aromatic oil it contains, it suffers less from the attacks of birds and insects. Oranges are more or less in season all the year round, and no other fruit has the same advantages in this respect. Trees of the Citrus family also

yield large and certain crops, as a rule, in comparison with other fruits. Besides their value as fruit producers, the trees, owing to their beautiful foliage and compact growth, are also very serviceable as ornamental plants for the pleasure garden, and they are very effective for shrubberies, either planted singly or in groups.

Some few years ago it was supposed by many that the Orange and Lemon could only be successfully cultivated in localities near to the sea-coast, but experience has proved that they will thrive to perfection in many of the inland districts of New South Wales, South Australia, Queensland, and Victoria. They may also be successfully cultivated in the milder parts of New Zealand. Many have recently turned their attention to the culture of Citrus fruits in the well-grounded belief that they are likely to give good returns to the planters. Having had a rather extensive experience in the cultivation of these fruits, the writer can say that there is a good foundation for this belief, and it is certain that the Orange and Lemon may be grown most successfully in many districts, provided the trees receive the attention they require. In fact, the culture of Citrus fruits will probably rank among the most profitable of our agricultural industries in the future, as there is a rapidly expanding home market for them, and any surplus that may be produced can be sold to advantage in other parts of the world. The climatic and soil conditions are as perfect as in any of the older countries where the Orange and Lemon are largely cultivated, and Australasian-grown fruit is in season when the ordinary sources of supply for Europe and America are exhausted. Australian growers have a great future before them in exporting Oranges and Lemons to Great Britain, the United States, and Canada at certain periods of the year when the supplies from Southern Europe, California, and Florida have ceased owing to the season's being over. There is nothing to prevent the Australian colonies from becoming large exporting countries if the Orange-growing industry is carried out with judgment and energy. From the writer's experience he has arrived at certain conclusions as to what is required to allow the Citrus family to be cultivated successfully, and these are dealt with at length in the following remarks.

History.

The various useful species of the Citrus family are supposed to have originated in China and Central Asia, and to have been taken to Syria by the Arabs. No species seems to have been known to the ancient Hebrews, Egyptians, Greeks, or Romans, as they are not mentioned by the writers of these nations. There is some uncertainty as to when they were first known in Europe, but the Citron is said to have been introduced to Italy in the second century. The Sweet Orange appears not to have been known till the fourteenth century, according to historical records, being introduced by returning crusaders from Palestine. The Lime and Lemon were not known till a century later, and the Shaddock not till a much later period. The first mention of the Citrus fruits

among ancient nations is by the Arabs, who not only used Oranges and Lemons in the ordinary way, but extracted oil from both fruits and seeds, as also citric acid. According to Galessio, the Arabs discovered the Orange tribe in a part of India farther in the interior than Alexander had penetrated. The culture of the Citrus family in Europe has been principally confined to Italy, Greece, Spain, Portugal, the Azore Islands, and some parts of the south of France, those being the only countries possessing a suitable climate. More attention has been paid to their culture in Italy than in any other country, and a very large number of varieties are grown, with but a comparatively few of which we in Australasia are acquainted. Risso, an eminent Italian botanist residing at Nice, published at Paris, in 1818, a history of the family, in which he enumerated and described one hundred and sixty-nine varieties, which he divided into eight classes, as follows:—forty-three Sweet Oranges, thirty-one Bitter Oranges, five Bergamots, eight Limes, six Pampelucos, twelve Sweet Limes, forty-seven Lemons, and seventeen Citrons. On the other hand, Linnæus only admitted that the Citron and Lemon were distinct species, while some botanists have decided the Shaddock to be the only one that was a separate species, and that all the others had originated from the Citron. For all practical purposes, however, the useful kinds may be divided into ten species, which will be dealt with in detail further on.

Uses of Citrus Fruits.

Oranges and several other species of the Citrus family are utilized to a great extent and in various ways. Sweet Oranges and those belonging to the Mandarin class are in great demand for eating, and, perhaps, are more generally used than any other fruits, as they are in season the greater part of the year. An excellent wine can be made from the juice of the Sweet Orange, and this, by distillation, yields a strong but palatable spirit. The Bitter, or Seville, species is used extensively in Europe for making Orange Marmalade, which is more generally used than any other kind. The rind of the Bitter Orange is also utilized in large quantities when preserved in sugar, and is sold under the familiar name of candied peel. In the south of France and Italy the Bitter Orange is cultivated extensively for perfumery purposes, as two pounds of the flowers are said to yield an equivalent to three pounds of the other kinds. One ton of flowers is calculated to produce forty ounces of otto, which on an average is worth twenty pounds, and the water remaining is worth another ten pounds. An essential oil, called Oil of Neroli, is also extracted from the flowers by distillation, and is yielded, according to Professor Balfour, at the rate of one ounce to five hundred and fifty pounds of flowers. Oil of Neroli is extensively used in perfumery, and forms a portion of the well-known Eau de Cologne. It is also used to some extent for flavouring liqueurs. The rind of the Orange yields an aromatic essential oil, which is contained in small cells, and may be extracted by pressure or distillation. Among other uses to which the fruit is put is the flavouring of the liqueur Curaçoa by the use of the

immature fruit of the Seville Orange. The unripe fruit is also preserved in syrup and crystallized, and used as a sweetmeat. In speaking of these products it may be observed that the different varieties of the Sweet Orange and the other species of Citrus contain the same properties, but in a lesser degree, and will yield the same extracts, but in smaller quantities. There is no reason why the manufacture of Orange marmalade should not prove a profitable industry in Australasia, and growers would do well to turn their attention in this direction. It is quite possible, also, that the Bitter Orange might be profitably cultivated for perfumery purposes, and it would certainly be worth trying. The Lemon is utilized in various ways, and is a very serviceable fruit. Its juice contains a large proportion of citric acid, and, when diluted with water, makes an agreeable and refreshing beverage. Lemon juice is in large demand for cooling and effervescing drinks, and is used to a great extent under the name of "Lime Juice," as also in the manufacture of citric acid. The peel is also dried and preserved in sugar, and by distillation yields what is known as Oil of Lemon or Essence of Lemon. The Lime has similar uses in every respect to the Lemon. The Bergamot is by some authorities regarded as a species, but others consider it to be merely a form of the Lime. A volatile oil, called Oil of Bergamot, is extracted from the rind, and, according to Professor Balfour, is obtained in the proportion of two and a-half ounces from a hundred fruits. The Citron may be used for the same purposes as the Lemon, though the juice is less acid. It is used to some extent for marmalade and candied peel. From the rind an extract called Oil of Citron is obtained. The flowers are very strongly scented, and may, therefore, be used with advantage for perfumery. The Sweet Lemon may be used for marmalade and candied peel, but it is inferior to other species. The Shaddock makes a fairly good preserve, both pulp and rind being used. Medicinally the Orange and other fruits of the Citrus family are of great value. The fruit of the Orange is wholesome, nourishing, and helps to purify the blood. The juice of the Lemon, Lime, and Citron has a great effect upon the blood, and is a preventative and remedy for scurvy and other skin diseases. It is an excellent remedy and preventative for gout and rheumatism, and also for malarial fever, ague, and other complaints. The dried peel of all the species of Citrus is a mild tonic and carminative, and may be used with advantage for some diseases. The wood of the Orange is hard, tough, fine-grained, and takes an excellent polish. In Europe and Western Asia it is used by turners and for fine cabinet work.

Hardiness and Longevity.

When the climate and soil are not absolutely uncongenial there ought to be no great difficulty in cultivating the Orange successfully, provided that its wants are duly attended to. Trees of this family are not as delicate as is generally supposed, and they may be profitably cultivated under various conditions of soil and climate. They will stand a considerable amount of heat and some degrees of frost with impunity, provided that their particular requirements receive due attention. When carefully

cultivated and growing in a congenial soil and situation, the trees will often attain a great size and age. There are in Spain and Italy trees whose ages are said to range from one hundred and fifty to two hundred years, and they are still healthy and vigorous. In the convent of St. Sabina, at Rome, there was an Orange tree thirty-two feet high, said to be over six hundred years old ; and at Nice there was a tree over fifty feet high, with a trunk that took two men to embrace it, and yielding from six thousand to seven thousand fruit every year. One of the largest and finest Orange trees in France grew at Versailles, and was known in the neighbourhood as the Grand Bourbon. It was raised from seed which is said to have been sown in 1421. We have also records of trees grown at Beddington, Surrey, England which were grown under shelter and attained an age of more than a hundred years. These trees were obtained from seeds sown by Sir Francis Carew, who obtained them from his uncle, the celebrated Sir Walter Raleigh. At Hampton Court Oranges were also successfully grown under the same conditions, some of which are stated to have attained an age of over two hundred years. These instances are mentioned to show that the Orange is one of the longest-lived fruit trees if it meets with congenial treatment. But though the trees of this family are vigorous and long-lived when growing under the most favourable conditions, yet they are not likely to give much satisfaction to growers unless they are well and rationally treated. The wants of this family are peculiar, and differ to some extent from those of other fruit trees. The writer believes that the chief cause of non-success in Orange culture is not so much due to the effects of soil and climate as carelessness or ignorance in the treatment of the trees. Too many people who plant Orange and other fruit trees seem to think that after an orchard is fairly started, and the trees have made a few years growth, no farther assistance or care is required except to keep down the weeds. This class of cultivators expect to take from the trees heavy crops year after year with little attention, and are surprised when they begin to fail in vigour. When not carefully attended to and supplied with proper nourishment, trees must necessarily begin to fail when comparatively young, and when this occurs the cultivator generally blames either the climate, soil, season, or insects instead of ascribing the failure to the true causes—neglect and starvation.

Requirements of the Citrus Family.

From a careful consideration of the subject, based upon many years' experience and observation, the writer believes the essential conditions for the successful culture of the Orange family to be as follows: —

1. A suitable climate and soil.
2. The perfect preparation of the soil.
3. The selection of healthy young trees.
4. A full and regular supply of congenial food for the trees.
5. A supply of water during periods of drought.
6. To disturb the roots as little as possible.
7. To keep the ground free from weeds and other undergrowth.
8. Shelter from strong winds.

Cultivators must bear in mind that each one of these conditions is essential to the most perfect success in the cultivation of the Citrus family, and it is not sufficient if some are provided for and others neglected.

Soil and Climate.

The Citrus family will do very well in any ordinary good soil of fair depth, and on any site which is not too wet or exposed. Low-lying land, where the temperature is often very low in the winter and spring; where fogs are heavy and frequent, and the sides of bleak hills should be equally avoided by Orange cultivators as a rule, The most favourable soil is a strong sandy loam with a gravelly or open subsoil. Limestone soils are also specially well adapted for the growth of the Orange family. The cultivation of Citrus fruits will prove a very profitable industry in the warmer regions of Austalasia. The conditions of soil and climate in many of these wide regions are as perfect as can be desired by the cultivator, and the only other requirement is a supply of water to contend with dry seasons.

Though the Orange family is specially suitable for warm districts, yet they may also be cultivated successfully in other localities, provided the winters are not too severe. The trees will stand three or four degrees of frost with impunity, but not more. When planted in the cooler districts the most favourable site for an orangery is a gentle slope, with an aspect between north and east, so that the trees may get the full benefit of the early morning sun. Planters, however, are not always in a position to make the most perfect choice of soil and situation, and must make the best of existing conditions. In the warmer districts the aspect of an orangery is not of so much importance.

Preparation of the Soil.

In preparing for Orange trees it is advisable to break up the ground to the depth of from eighteen inches to twenty-four inches when circumstances will permit. The soil should also be thoroughly broken and well mixed, as a fine tilth is grateful to the roots of the Orange family. Trenching with the spade is by far the most effective way of preparing the ground; but the work can be done more quickly and economically by the use of the plough and subsoiler. A good depth of well-worked soil gives the trees a wide field to obtain nourishment from, and places them in the best position to withstand the effects of dry weather. It is not advisable, however, in preparing the ground to turn up much of a bad subsoil, and when this exists cultivators should simply stir and break it to the depth of a few inches, leaving it in the same position as before. Perfect drainage is essential in the cultivation of the Orange family, as the trees cannot thrive when water is stagnating at their roots. Due provision for effective drainage should always be made when the ground is prepared. In light soils, on sloping ground, or when the subsoil is open, there will often be sufficient drainage naturally. When, however,

the soil is heavy and retentive, or on flat ground, with a close subsoil, the cultivator should always provide for effective drainage. Underground drains are preferable, and the distance apart must, of course, depend upon the conformation of the ground. If the ground has only a slight fall, parallel drains between every other row of trees will be necessary to allow each tree to get an equal and thorough drainage. On steeper slopes a less distance will suffice, according to the nature of the soil, and the more heavy and tenacious it is the closer must the drains be. In preparing the ground, any deficiencies should, if possible, be rectified, and practical men need scarcely be told that there is a great difference in the character of various soils, some being deficient in certain properties which others have in excess. If soils are lacking in lime, potash, or other material that is essential to the growth of the trees, the deficiencies must be made good to make cultivation successful.

Selecting Young Trees.

In planting trees of this family due care should be taken that none but healthy and vigorous plants are selected. This is a matter of essential importance, as if the trees are unhealthy or weakly in constitution they are not likely to give the grower the same satisfaction as more vigorous plants will do. In selecting trees planters should give the preference to those having a healthy dark green foliage, and avoid those which have a sickly yellowish appearance. It is also a matter of some importance that the young trees have been raised from vigorous parents. "Like has a tendency to produce like" is one of nature's laws in the vegetable as well as the animal kingdom, and if young trees have been raised from debilitated parents they are liable to inherit weak constitutions. It stands to reason, therefore, that the stocks should be vigorous and suitable, and that the scions, whether for grafting or budding, ought to be taken from robust healthy trees.

Planting.

If circumstances will permit, the most favourable period of the year for planting trees of the Orange family is from the middle of March to the end of April, according to the nature of the season and locality, though it may be done successfully at other times. When the trees are planted early in the autumn, as the ground contains a considerable amount of warmth, root action begins quickly, the plants soon recover from the check caused by removal, and they get fairly established before the winter sets in. If trees are planted later on during the winter months growth is necessarily less active, and the plants are very liable to suffer from the effects of frosts and bleak winds. When it is not convenient to plant in the autumn it is better to wait till September rather than put the trees in during the winter months. As a rule, however, trees should not be shifted after their growth has fairly started or before the summer growth has matured. It must be clearly understood,

however, that though autumn planting is advocated, when practicable, for the reasons named, it is essential that the trees are in a fitting condition for shifting. As a matter of fact, very frequently the summer growth does not mature early enough for the trees to be shifted in the autumn. Under such circumstances cultivators must necessarily wait till a later period. In shifting trees of the Orange family the greatest care should be taken not to injure or lessen the number of roots more than can be avoided, as the plants require all their feeders in making a new start. Care must also be taken not to expose the roots to a dry atmosphere, and they should be effectively protected from the time they are lifted till they are planted. As soon as each plant is taken up cover the roots so as to prevent them from being injured by either sun or wind, as they are rather delicate and very susceptible to injury from these causes, and if allowed to get dry the plants will be almost sure to lose their foliage, and very likely die altogether. Uncover the roots of each plant singly as soon as the hole is made ready for its reception, then put it in its place, and cover up the roots as expeditiously as possible. Be careful in planting to spread out the roots in every direction, and see that none of them are tangled or doubled up. When any of them are bruised or injured they must be removed with a clean cut or they will rot and perhaps canker the others. Care must also be taken not to plant the trees too deep. If possible a moist or dull day should be chosen for planting trees of this family, as less care is then required. After planting give the trees a good watering over the tops, and afterwards occasionally, according to the state of the weather. Some difference of opinion exists among practical men as to the advisability of cutting back the heads of newly-planted trees. According to the writer's experience, the cutting back of the branches must be determined by the quantity and condition of the roots. If the plants have suffered severely in loss of roots by removal the heads should be reduced in proportion. On the other hand, if the roots are nearly perfect the trees will require but little in the way of heading back. Young trees will have a much better chance if sheltered from the effects of cold drying winds for a few months till they get thoroughly established. Though giving shelter requires some extra labour, yet cultivators will be more than repaid by the lessened risk with their trees. In planting trees of the Citrus family many people commit the great mistake of placing them too close to each other. Most kinds of Oranges will require for free development a space of at least twenty-four feet from tree to tree. The Mandarin section, however, being less robust in habit than the other kinds, may be planted from fifteen to eighteen feet apart, according to the growth of the variety. Lisbon Lemons, Limes, and Citrons may be planted about eighteen feet apart, as they are less robust in habit than most of the varieties of Oranges. While the trees are young the spaces between may be utilized for growing Peaches and other fruits or vegetables. But care must be taken that they do not interfere with the growth of the Citrus family.

Supplying the Trees with Nutriment.

Trees of the Orange family cannot thrive unless they have a regular

supply of congenial food. Their requirements are greater than those of other fruit trees in this respect, there being always a steady drain upon their energies. No sooner has one crop matured than another requires support. This severe drain upon the trees must be compensated by an ample supply of congenial food; otherwise the plants will become weakened and liable to the attacks of disease and insects. Trees must necessarily pine away and die if they do not obtain sufficient nourishment to support healthy growth. Cultivators too frequently make the mistake of expecting their trees to remain healthy and bear heavy crops year after year without anything being returned to the soil in the shape of manure. It is chiefly owing to this unreasonable mode of treatment that so many trees fail while comparatively young, whereas they ought to live and flourish for lengthened periods. An ample supply of nourishment is also essential to the quality of the fruit, which will necessarily be inferior if the trees lack vigour owing to an impoverished soil. In many of the old Orange orchards in New South Wales the quality of the fruit has materially deteriorated of late years through the neglect of the owners in not maintaining the fertility of the land. In fact, owing to this neglect, a large proportion of the Oranges grown in the Parramatta and other districts have been so inferior in size and quality as to be almost useless for market purposes. Such a state of affairs is due entirely to neglect and carelessness, and could be avoided by rational cultivation. No fruit will respond to good treatment better than the Orange, but it will not stand neglect. But, on the other hand, cultivators must bear in mind that though Orange trees require plenty of nourishment to keep them in a healthy vigorous condition, yet manure should not be given in excess, as under such circumstances a rank and unhealthy growth is stimulated for a short period that is followed by a reaction which is injurious. Whatever manure is used ought not to be of a forcing character or violent in its action, but should yield a gradual, regular, and lasting supply of nourishment to the trees. As regards the most effective and economical way of supplying food to the trees of the Citrus family, the writer has arrived at the conclusion, from his experience, that surface feeding is the best plan for mature trees. The best general fertilizer is stable manure. This should be applied as a mulching over the surface as far as the roots extend. Lay it on in a layer three or four inches deep, and as the manure decays add fresh material from time to time. The main dressing should be applied in September or October, and, as a matter of course, the layer ought to be thicker during the summer than in the winter. When this system is adopted, the trees not only get the benefit of a continuous supply of nourishment, but also the advantage of having their roots effectively protected by mulching. If the soil is deficient in lime, potash, or other essential materials, its wants must, as a matter of course, be supplied by special manures. Very frequently, and more especially in old orchards, the supplies of lime or potash will have become exhausted, and cultivators should not fail to find out these deficiencies before the trees suffer to any material extent. An occasional dressing of bonedust or lime under the layer of mulch will generally prove serviceable to the trees. In the case of young trees the

ground, as a matter of course, should be well manured at the start if requisite, and free supplies given afterwards.

Pruning and Training

Like all other fruit trees those of the Citrus family require some attention in pruning. But the operation should be performed in a rational manner with a due regard to the natural habits of the trees, their age, and condition. The operation of pruning is too often performed without much discrimination, and the trees cut in such a manner as is productive of more harm than good. In pruning trees of the Orange family cultivators should be careful in using the knife or saw, and no more cutting ought to be done than circumstances render necessary. In the case of trees which have arrived at the full-bearing age, but comparatively little is required in the way of pruning except for any special purpose. The removal of rank shoots, dead or diseased wood, and the thinning out of the branches when over-crowded so as to allow light and air to penetarate freely is all that is generally required in the shape of pruning. In the case of young trees a different way of treatment is necessary, as the object of the cultivator is the development of a strong growth of wood in particular directions, and to bring about the desired result the knife must be used more freely. Young trees, in the first place, should have sufficient lateral shoots left to balance the plants in each direction and form the heads. As a rule, shoots which are not required for the development of the trees should be cut away close to the main stems. It is better, however to leave a few more shoots than those which will be ultimately required to form the trees in order to afford the stems the necessary protection from the sun, removing them as the trees increase in size. In training trees of the Citrus family it is desirable that the branches hang to within about two feet of the ground so as to protect the trunks from the heat of the sun in summer. It is not an uncommon thing for trees to be trained high so that horse-power cultivating implements can be used close to the stem, but the practice is bad. The writer holds the opinion that the cracking or discolouration of the bark in Orange and other fruit trees, which is so common in this part of the world, is often caused by the sap fermenting through the action of the sun. By training the heads low there will be no trouble caused by the exposure of the trunks. Besides, trees with low heads are less liable to suffer from the effects of high winds. It is not advisable to let young Orange trees bear too freely, as the production of fruit lessens the growth of wood. The growth of wood in young trees is the principal consideration. Trees should be five years old before they are allowed to bear heavy crops, as by that time they will have attained a fair amount of growth.

Protecting the Roots.

In the cultivation of trees of this family and other evergreen fruits, it is advisable to place them under such conditions that their roots will not

How a Young Tree should be Planted.

Desirable Form of Orange Tree.

Desirable Form of Orange Tree

be subject to the extremes of drought and excessive moisture in the soil, or to sudden changes of temperature. Unless means are taken to prevent it, the sudden changes which often occur from severe drought to excessive rain, and *vice versa*, will cause great variations in the temperature of the soil, and these should be avoided by the cultivator as much as possible. This may be done to a great extent in the first place by trenching and draining the ground thoroughly, so as to secure the most perfect root-bed, and secondly by mulching the surface soil so as to shelter it from the full power of the sun and drying wind. In deeply-worked, well-drained land the temperature is higher in winter and lower in summer than in shallow or undrained soil, and it is not so readily affected by atmospheric changes. Consequently, trees growing in deep, well worked, and properly-drained land are placed under the most favourable conditions for making steady growth, are not as liable to injury from frost, and in no danger of becoming injured through their roots getting soddened. Then, as regards the protection of the trees by mulching, the cultivator must bear in mind that when the trees are growing under the most favourable conditions the masses of delicate rootlets or feeders which lie near the surface are not as easily injured by the power of the sun as when the ground is fully exposed, and the supply of moisture lasts much longer.

Disturbing the Roots.

In the cultivation of trees of the Orange family it is a matter of essential importance that the roots should not be disturbed to any great extent. The common practice of digging or ploughing among the roots cannot be too strongly condemned. These operations cannot be performed without destroying a great number of the small fibrous roots, or feeders, a large proportion of which lie near the surface. These roots are all required to supply the trees with nourishment, and if a quantity is destroyed, as must be the case when the surface soil is broken up by either the plough or spade, the loss will be felt more or less. The best plan is, as far as is practicable, never to disturb the surface soil at all, leaving each layer of mulching to lie till it decays ; and the only cultivating implement which should ever be used in an orangery is a hand or light horse hoe to keep down the weeds.

Keeping the Land Clean.

It is a matter of material importance, in cultivating trees of this family, that the ground should be kept perfectly free from weeds, grass, or any other kind of undergrowth. When weeds are allowed to make headway they absorb a considerable amount of plant food and moisture, which otherwise would be available for the support of the trees. The loss of these materials must necessarily be felt by the trees, and more especially the exhaustion of surface moisture during the dry summer months.

Watering in Dry Weather.

No fruit trees require so much attention in watering as those belonging

to the Citrus family. In fact, crops cannot be depended upon unless the trees can be supplied with water during periods of drought. The trees are always in an active state of growth, and the roots absorb a great deal of moisture from the soil. This moisture must be replaced from some source, or otherwise root action is interfered with more or less, and the trees suffer. The easiest and most effective way of supplying water is by a system of irrigation. This mode should be adopted when practicable, as it will prove a great aid in the culture of the Citrus family. As regards the watering required by trees of the Citrus family, no precise rules can be laid down, as much will necessarily depend upon the character of the season and nature of the soil. As a general rule, the trees should never be allowed to flag through lack of moisture at their roots. On the other hand, however, water should not be used more freely than is necessary, as when supplied in excess the fruit is liable to become coarse, wanting in flavour, and too tender for packing and keeping.

Shelter.

Shelter from bleak winds is necessary to the successful cultivation of the Orange family, and no trees suffer more by exposure, both as regards their health and the quality of the fruit. In exposed situations the trees have a tendency to produce thick-skinned fruit deficient in juiciness and flavour, and the produce of the choicest varieties is sometimes so altered in character as not to be recognised easily The value of effective shelter is fully appreciated by European cultivators, and invariably provided for. At St. Michael, one of the Azore Islands, where Orange-growing is the staple industry, the cultivators commonly shelter their trees from the bleak winds which sweep over the Atlantic by means of stone walls of from twelve feet to twenty feet high. When there is no shelter naturally, cultivators should always make provision for it by planting belts or lines of quick-growing trees to serve as breakwinds. If the area is of large extent it will be necessary to have cross breakwinds in addition to those on the boundaries. There are many quick-growing dense-foliaged trees which will answer the purpose. Care must, however, be taken that the roots of these breakwinds do not interfere with those of the Orange trees. As an effective breakwind, and more especially as a secondary one, something may be said in favour of the Olive, which answers admirably, though it does not make such rapid growth as some other trees. On the other hand, however, its roots are less troublesome when it gets large, and the tree itself yields a return in fruit.

Propagation.

The Citrus family can be propagated from seeds, layers, cuttings, budding, and grafting. Seedling plants are, as a matter of course, uncertain as to the quality of their fruit, and some years will elapse before they come into bearing. It is no uncommon thing for trees to be eight or ten years old before they begin to fruit, and their value ascer-

tained. As a matter of course, seedling trees may turn out to be excellent varieties, but, on the other hand, the fruit may be very inferior. Therefore, it is not wise to depend upon seedlings for a plantation of Citrus fruits except as stocks that have been grafted or budded with approved varieties.

Raising Plants from Seed.—Seedling plants make the best "stocks," and should be used exclusively. The seed should be sown thinly in rows about two feet apart, or in small beds, covering it about an inch deep. It should be sown soon after it is taken from the fruit if practicable, and if it has to be kept any time before sowing, care must be taken that the seed does not get too dry. The young plants, as soon as they are large enough to handle, should be thinned out so as to stand about six inches apart. In localities where the sun has great power it will be advisable to slightly shade the rows or beds, as the case may be. The following season transplant into rows three feet apart, leaving about fifteen inches between the plants in the lines. Many growers plant closer, but it is not well to overcrowd the young trees, as they require room for development both for their roots and branches. The plants will be ready for working the second year.

Layering.—Plants can be readily obtained from layers, which root freely, but the trees are, as a rule, not so vigorous and durable as those raised from seed. This mode of propagation is, therefore, not to be commended as a means for obtaining trees under ordinary conditions. It may, however, be adopted without any drawback with the Kumquat, Myrtle-leaved, and other dwarf species of Orange grown merely as ornamental plants. Layers may be put down at any time, but the most favourable periods are late in the summer or autumn and early in the spring.

Cuttings.—Plants of any species of the Citrus family may be obtained from cuttings of ripened shoots of the current season's growth, which will readily strike in sand or light soil if placed in a frame or under a glass to protect them from the weather. This method of propagation is, however, not to be commended except for special purposes, as the plants are slow in growth, and, as a rule, do not make such robust and long-lived trees as seedlings.

Budding.—There is some difference of opinion among growers as to whether budding or grafting is the best mode of propagating the Citrus family. Budding is not so generally practised as the other method, though it finds favour with many experienced cultivators, including the writer, who considers it the best mode of working trees. One great advantage obtained by budding, and a very important one, is that, the trees being worked well above the ground, there is less risk of the disease known as "collar rot" than when the union is under or near to the ground, as it usually is with grafted plants. This mysterious and destructive disease seems to attack trees most readily at the point of union between stock and scion when it is near the surface of the ground, and the risk is materially lessened when the plants have been budded well up the stems. The time for budding will depend, to some extent, upon local conditions such as the character of the season and climate. It

may be done in the spring, provided the bark of stock and scion will rise freely. Early buds, when they have a good start, generally make a strong growth during the following summer and autumn. Sometimes the conditions for budding are not favourable till after mid-summer. Buds put in at this season of the year generally take well, but they do not usually make such strong growth the first season as the earlier worked plants. Buds may also be put in in the autumn, but these often remain dormant till spring, and seldom make much headway till after the winter. In selecting buds a preference should be given to those that are plump and well matured, and care must be taken that none are defective. After the buds have made a fair start, the stocks should be cut back a few inches above the unions. As growth proceeds the young shoots should be carefully tied to stakes or other supports, as they are easily broken off by high winds or heavy rains. In working old trees the better plan is to lightly shorten back the heads and work a number of buds upon them. This is better than heading back closely, working a few branches, and forcing a strong growth of young wood. Buds, if necessary, may be inserted in wood several years old, but, when practicable, the preference should be given to younger branches. When old trees have been worked, the better plan, after the buds have made a good start, is to reduce the tops gradually in preference to cutting them back all at once. By adopting this plan the young growth will have the advantage of shade, which is a matter of some importance, in the summer. In removing the old branches the cuts should be clean, and it is advisable to paint the wounds over with some composition that will protect the wood from the effects of sun, wind, and rain.

Grafting.—This method of propagation is the one most generally adopted in Australia, and the greater portion of the trees sold by nurserymen are raised by this means. Grafting may be done successfully at various periods of the year, but the most favourable time is in the spring when growth is becoming active. The operation may also be successfully performed late in the summer or early in the autumn in regions where there is a second growth after the breaking up of the dry season. In grafting great care should be taken to obtain the scions from vigorous, healthy, and thrifty trees, and not from those that are diseased or weakly. As regards the working and heading back of old trees, the same directions will apply as given in the section referring to budding.

Stocks for Budding or Grafting.—Growers of Citrus fruits differ considerably in opinion as to what are the best stocks for budding and grafting, some authorities being in favour of one kind, while men of equally good repute give the preference to another sort, and some will condemn both and claim that a particular species is the only one to be relied upon. In this part of the world the Rough, or Common, Lemon has been hitherto chiefly used as a stock for the varieties of Sweet Oranges, and also the Lisbon Lemon. Trees raised in this way have, generally speaking, given fairly satisfactory results in most localities. It is claimed for these trees that the roots are more hardy than those of the Orange, that they adapt themselves with greater facility to widely different soils, and that being more fibrous the plants are shifted with

less risk than if growing upon other stocks. It is also claimed for the Rough Lemon that it will stand drought better than other stocks, and be least affected by wet soils. American authorities in California and Florida are mostly in favour of the Bitter, or Seville, Orange as a stock on the ground that it is not affected by the "Collar Rot." It is, however, somewhat doubtful whether this stock is really proof against the disease as supposed. Many years ago, to the writer's own knowledge, the Bitter Orange was strongly recommended in New South Wales as a stock by high authorities, and many cultivators made use of it. After many years' trial, however, the results have not equalled the high expectations, and many experienced cultivators have arrived at the conclusion that as a stock the Bitter Orange gives no advantage over the Rough Lemon. There is no reason, however, why both the Sweet and the Bitter Orange should not be widely used as stocks, as both yield robust and long-lived trees. The closer the affinity between stock and scion the more vigorous and durable is the tree likely to be in the opinion of the writer, and, consequently, the Orange should receive more attention for stocks. *Citrus trifoliata* has of late years received some attention as a stock for the Sweet Orange, and appears to have given satisfaction to many who have tried it. This stock is hardy, shifts well, and is said to be little affected by disease. It has a dwarfing tendency, and may, therefore, prove serviceable for the Mandarin section and other small-growing kinds.

Injurious Insects.

The Citrus family, like most other fruits, is liable to the attacks of various insects, which often cause much trouble and loss to cultivators. When any of these pests make their appearance, efforts, as a matter of course, should be promptly made to check or destroy them. Apply the most effective remedies in the best possible ways, and a great deal can be done by cultivators to mitigate the evils, if they are not actually eradicated. But in addition to applying the various insecticides, care should be taken, as far as is practicable, to remove causes that may predispose trees to the attacks of insects, fungi, or disease. When such causes are allowed to remain, though evils may be combatted to some extent, yet the trees will always be ready subjects for fresh attacks. If the trees are well cared for, and due provision made for their various requirements, they will be far less liable to be attacked by some insects, fungi, or disease. Healthy vigorous trees are comparatively free from the attacks of many pests, but when, through any cause, their growth is interfered with, various insects and fungi soon make their appearance. Prepare and drain the ground thoroughly, plant healthy trees in a proper manner, feed the trees according to their requirements, give the necessary shelter, mulch before the hot weather sets in, and trees of the Citrus family will suffer far less from insect and other pests than if carelessly cultivated.

The insects that are injurious to the Citrus family are somewhat numerous, and, as a matter of course, each class must be treated with

remedies suitable to its form and habits. In the following list the more prominent and best known species are included, as also representatives of the various classes :—

Aphides.—Several species of "fly" are more or less injurious to trees of the Citrus family, the most prominent and troublesome one being the Orange Aphis (*Siphonophora aurantii*). This is a small dark-coloured fly somewhat similar in appearance to the Black Peach Aphis. It chiefly attacks the young shoots and buds, and often causes much injury.

ORANGE APHIS.

Insects (Natural Size)

Winged Female (Magnified).

Pupa (Magnified).

Wingless Female (Magnified).

Another very troublesome species is *Siphonophora citrifolii*, which has proved to be very injurious in some parts of New South Wales and Queensland. It is somewhat similar to the previously mentioned species

in appearance and habits, but is lighter in colour. Aphides not only injure the trees by feeding upon the foliage and young shoots, but, through their excreta, are also one of the causes of the unsightly "Sooty Blight" that frequently disfigures trees of the Citrus family. Remedies —Various means may be adopted with success in dealing with Aphides, 1, Kerosene Emulsion. 2, Tobacco Water, 3, Soft Soap and Tobacco Water, 4, Quassia, 5, Elder Leaf Water, 6, Walnut Leaf Water, also various patent insecticides. All the remedies named are effective, and should be applied as fine sprays in the evening. Full directions for preparing and using the various remedies will be found in volume 1, pages 90 to 102.

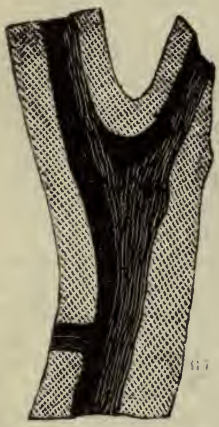
Borers.—Several kinds of boring insects cause damage to Citrus trees, and very often do serious injury. Prominent among this class of pests is a longicorn beetle known as *Uracanthus cryptophagus*, which is rather widely distributed in New South Wales, and perhaps in other colonies. The damage done by this insect in its grub or larval stage is very considerable. The full-grown larva is large as compared with the perfect insect, or beetle, and usually measures from two and a-half to three inches in length. It is nearly cylindrical, and has a small pointed head. In colour it is pale yellow, with a black head. The pupa is about two inches and a-half in length, and in colour is yellowish-brown. The beetle is a slender brownish-grey insect, measuring about an inch and a half in length. This pest is propagated by the parent beetle depositing its eggs on the smaller branches of the trees, and as soon as they are hatched the young larva begins to eat its way into the wood. The grub seems to prefer the centre of the branch that it attacks, and makes a clean cylindrical bore, often to a considerable length. It attacks both branches and trunk, and enlarges its burrow as it increases in size, making small openings occasionally to the side. The result of an attack from these insects is that the branches become weakened and break off, and the trees fail in health when the trunks are affected. Orange and other trees of the Citrus family are sometimes attacked with insects belonging to the Weevil family, as also other beetles. The Elephant Beetle in particular is very destructive to trees of the Orange family. Boring pests are very difficult to deal with, and there are no absolute remedies or preventatives. For those kinds that make their attacks above ground, the better plan is to watch for the eggs or germs, and destroy them as far as is practicable. The trunks of affected trees should be dressed with Alkaline Wash occasionally. If boring insects have attacked the roots the best remedy is Bi-sulphide of Carbon. Full directions for preparing and using these remedies will be found at pages 88 and 89, volume 1.

Fruit-eating Beetles.—Sometimes Citrus fruit are injured by the larvæ of small beetles (or bugs, as they are sometimes called), which puncture the rinds and extract the juices of Oranges and Lemons. Sometimes they make innumerable punctures in the fruit and cause it to shrivel or fall off prematurely. These insects also attack the buds and young shoots often in this way, causing serious injury to growth. One of the most troublesome of this class of insects is the Orange Bronze Beetle (*Oncoscelis sulciventris*), which is widely distributed in the northern districts of New

Orange Boring Beetle.

Full-grown Larva or Grub (Natural Size).

Pupa
(Natural Size).

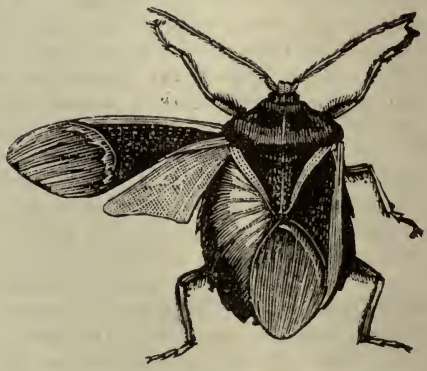


Section of Stem showing Burrow made by the Grub.

Perfect Insect (Natural Size).

Orange Fruit Beetle.

Larva.



Perfect Insect

(Both One-third larger than Natural Size)

South Wales and Queensland. The insects are propagated by eggs, which are laid in patches of from six to thirty on the leaves of the trees they feed upon. These eggs usually hatch out early in the spring, and the young greenish-white larvæ at once commence the business of their lives. As they get older their colour changes to reddish-brown, and when fully grown they are about three-quarters of an inch in length. The perfect, or winged, insect is the same size as the larva, or a little larger. In colour it is a dark bronze brown above and reddish-yellow beneath. These insects and kindred ones are somewhat difficult to eradicate. Spraying with weak solutions of Paris Green or London Purple has to some extent proved effective in destroying them. Three or four sprayings may be necessary, and should be given while the insects are in their wingless state. Another fairly successful way of dealing with them is to spread sheets upon the ground and shake the insects from the trees—the same as is done with the Plum Weevil (*Curculio*). In the cool of the morning or on dull days the insects are somewhat torpid, and will fall in large numbers if the trees are shaken or jarred. Those that fall upon the sheets are easily collected and destroyed.

Orange Moth.—Though not so widely spread or troublesome as many other pests, this insect, which is known to entomologists as *Hydrusa sp*, sometimes causes considerable damage to trees of the Citrus family. The larvæ are small, black, hairy caterpillars, which feed upon the leaves, and are very voracious. The perfect insect is a handsome moth, the body of which is black with deep yellow markings, and the wings black with

ORANGE MOTH.

Caterpillar (Natural Size).

Pupa (Natural Size).

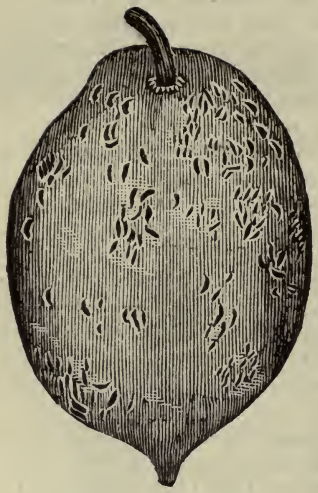
Perfect Female Insect (Natural Size).

Perfect Male Insect (Natura Size).

Ichneumon Parasite (Natural Size).

Ichneumon (Magnified.

LEMON SCALE.



Fruit showing Scale (Natural Size).

Female Scale

Male Scale

(Both Magnified).

Larva

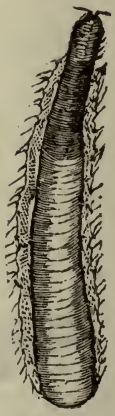
Winged Male

(Both Magnified).

LONG SCALE.

Branch showing Insects (Natural Size).

Female (Magnified).



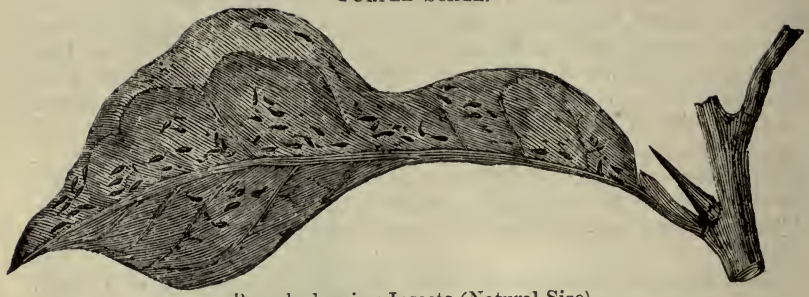
Male (Magnified).

orange blotches. Remedies: The treatment required is the same as for other leaf-feeding caterpillars, viz., spraying with solutions of Paris Green, London Purple, Tobacco Water, Kerosene Emulsion (mild), Elder Leaf Water, and Walnut Leaf Water. Lime dusted over the trees helps materially to keep all kinds of caterpillars in check. Hellebore powder is also a very effective remedy. Full directions for the preparation and use of the remedies named will be found in pages 90 to 102, volume 1. This insect, however, and others of the same class have natural enemies in the form of "fly" parasites, one of them being shown in the illustration. These parasites materially assist in preventing the spread of the Orange Moth.

Rust Mite.—It is not an uncommon thing for Oranges to have a brown rusty appearance, which is very much against them when they are sent to market, and sometimes causes them to be almost unsaleable In the Orange orchards of New South Wales this discolouration is called the "Maori" disease, in allusion to the brown appearance of the fruit. The cause of the evil is a very small four-legged "Mite," known as *Phytoptus oleivorus*, and insect closely allied to the Pear Mite. This insect punctures the oil cells of the rind and causes the oil to exude. This oil, after escaping from the cells, dries upon the rind, and exposure to the air gives it the dark rusty appearance. The insect usually makes its appearance early in the summer, and continues its work till the beginning of the winter. It often attacks the fruit when it is small, and not only gives it an unsightly appearance, but prevents it from attaining its normal size. When the fruit becomes badly discoloured it is, as a rule, deserted by the "Mites," who seek fresh pastures. Remedies: 1. Kerosene Emulsion, used as a spray, 2. Whale-oil Soap in the proportion of one pound to fifty gallons of water, also used as a spray. The spraying should be done in the evenings, and ought to be commenced as soon as the insect is detected. If allowed to make much headway the insects will be able to cause the discolouration of the fruit, and remedial measures will be comparatively useless. It may also prove necessary to give several sprayings to keep the insects under.

Scale.—The insects commonly known under this name are the most troublesome pests with which the growers of Citrus fruits have to contend. They include several species, each embracing numerous varieties, and all are injurious to a great extent. Some kinds confine themselves to particular plants, while others are more cosmopolitan in their habits and attack various trees and shrubs. The principal kinds that attack trees of the Citrus family are as follows:—Black, or Olive, Scale (*Lecanium olea*). —This is a medium-sized dark-coloured insect which greatly affects Olive trees, hence the name. It, however, is equally troublesome to the Citrus family, and often causes serious injury. Lemon Scale (*Mytilaspis citricola*). —This insect affects both foliage and fruit when it makes its appearance, and often quite disfigures the latter. It is an elongated and slightly curved "Scale," as will be seen by the illustration, and is of a dark colour. Long Scale (*Aspidiotus Gloverii*).—This insect is long, hence its common name, and very destructive to the foliage of the trees it attacks. Purple Scale (*Aspidiotus citricola*).—This insect appears to be very

PURPLE SCALE.



Branch showing Insects (Natural Size)

Female (Magnified).

Male (Magnified.)

WOOLLY SCALE.

Leaf showing Insects (Magnified).

Female, Upper View (Magnified).

Female under view showing Eggs (Magnified).

Winged Male (Magnified).

similar to, if not identical with, the Lemon Scale. Red Scale *Aspidiotus coccineus*, (*Aspidiotus aurantii*, *Aonidia aurantii*).—This is one of the most destructive and widely distributed of the Scale insects. It is indigenous to the south of Europe, but is now widely distributed in Australasia and America. The insect is in colour a reddish-brown, and comparatively small in size. It attacks indiscriminately the trunk, branches, leaves, and fruit, and multiplies with great rapidity. If not kept under by prompt treatment as soon as it is discovered, this pest will cause serious injury to the trees that are attacked by it. Soft Orange Scale (*Lecanium hesperidum*).—This is a troublesome species in some localities, but it is not so widely distributed as many of the other Scale insects. It is comparatively large, light brown in colour, and the insects are generally grouped in bunches. White, or Oleander, Scale (*Aspidiotus nerii*).—This insect specially affects the Oleander, and hence one of its common names. It also attacks the Olive, and very often trees of the Citrus family. Various other fruits, as also many ornamental trees and shrubs, are liable to its attacks. It is in colour pale brown, of medium size, and in shape nearly circular. The insects attack all parts of the tree indiscriminately, and the fruit more especially. They affect Lemons perhaps more than Oranges, and when the fruit is infested it is often seriously injured in quality. Woolly, or Fluted, Scale (*Icerya Purchasi*).—This insect, which also passes under the name of Cottony-cushion Scale, is supposed to be indigenous to Australia, and is found upon various native trees and shrubs. It is certainly one of the worst of the Scale insects, as it increases with great rapidity, and is very voracious. The insect has developed a strong predilection for trees of the Citrus family, and is often very destructive. This insect is comparatively large and long, the upper side being somewhat in the form of a cushion. It is covered thickly with a white woolly or cottony substance which has a fluted appearance, and hence the common names.

Scale insects of all kinds are injurious to the trees they attack, but, as a matter of course, some are far more injurious than others. They feed upon the juices of the plant, and, when in large numbers, must, as a matter of course, lessen the vigour of the trees. Their effect upon the foliage can be clearly seen by the pale blotches that surround the insects, which contrast with the darker green of the leaves. When the fruit is attacked badly it generally becomes paler in colour, and often has a shrivelled and unwholesome appearance. Very often when the insects are numerous at the base near to the stalk, the fruit drops from the tree prematurely. Scale insects, by means of their excreta, or Honey-dew so called, are also the main cause of what is known as the Sooty Blight or Soot Fungus which so often makes its appearance upon trees of the Citrus family. Many people are under the impression that ants are the main cause of the sooty appearance because they are often seen in large numbers upon affected trees. This is not so, however, as the ants are really useful scavengers who assist in clearing the trees of other insects. Remedies: 1. Kerosene Emulsion is regarded as one of the best remedies for the Scale insects. It should be used as a spray, and applied in the evenings. 2. Resin Compound. This preparation, used as a fine spray,

RED SCALE.

Branch showing Insects (Natural Size).

Female (Magnified).

Male (Magnified).

PARASITES OF SCALE INSECTS, FLIES.

Insect
(Natural Size).

Insect on the Wing
(Magnified).

Insect at Rest
(Magnified).

Lestophonus Iceryæ.

Insect (Natural Size).

Insect (Magnified).

Insect at Rest (Magnified).

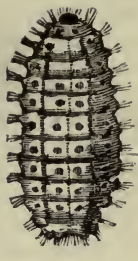
Hymenopteraus Insect.

ENEMIES OF SCALE INSECTS, LADYBIRDS.

Perfect Insect.

Pupa.

(All Magnified).



Larva.

Insect on the Wing (Natural size).

Novius cardinalis.

Leaf with Insects (Natural Size).

Novius bellus.

Perfect Insect (Magnified).

Rhizobius sp.

Perfect Insect (Magnified).

is also one of the best remedies. Full directions for mixing and using these preparations will be found at pages 100 and 101, volume 1. Lime dusted over the trees checks most of the Scale insects to some extent, and assists in removing Sooty Blight from the leaves. As a matter of course, the remedies should be applied while the insects are few in number if

practicable, as it will be much more easy to deal with them then than when they are numerous. It will also be necessary to make several applications of whatever remedy may be used, as one or two are seldom thoroughly effective.

Natural enemies: The Scale insects, like others, have their natural enemies, which materially assist in preventing their increase. Several kinds of insects feed upon them to some extent, prominent among which are various species of Ladybirds. Some of these are very active and voracious, and both in the larva and perfect state wage incessant war with various kinds of Scale insects. These Ladybirds are indigenous to Australia, and, owing to their usefulness as Scale destroyers, have been introduced to American orchards with excellent results. Some of these insects are shown by the illustration in various forms, and particulars respecting others will be found at pages 87 and 88, volume 1. Scale insects have also natural enemies in various "Flies," some of them being very destructive. Two of these are shown by the illustration. Parasitical fungi probably assist in keeping down this class of pests, but though this is known to a limited extent, our knowledge upon this point is very imperfect. It is within the range of probability that careful investigations will enable cultivators in the not distant future to combat Scale and other insect pests to a great extent with their natural enemies.

Case Moths.—These insects derive their common name from the coverings or cases with which they are enveloped, and they are familiar to most people who are connected with orchards. There are several species, all of which are more or less injurious to the foliage of fruit trees. One of the most destructive of these insects is the Large Stick-case Moth (*Metura elongata*), which affects various fruit trees, and is very partial to those of the Citrus family, and often proves very destructive to the foliage and shoots, as also to flowers and young fruit.. The young larvæ are at first very minute, but they rapidly increase in size. They are very voracious even at the earliest stage, and from that period they also commence to spin or form their cases. In the perfect insect the male is a quick-flying bright-coloured moth. The females have no wings, and are practically caterpillars. Remedies: 1. Sprayings with weak solutions of London Purple or Paris Green. 2. Hellebore Powder, dry, dusted over the foliage, or used as a spray when mixed with soft soap and water. When used in this way the proportion should be one pound of Hellebore, three pounds of soft soap, and forty gallons of water. Full directions for the preparation and use of the remedies will be found at page 101, volume 1. Powdered lime dusted over the trees will also assist in keeping down the pest when in its larval state.

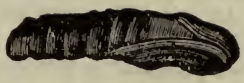
Other Insects.—Trees of the Citrus family are also liable to the attacks of the insects known as Mealy Bug, Red Spider, and Thrips, more or less. Remedies for these are described at pages 98 to 102, volume 1.

Injurious Fungi.

The Citrus family, like others, are to some extent troubled by various kinds of fungi, but less so than many other fruits. In the majority of

STICK-CASE MOTH.

Larva in Case (Natural Size)



Pupa (Natural Size)

Larva (Natural Size)

Perfect Female (Natural Size).

Perfect Male (Natural Size)

cases the attacks of these vegetable parasites are made upon trees that, from other causes, are in an unhealthy condition, or those that have been injured locally. There are in fact, always predisposing causes to bring on the attacks of many kinds of fungi.

Mildew.—Mildew in various forms will sometimes be found upon roots that have been damaged by careless cultivation. These fungi will also often attack the roots of trees that have become inactive for any length of time through the dryness of the soil, or when standing in soddened ground. Mildew fungi will sometimes appear above ground upon diseased wood arising from sunburn, canker, or injury to the bark. They also generally accompany the Collar Rot. The best remedies for this class of fungi are lime and sulphur, either singly or in combination dusted or painted over the affected parts.

Fusicladiums.—This class of fungi, commonly known as "Scab," very often affects Citrus fruits. They make their appearance both upon the leaves and fruit in the form of small dark dots, and often in patches, which have the appearance of scabs. Fruit attacked with this fungi are rendered more or less worthless. Remedies: 1. Ammoniacal solution of Copper Carbonate. 2. Bluestone and Sodium Carbonate. 3. Bordeaux Mixture. 4. Eau Celeste. 5. Soap and Sulphur. 6. Sulphate of Iron. Each of these remedies is fairly effective if used as fine sprays in the evenings, but only when the foliage is dry. It will be advisable to spray the affected trees several times at intervals of two or three weeks, *and the same remedy should be used throughout.* Full directions for preparing and using the fungicides named will be found at pages 98 to 102, volume 1.

Sooty Blight.—This unsightly fungus particularly affects the Citrus family, though it is found more or less upon various evergreen trees and shrubs. It makes its appearance upon the excreta left by Scale insects and Aphides, though many people are wrongly under the impression that it is caused by Ants. This fungus is not specially hurtful to the trees, though, as a matter of course, it and the material upon which it develops injure the affected foliage by stopping the pores and impeding transpiration. Remedies: The Sooty Blight will gradually disappear from trees if the insects that cause it are destroyed. By dusting powdered lime over the affected trees after the cause has been removed, its disappearance will be facilitated.

Diseases.

Canker.—Trees of the Citrus family frequently suffer from the complaint known as Canker, a disease that assumes various forms. Sometimes it affects the roots, at others the trunks, and frequently it is confined to the branches. This disease may result from various causes such as defective drainage, the use of strong forcing manures, or an oversupply of water. It may be caused by drought or frost, as also by deleterious matter in the soil. Any of these causes may affect the flow of sap and induce Canker. Root Canker is often caused by rough cultivation, and may also result from the action of insects or fungi

Stem and Branch Canker may result from an irregular flow of sap, and is sometimes caused by the scorching of the bark, local injuries to the trees, as also the attacks of insects and fungi. Canker is a very difficult disease to deal with, and growers should try to prevent it by avoiding, as far as may be practicable, any of the probable causes named in the foregoing remarks. Prevention is better than cure in most cases, but especially so as regards Canker. When the disease does make its appearance it is somewhat difficult to check it, and there are no absolute remedies. All that can be done when the roots are affected is to promptly cut away the diseased parts to such an extent as may be necessary and practicable. The same system must be adopted when the branches are attacked. Should, however, either roots or stems be badly cankered, it will be the wisest plan to destroy the trees, as the chance of curing them is but slight.

Collar Rot.—This is the most destructive and troublesome disease that affects the Citrus family, and often causes serious losses to growers. It also is known as Foot Rot, Gum Disease, and Sore Shin, while in the south of Europe it passes under the name of Mal di Goma. This disease is said to have first made its appearance about fifty years ago in the Orange groves of the Azore Islands. Soon after it spread to the countries bordering the Mediterranean Sea, and since has been a serious evil to European cultivators. It has also been very destructive in the Australasian Colonies, and equally so among the orangeries of California and Florida. The disease is a mysterious one, and it has not been ascertained clearly what is the cause or causes. Though various theories have been propounded, further observation is necessary before we can be positively sure of the cause of this evil. The disease attacks the trees near to the surface either above or below the soil, its first appearance being indicated by the exudation of a few small drops of gum from the bark. These increase in size, and the bark gradually rots away and drops from the stem. Afterwards the surface of the wood becomes affected, and the tree gradually dies away. Soon after the tree has become affected, the foliage begins to have a yellow and sickly appearance, and when this is observed an examination of the base of the stem should be made. Among the theories propounded as to the cause of the disease are want of proper drainage, unsuitable soil, planting too deep, and allowing water to lie round the stems of the trees. These things are all of great importance to the health and vigour of the trees, but it is doubtful whether any one of them is the real cause of the disease. The most probable cause is sudden and extreme variations of temperature in the surface soil surrounding the stems, which affect the regular flow of sap, and cause contractions and expansions of the bark. As the disease always attacks the lower part of the stem near to the surface of the ground either below or above, the cause certainly seems most likely to be the result of peculiar soil conditions.

The disease is a very difficult one to deal with, and though, if action is taken at an early stage it may be checked to some extent, yet there is no absolute remedy. The treatment likely to be of service is to carefully remove the affected bark, and cutting away

sufficiently far back to be quite clear of the disease. The bared portion of the stem should then be dressed with a composition made of ten pounds of lime, five pounds of sulphur, four pounds of sulphate of copper, and a gill of carbolic acid. Mix these materials thoroughly, using enough water to make of the consistence of a thick paint, and apply with a brush. Pieces of sound bark from the same or other trees may afterwards be grafted into the places. If, however, the wood is affected, a cure is hopeless, and to spend time and labour in treatment will be a waste. The better plan with such trees is to destroy them as soon as is practicable. Though the disease is not easily cured cultivators may do much towards preventing it from coming. In the first place, as it seems to affect trees chiefly near the place of union between stock and scion it will be advisable to give the preference to budded rather than grafted plants. Budded plants being worked higher up the stems than those that are grafted, the union of stock and scion is farther removed from the part liable to be attacked, and, consequently, the risk of the disease is lessened. The writer has found by his own experience that budded trees are comparatively free from this destructive disease. Some authorities assert that this disease may be avoided by using varieties of the Bitter Orange (*Citrus Bigaradia*) as stocks, but this has not yet been proved beyond doubt. Possibly the Bitter Orange stock may have some influence in lessening the risk from the disease, but according to the experience of the writer its use will not entirely avoid the evil. Possibly, however, some species of the Citrus family will prove a thoroughly preventative stock, and experiments in this direction are likely to prove serviceable.

Sunburn.—Trees of the Citrus family are often more or less injured through the bark of the stems being scorched by the sun. The complaint more especially affects young trees whose heads are not large enough to shade the stem, and whose bark is somewhat tender. Older trees, however, suffer from Sunburn. This disease may be noticed by brown patches or strips on the bark upon the sides of the stems most exposed to the sun. The scorching occurs on very hot days when the air is very still, and is sometimes so severe as actually to kill the affected portions of the bark. When the trees are affected the circulation of the sap becomes irregular, and, as a matter of course, the vitality of the plant suffers more or less. It is the writer's opinion that many trees become unhealthy and die off prematurely from their bark being affected by Sunburn. And not only are the trees injured directly through the circulation of the sap being disturbed, but they are predisposed to the attacks of certain insects and fungi. The affected bark becomes ruptured by shrinkage, and often dies altogether, and in either case it affords harbour for the germs of insect and fungoid parasites. In order to avoid Sunburn it is, in the first place, advisable to train trees with low heads, and in such a way that the foliage will effectively shade the stems from the full power of the sun. As regards young trees, however, the heads for a year or two after planting are not large enough to afford the requisite amount of shade, and the cultivator must protect the stems

artificially. This may be done by bandaging the stems with bagging, matting, straw, grass, rushes, or any other material that will answer the purpose. One of the best mediums for the purpose is strips of bark taken from young "gum" or "wattle" saplings, which, when placed round the stems, require no tying, and offer the advantage of being easily obtained in most localities. Cultivators should, however, bear in mind that though stem wrappings are a great protection to young trees during the hot season, yet they must be removed as soon as the power of the sun decreases in the autumn. It is essential that the bark of the the stem should have the full benefit of exposure to air and light for the greater part of the year in order that it may perform its functions properly. When the bark is badly discoloured it is a good plan to carefully cut out the affected parts and graft into their places healthy pieces. By adopting this plan the evil will often be effectually cured. In this, however, as with other complaints that can be avoided, prevention is always better than cure.

Gathering, Storing, and Packing.

Oranges.—In gathering Oranges care should be taken not to injure the fruit in handling, as the slightest bruise or scratch will cause early decay. The fruit hangs very tight to the stems, and when required for keeping or shipping ought to be cut and not pulled. Fruit that has to find a local market may be allowed to get fully ripe upon the trees, but if required for shipment it should be gathered just as it begins to turn colour. Fruit should never be picked for packing while wet with rain or dew, and any that are imperfect ought to be rejected. It will be advisable to delay packing for two or three days after the fruit is gathered to get rid of some of the moisture in the rind, as when slightly dried the Oranges pack closer and better, and are more likely to arrive at their destination in prime condition. The boxes should be uniform in size, and so constructed as to permit free ventilation. Each box should contain fruit that is perfectly even in quality, and the number ought to be marked upon the case. The safest way of packing for shipping long distances is to wrap each fruit singly in tissue paper. The boxes should be filled sufficiently to require a gentle pressure in nailing on the tops, taking care, however, not to bruise the fruit. Fruit in transit requires an even temperature, and if subjected to extremes of heat and cold is liable to spoil, notwithstanding all care in gathering and packing. As a matter of course, when the fruit is required for local markets less attention is necessary, but still care in gathering, sorting, and packing will generally pay growers.

Lemons.—As regards Lemons, the same directions will apply as given for Oranges, so far as regards care in gathering and handling, in order to prevent bruising or otherwise injuring the fruit. Lemons, unlike Oranges, should not be allowed to ripen upon the trees, as when allowed to do so the skin increases in thickness and puffiness, while, on the other hand, the quantity of juice decreases in proportion. The economical requirements in Lemons are thin rinds with a small

proportion of pith, and an abundance of juice. The fruit is in the best possible condition for meeting these requirements when gathered quite green, and several weeks before it would ripen upon the trees if allowed to do so. No absolute rule can be laid down as to the proper time for gathering, as much will depend upon the variety, season and locality. The safest rule will be to cut the fruit when it is from two and a-half to three inches in diameter, leaving Lemons below that size for further development. The removal of the large fruit in this way relieves the trees considerably, and gives the younger Lemons a better chance to increase in size. As a matter of course, Lemons gathered as recommended are not marketable at once, and they must be kept in store till they are of the orthodox colour. They should at first be allowed to stand in the cases they were gathered into at the trees for ten days or a fortnight. During this time a considerable amount of moisture will exude from the skins and escape. The Lemons are then taken out of the cases and arranged in single layers upon trays or shelves and placed in a chamber where light can be excluded, but which at the same time is well ventilated, and can be kept at a medium low and even temperature. A dry cellar, cool shed, or cupboard may be used as a store, but if large quantities of fruit have to be treated, it will be advisable to build a house specially for the purpose. As a matter of course, in filling the trays or shelves, all damaged or defective Lemons should be carefully excluded. If the fruit has been carefully gathered and handled it may be kept in good condition for several months by this mode of treatment. As a matter of course, some of the Lemons will spoil, but if the essential conditions are duly provided for, the percentage of losses will not be large. In addition to being able to market the fruit in the best possible condition, this mode of treatment will enable the grower to keep it till it will fetch the highest prices. It is true that fruit preserved in this way will shrink considerably in size, sometimes to the extent of one-third, but, on the other hand, it will invariably realize much better prices than the coarser and thicker skinned Lemons that are allowed to ripen upon the trees. When packed for exportation the fruit, as a matter of course, should be less advanced in ripeness than if intended for a local market, and should not have commenced to turn yellow. Care should also be taken that the fruit in each case is as even in appearance and size as it is possible to get it. It should be wrapped in paper, and in all other respects treated precisely the same way as that recommended for Oranges.

Limes.—The desirable qualities in this section of the Citrus family are the same as with Lemons, viz., thin skins and abundance of juice. They, therefore, require precisely similar treatment as regards gathering, storing, and packing, and the same directions will apply in every respect.

Citrons, Shaddocks, and Sweet Lemons.—When either of these fruits is wanted for its juice it should be gathered and stored as recommended for the Lemon, and not be allowed to ripen upon the tree. If, however, the fruit is required for marmalade or candied peel, it

will be advisable to let it colour on the tree, though it ought not be allowed to get over-ripe. If required for exportation these fruits must, as a matter of course, be gathered and packed before they begin to turn colour.

Making Candied Peel.

Candied Peel of the Citron, Lemon, and Orange is prepared in large quantities in Europe, and more especially in Italy, and the industry is of some importance. It is also worthy of attention in Australasia, as there is locally a demand for considerable quantities, and if a surplus is produced outside markets can always be found. In preparing the peel the first process is to halve or quarter the fruits and remove the pulp from the rind. The rind is then boiled in a copper vessel for from one to two hours in order to soften it and to allow the sugar to be readily absorbed. The next process is the gradual absorption of the sugar, and this goes on for eight or ten days. The Italian method is to use large earthenware jars about four feet high and two feet six inches in diameter. A jar is filled with the rind, and a weak solution of syrup is poured over it. A weak solution is more readily absorbed at first than a thicker syrup. The next day the syrup is drawn off and a somewhat stronger one used. This process is repeated for eight days, and each time a stronger syrup is used. To facilitate operations a jar is filled with fresh rind every day, and the syrup from the one commenced yesterday is used for the new lot, and so on. As a matter of course, the strength of the syrup is kept up to regular standards throughout the whole period. After the rind has passed through the soakings in the jars it is slowly boiled for an hour in a syrup of forty degrees' density. When removed from the fire the material is poured upon trays composed of coarse wire netting placed over wooden troughs, and the syrup that has not been absorbed drains off, and the peel is allowed to dry. Another operation has now to be performed, and this is to cover the peel with a layer of crystals. This is done by dissolving sugar in water, so as to form a thick syrup, and immersing the peel in it. The peel is then again allowed to dry upon the trays, and the candying is complete. The prepared peel is then carefully packed in small boxes lined with white paper, and is ready for export.

Sometimes the fruit is brought from distant regions, and cannot be utilised quickly. The practice then is to halve the fruit and pack in barrels filled with a fairly strong brine. When this course is adopted it is necessary, after removing the pulp, to soak the skins for a few days to remove the salt that has been absorbed, changing the water several times.

Marmalade.

Marmalade made from the varieties of the Seville Orange is a favourite conserve, and its use is general. The Sweet kinds may also

be used for the purpose, but they are not nearly so good as the others. An excellent marmalade can be made from the Kumquat, as also from the Lemon, Citron, Sweet Lemon, and Shaddock. In making marmalade with Seville Oranges it will be necessary to use an equal weight of sugar and fruit. The Oranges are first cut into halves or quarters and boiled for about two hours till the rinds become soft. When sufficiently tender pour off the water, which should be preserved, and slice the fruit, rind and pulp, into fine shreds. Make a syrup in the proportion of two pounds of sugar to a quart of water. Let the fruit soak in the syrup for about six hours, then simmer for half-an-hour, and boil briskly till the material jellies. The water from the first boiling should be used in making the syrup. Precisely the same directions can be given for making Lemon, Sweet Lemon, Citron, or Shaddock marmalade, but the first-named fruit requires a larger proportion of sugar.

Wine.

Palatable wine can be made from the Orange, Citron, or Lemon by fermenting the juice in combination with sugar and water. For Orange wine the proportion should be a gallon of water and three pounds of sugar to each pint of juice. Boil for several hours and then strain, and put into a cask to ferment, adding a small quantity of yeast. When the fermentation ceases, the cask should be made air-tight, the liquor allowed to stand for several months, and then bottled off. Precisely the same directions will apply to the Citron and Lemon, but the proportion of sugar should be varied somewhat, according to the natural sweetness of the fruit. Some people like the wine to have the flavour of the peel, and when this is the case the rinds of several fruits should be steeped for two or three days, and the water poured into the cask. It is also customary with some people to add small quantities of brandy.

Species and Varieties.

Their are a large number of species belonging to the Citrus family, but only a few are valuable commercially. These include the Sweet Orange, Bitter Orange, Mandarin Orange, Kumquat Orange, Lemon, Sweet Lemon, Lime, Bergamot, Citron, and Shaddock. Each of these species embraces varieties more or less numerous, and differing to some extent in size, form, and qualities. The following remarks will supply such particulars as are likely to prove practically useful respecting each species of the Citrus family and their most useful varieties. They supply a practical, though concise, description of the useful species and a number of the better known varieties, as also their peculiarities and uses. The lists of several species might have been extended, but larger ones would serve no practical purpose. But it must be remembered that though the descriptions will show the normal character of species and varieties, Citrus fruits are apt to vary considerably in quality, according to climate and local conditions. In cold climates, or when growing in exposed situations, the fruit is apt to have a thicker and coarser rind and possess

less juice and sweetness than when grown in a warm and sheltered locality. Young Orange trees almost invariably produce fruit with thicker rinds and inferior in quality to that obtained from older trees. Therefore, cultivators must not too hastily jump to the conclusion that their trees are not the supposed kinds. Very frequently the fruit from young trees has none of the character of the variety it belongs to. The same remarks will apply more or less to the various other species of the Citrus family. The fruit will also vary considerably both in size and quality, according to the climate and soil, and a variety grown under different conditions will often be difficult to recognise as the one kind. Shelter has an important bearing upon the quality of Citrus fruits, and more especially Oranges. Then, again, the size and flavour of Oranges is affected to some extent by the health and vigour of the trees, and this, in a large measure, will depend upon the system of cultivation.

Sweet Oranges.

This class belongs to a species which is known botanically as *Citrus aurantium (dulcis)*, embracing a large number of cultivated varieties, all of which possess the same essential qualities. The fruit is wholesome and useful medicinally, and the rind is a mild tonic. Essential oil is extracted from the rind, and the flowers yield a popular perfume, but to a far less extent than the Bitter Orange. For perfumery purposes this species is less valuable than the Bitter Orange. The varieties named are chiefly those that have been cultivated successfully in Australia.

Allsop's Gem.—A very good Australian variety raised in the Parramatta district, New South Wales. Fruit medium-sized, round, and rather flattened. Skin medium smooth and a bright colour. Juicy and well flavoured.

Caprera.—An imported variety. Fruit small, somewhat similar to the Mandarin in shape. Skin medium smooth and dark coloured. Compact in growth, with handsome foliage, and bears freely. Juicy and sweet.

China.—An imported variety. Fruit medium-sized or under, round, slightly flattened. Skin very thin, shiny, smooth, and rather dark in colour. Very juicy, and richly flavoured, but when over ripe the fruit is apt to fall from the tree A regular and heavy bearer, but requires a warm district.

Common.—There is but little, if any, difference between this Orange and the one known as the Parramatta Fruit large and round. Skin bright and medium smooth. Juicy and well flavoured. Tree hardy and prolific.

Exeter.—A good Australian variety raised at Seven Hills, in the Parramatta district. Fruit large, round, and somewhat flattened. Skin moderately smooth and bright coloured. Juicy and pleasantly flavoured. Tree robust, prolific, and the fruit hangs well.

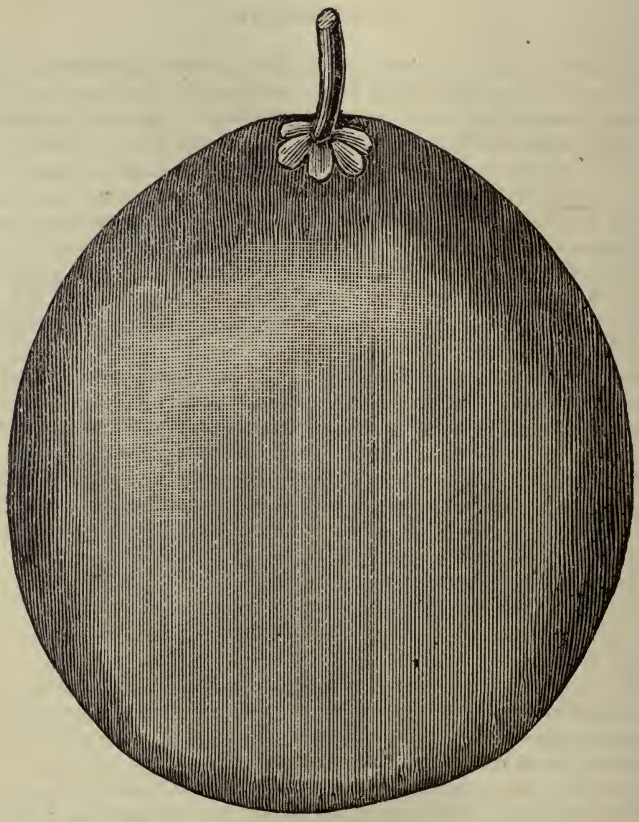
Federation.—An Australian Orange of excellent quality raised in the Parramatta district. Fruit large and round, and ripens late. Skin thin and rather pale coloured. Juicy, sweet, and highly flavoured. Tree vigorous, and bears very freely.

Frontignan.—A first-class variety of uncertain origin. Fruit medium-sized and round. Skin thin, smooth, and brightly coloured. Flavour excellent, and very juicy.

Gooseberry.—A very early and prolific variety. Fruit small, round, and rather flattened. Skin deeply coloured and moderately smooth. Flavour very good. Tree hardy and a very free bearer.

Holdfast.—An excellent Australian variety raised in the Parramatta district. Fruit large, round, inclining to oval. Skin light coloured and smooth. Very juicy and highly flavoured. Tree vigorous, and considered to be one of the most prolific of the Orange family. The fruit hangs well on the trees, and hence the name.

Holroyd's.—An excellent European variety, but the imported name



Jaffa.

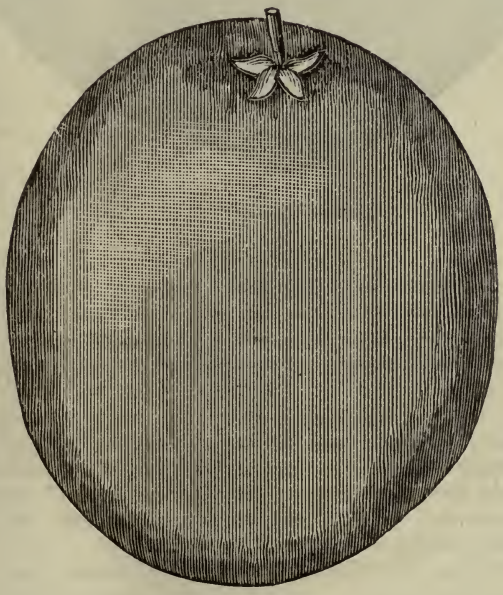
has been lost, and that of the introducer, the late Mr. A. T. Holroyd, of Parramatta, given. Fruit large and round. Skin deep coloured, medium thin, and moderately smooth. Very juicy and sweet. Tree strong and a very free bearer.

Jaffa.—An excellent variety from the Levant, and extensively grown in Turkey, Egypt, and the countries of Western Asia. Fruit large, oval, somewhat narrowed at the base. Skin smooth and highly coloured. Very sweet and juicy. Tree of medium growth and very prolific, but requires a fairly warm climate.

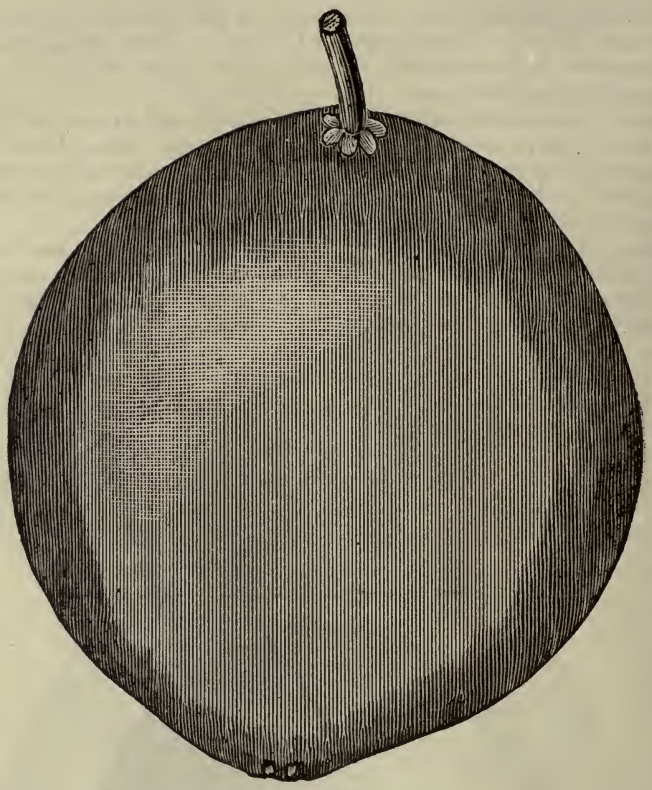
Joppa.—This is a very popular variety in California, where it was raised from seed brought from Joppa in Palestine, and hence the name. The fruit is large and oval. Skin thin and deeply coloured. Very sweet and juicy, with very few seeds. Tree moderately robust and a good bearer.

Majorca.—This variety has medium-sized to large nearly oval fruit. Skin thin, smooth, and of a deep colour. Very sweet and juicy. Tree prolific and moderately hardy.

Malta (Blood Orange).—This variety derives its second name from its dark-coloured fruit, which is blotched with red stains. Fruit medium-sized, round, inclining to oval. Skin thin, medium smooth, Flesh juicy, but heavily stained with purplish-red. It is hardy and prolific, and the



Malta.



Navel.

fruit is of good quality, but it has never become popular in this part of the world owing to the colour of the pulp, and cannot be recommended for commercial purposes in comparison with the Parramatta and Siletta.

Navel (*Bahia*).—This variety produces large, showy, high-flavoured fruit without seeds, and has at the end a navel-like scar where the flower has been. This variety is a somewhat shy bearer unless when grown under very favourable conditions, and requires a sheltered situation, as it is less hardy than many of the other sorts. This kind, owing to its fine appearance and rich flavour, has been termed the King of Oranges. Fruit large, roundish-oval. Skin bright dark, medium thin, and moderately smooth. Flesh juicy and very highly flavoured.

New Caledonian.—A variety of uncertain origin, but brought to Australia from New Caledonia, and hence the name. Fruit medium-sized or over, round, inclining to oval. Skin thin, smooth, and pale coloured. Flavour very good.

Parramatta (*Paramatta Seedling*).—This is an excellent and very useful variety of uncertain origin which is grown extensively in the orangeries of New South Wales. It is one of the hardiest sorts, and yields regular and heavy crops of medium-sized well-flavoured fruit. The writer can strongly recommend this variety for general cultivation in medium cool districts. Sometimes this sort is sent out by nurserymen as the Pennant Hills or Kissing Point Orange and under other local names.

Pearce's Gem.—An Australian variety raised at Seven Hills, in the Parramatta district. Fruit medium size to large, round, and rather flattened. Skin light coloured, thin, and smooth. Juicy and sweet. Tree robust, and an abundant bearer. A first-class Orange.

Pomme d'Adam (*Adam's Apple*).—This is a French variety which is remarkable through having a protuberance at the apex of the fruit like a Lime. Fruit moderately sweet and juicy, but inferior to many other varieties. Not worth cultivating except for variety.

Portugal.—This variety, which comes from the country whose name it bears, has medium-sized roundish fruit Skin bright yellow and thin. Juicy and sweet. Tree robust and prolific.

Pye's Early Acme.—An excellent Australian variety raised by Mr. T. Pye, of Seven Hills, New South Wales. Fruit above medium size, round, and rather flattened. Skin bright coloured, thin, and smooth. Flesh very juicy and sweet. Tree vigorous and a regular and very free bearer. Ripens very early and keeps well.

Pye's Late Acme.—Another excellent Australian variety from the same raiser. Similar in appearance and quality with the preceding sort, but ripens several weeks later.

Queen.—An Australian variety raised in the Parramatta district. Fruit medium-sized or larger, round, inclining to ovate. Skin thin, medium smooth, and rather light in colour. Flesh juicy and well flavoured.

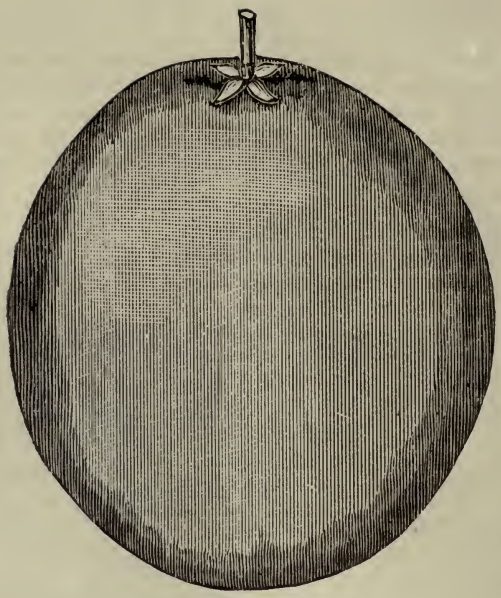
Ribbed Orange.—Fruit medium-sized, roundish, flattened, and regularly ribbed. Skin deep coloured, moderately thin, and medium smooth. Juicy and sweet.

Rio.—This variety is supposed to be of Brazilian origin. Fruit medium to large, roundish-oval. Skin deep coloured, thin, and smooth. Juicy and sweet. Tree nearly thornless, moderately robust, bears freely, but ripens somewhat irregularly. Most suitable for the warmer districts.

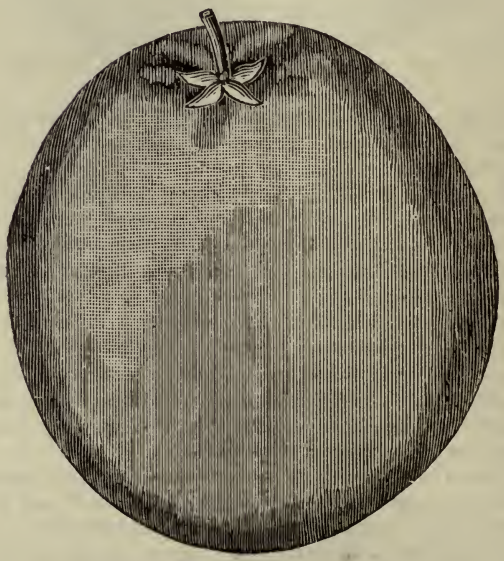
Ruby.—An Australian variety of great excellence raised at Seven Hills. Fruit small, round, and flattened. Skin smooth, thin, and deep coloured. Flesh juicy and highly flavoured. Tree a heavy cropper.

Satsuma.—A Japanese variety, which has, to some extent, the character of the Mandarin class. Fruit medium-sized or under, somewhat flattened, deeply coloured. Sweet and well flavoured. Tree very hardy, prolific, and well suited for medium cold districts.

Siletta (*Cluster Orange.*—As its second name signifies, this variety bears its fruit in bunches, and is a useful and profitable kind. It is one of the hardiest kinds, is very prolific, bears regularly, and the fruit is of good size and excellent in flavour. This is a sort that the writer would recommend to be included in every collection in medium cool districts. Fruit large,



Queen.



Rio.

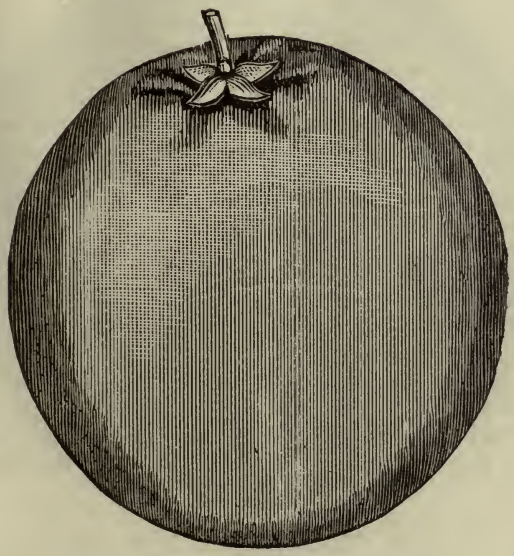
round. Skin bright coloured, medium thin, and moderately smooth. Juicy and good.

St. Michael's.—This is a variety that has a high reputation for the quality of its fruit, which is very thin skinned and sweet when grown under favourable conditions, Like the Navel, however, it is less hardy than some other kinds, and requires a sheltered situation. When grown under favourable conditions this variety is very prolific, but if circumstances are uncongenial it is a shy bearer, and the fruit is apt to lose its high character. Fruit large and round. Skin a bright deep colour, very thin, and smooth. Quality first-class.

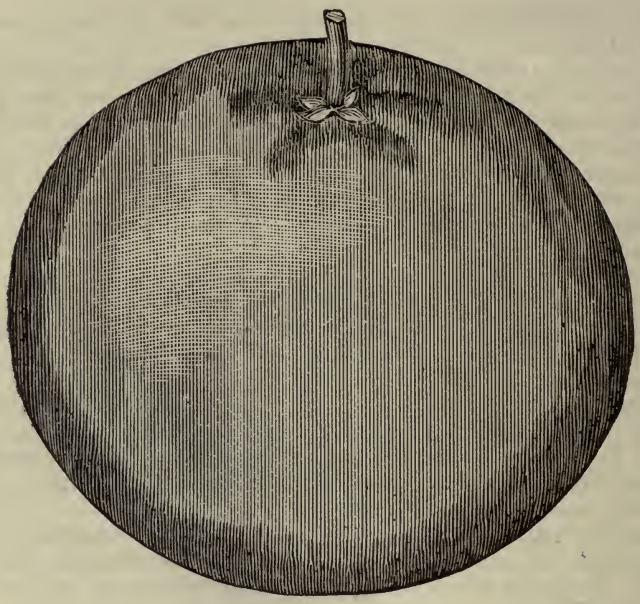
Sugar Orange.—As its name implies this is a very sweet Orange. It is of Australian origin, and was raised in the Parramatta district. Fruit medium-sized or under, round, and flattened somewhat like a Mandarin. Skin deeply coloured. medium thin, and rather smooth. Tree an abundant and regular bearer.

Tahiti.—A highly-flavoured European variety. Fruit medium-sized or smaller. Skin bright deep colour, smooth, and thin. Juicy and very sweet. Tree somewhat tender, and will only thrive in warm localities. A variety from New Caledonia has been introduced as the Tahiti, but it in no way resembles the true kind.

Tangerine.—A popular European variety. Fruit medium-sized or under, round, and somewhat flattened. Skin deep coloured, thin, and smooth. Flesh very rich and juicy. Tree somewhat tender, and requires a warm locality.



Siletta



St. Michael's

Valencia.—A Spanish variety which ripens somewhat late in the season. Fruit large, roundish-oval Skin bright yellow, thin, and smooth. Very sweet and juicy. Tree fairly hardy, vigorous and prolific.

Washington Navel.—A supposed new variety has been introduced from California under this name with the claim that it is quite distinct to the ordinary Navel. It is somewhat doubtful as to whether this is a new variety or merely the ordinary Navel changed somewhat in character by local conditions. This is a very common occurrence with the Citrus family, and the writer believes it is so in this case. It is claimed in California that the Washington Navel is superior to the ordinary kind because it bears more regularly and freely, and if this quality is lasting, it will certainly prove a useful sub-variety, but time only will show its character in Australasia.

White Orange.—A very early and excellent Australian variety raised in the Parramatta district. Fruit medium-sized or over, round. Skin thin, smooth, and very light coloured, hence the name. Flesh juicy and of high quality. Tree a great bearer, and as hardy as the Parramatta or Siletta.

Bitter Oranges.

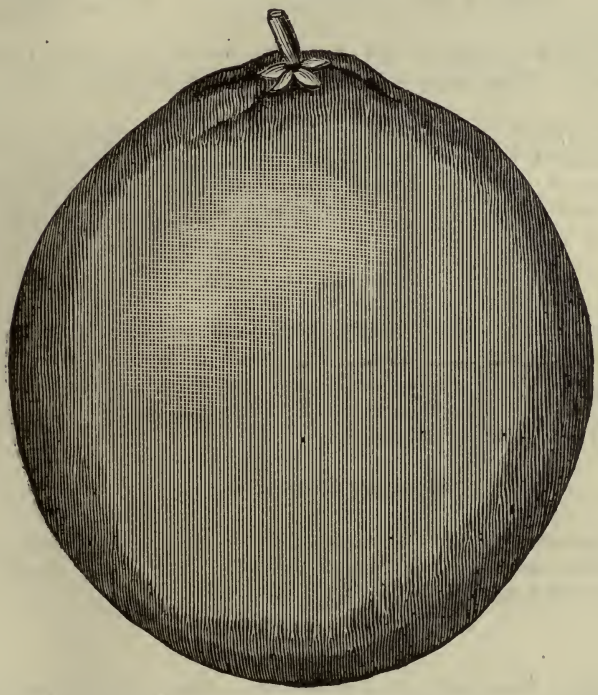
The Seville or Bitter Orange is classed as a distinct species, and is

known botanically as *Citrus vulgaris* (*Bigaradia*). It is not much cultivated in this part of the world, as the fruit is too bitter to be palatable. But in other countries it is turned to good account. This kind in Europe is extensively used for making marmalade and the familiar candied peel. The flowers have a much stronger perfume than those of the Sweet Orange, and, consequently, are more generally used in the preparation of oils and essences. Many varieties are cultivated in Europe, but a few only are known in Australasia, though they are sufficient for practical purposes. The celebrated French Orange tree, Grand Bourbon, alluded to previously, belonged to this class. The following list embraces the most desirable varieties:—

China.—A hardy and very prolific variety. Fruit medium-sized, obovate, juicy, and moderately bitter. Skin bright coloured and moderately thick.

Common Seville.—Fruit medium-sized or larger and round. Skin bright coloured, moderately smooth, and medium thin. Flesh juicy and bitter flavoured. Tree hardy and very prolific.

Poor Man's Orange.—A very hardy, vigorous, and prolific variety. Fruit very large, round, inclining to oval, and produced in clusters. Skin



Poor Man's Orange.

deep coloured, thick, and rough. Flesh juicy and less bitter than the Common Seville.

Navel Seville.—A hybrid variety, combining in appearance the character of both parents. Fruit medium-sized, roundish-oval. Skin light coloured, medium smooth, and moderately thick. Flesh juicy and slightly bitter. Can be used for preserviug, but has no special recommendations.

Seedless (*Bigaradier sans Grains*).—A strong-growing variety with large roundish fruit. Skin rough and deeply coloured. Juicy and moderately bitter.

Mandarin Oranges.

This class of Orange belongs to another distinct species known botanically as *Citrus nobilis* (*Mandurensis*). There are numerous varieties, all bearing comparatively small thin skinned fruit, quite distinct in appearance and flavour to the other kinds. The trees are also smaller in growth and more hardy than the other kinds, and may be grown successfully through a wider range of climate. This class, independent of their value as fruit-bearing trees, are well adapted for shrubberies and gardens, where they are very effective. Most of the kinds bear very freely, but the fruit of some is much superior in quality to that of others. The following is a list of the most desirable kinds, each including several sub-varieties :—

Emperor.—The largest and finest variety in the Mandarin class. Fruit large. Skin deep coloured. Flavour first-class. Tree a free bearer.

Canton.—Fruit much smaller than that of the Emperor. Skin very deeply coloured. Flavour fairly good. Tree hardy and prolific.

Thorny.—A prolific and very good variety. Fruit smaller than the Emperor, and paler in colour. Flesh juicy and pleasant. Hardy and a free bearer.

Kumquat Oranges.

The Kumquat is another species, known botanically as *Citrus japonica*, and it embraces several varieties. All the kinds are small trees, or more properly shrubs, and are valuable chiefly as ornamental plants for the pleasure ground. The fruit is small, bitter, and only serviceable when candied or preserved as marmalade.

Myrtle-leaved Orange.

An ornamental species with myrtle-like foliage, and of dwarf compact habit, known botanically as *Citrus myrtifolia*. Fruit very small and of no commercial value.

Lemons

The Lemon, botanically known as *Citrus limonium*, is a popular and largely cultivated species. It has smaller fruit than the Citron, and the

juice is more acid. The peel is aromatic and tonic, and yields an essential oil called "Oil of Lemon." Several varieties are in cultivation, which differ more or less in size, shape, and quality. The one known as the Lisbon is decidedly the most popular and generally cultivated in Australia, as it is prolific, fairly hardy, and produces large and well flavoured fruit. There are several sub-varieties of the Lisbon, such as the "thornless" and the "variegated," differing from the parent to the extent their names imply. Other varieties are, however, quite equal to the Lisbon in quality, and will, in some cases, give more satisfactory returns. The more generally known kinds are as follow :—

Common (*Milk Lemon*, *Rough Lemon*, *Wild Lemon*).—A very hardy kind, and generally used as a stock for Oranges and Lemons. Fruit roundish-oval, medium-sized. Skin very rough. Flavour inferior, and not worth cultivating for its fruit.

Eureka.—A variety recently introduced from California, and very popular in that country. Fruit medium-sized, oval. Skin bright yellow, thin, and smooth. Very juicy and briskly acid. Hardy and prolific, but foliage often thin and not sufficient to effectually shade the fruit, which, consequently, often gets sunburnt.

Genoa.—An excellent and prolific variety. Fruit medium-sized, oval, bright yellow, thin skinned, very juicy, and nearly seedless. Also keeps well. Tree of moderate growth, and nearly thornless.

Heong Leong.—A Chinese variety. Fruit large, roundish-oval. Skin bright yellow, medium smooth, and rather thick. Useful only for preserving.

Lisbon.—Fruit large and long. Skin bright yellow, moderately smooth, and thin. Very juicy and briskly acid. Prolific, hardy, and one of the best market varieties.

Sicilian.—A popular Italian variety. Fruit medium-sized, oval, bright yellow, and juicy. Tree vigorous and bears freely.

Villa Franca.—This is one of the finest and most profitable varieties in cultivation. Fruit medium large, oblong, slightly pointed at the end, very juicy, and nearly seedless. Skin bright coloured and very thin. Tree thornless, or nearly so, very hardy, prolific. Foliage strong and abundant.

Sweet Lemons.

What is known as the Sweet Lemon is *Citrus lumia*, a species but little cultivated. It has a thick rind and pale pulp, not acid, and may be used for marmalade or candied; but it is inferior to other kinds for these purposes, and hardly worth growing. There are several varieties which differ considerably in shape, colour, and thickness of the rind, but all possess the same essential qualities.

Limes.

The Lime, *Citrus limetta*, is a smaller growing tree than either the Lemon or Orange, and the fruit is used for various purposes. The

fruit has a sub-acid slightly bitter flavour, with similar properties to the Lemon, and its uses are the same. There are several varieties in cultivation, all being more tender than the Orange or Lemon, and they are not likely to thrive except in warm and sheltered localities. The principal kinds are as follows:—

Adam's Apple (*Pomme d'Adam*).—Fruit large, somewhat like a Shaddock. Skin very thick and rough. Flesh deeply stained with red and very bitter. Only fit for preserving.

Persian Sweet Lime.—Fruit roundish, something like an Apricot in shape. Skin tawny-yellow, smooth, and thin. Flesh juicy and without acidity.

West Indian.—Fruit very small and oval in shape. Skin bright yellow, smooth, and thin. Very juicy, acid, and the kind used chiefly for making the lime juice of commerce.

Bergamots.

The Bergamot is known as *Citrus Bergamia*, but some authorities consider it to be merely a form of *Citrus limetta* (the Lime). The fruit is used for the same purposes as the Lime, and from its rind the peculiar volatile oil known as Oil of Bergamot is obtained. There are several varieties which differ somewhat in the shape of their fruit, which varies from pyriform to oblong. In Italy a double flowered variety called Mellarosa is most highly prized.

Citrons.

The Citron, which is a type of the family, is *Citrus medica*. It is less robust in habit than either the Sweet or Seville Orange, and has lighter green foliage. The fruit is oblong, with a very rough and thick rind, and in flavour is less acid than the Lemon. This species is not much cultivated, though the fruit makes a good marmalade, and the peel when candied is excellent. The flowers have also a very powerful odour, and may be used profitably for perfumery purposes. Several varieties are to be found in nursery catalogues, but there is no material difference in quality between most of them. The following are the principal sorts:—

Bengal.—Fruit large, roundish-oval. Skin very rough. Used for preserving, and one of the best varieties. Tree bears freely.

Long Citron.—Fruit very long and somewhat pointed. Skin thick, rough, and better adapted for candied peel than other varieties.

Short Citron.—Fruit much smaller than the preceding variety. Skin also less thick and rough. Tree very prolific.

Fiji Lemon

A species of the Citrus family (*Citrus Figiensis*), which differs to

some extent from the Citron and Lemon, though possessing more or less the qualities of both, has been recently introduced to Australia under the name of the Giant Lemon of Fiji. It was discovered at Fiji, and is said to have flowers and foliage that resemble those of the Citron, while the fruit has the acidity of the Lemon, with a fragrance peculiar to itself. The fruits are very large, averaging three or four pounds, but sometimes attain a weight of six pounds. They are not pointed like Citrons, but are nearly round and slightly oval. The skin is similar in colour to the Lemon, and deeply pitted, but not marked like the Citron. It is about an inch thick in the thinnest part, and over two inches at the ends. The pulpy part is about five inches in diameter, and the juice fairly abundant. From the skin a good preserve can be made which has its own peculiar flavour. This species will probably prove serviceable in the warm parts of Australasia for its fruit, and may possibly prove a useful stock in these regions for other kinds of Citrus fruits.

Shaddocks.

The Shaddock, Sweet Ball, Pompelmouse, Pomplemous, Pompoleon, or Pomelow, as it is sometimes called, is *Citrus decumana*, a species with very large coarse fruit, which is sometimes twenty pounds in weight. It is not much cultivated in this part of the world, but greatly prized in India, China, and the West Indies, where it is generally used. It was introduced into the West Indies from China, its native country, by a Captain Shaddock, from which circumstances it derives its common name. There are several varieties, some having fruit with reddish, and others white, pulp, which may be used for preserving. The trees are robust, bear freely, and make good stocks for other kinds of the Citrus family. The kinds known in this part of the world are as follows:—

Large.—Fruit large, round, and somewhat flattened. Skin smooth, dull yellow, and moderately thick. Used for preserving.

Pear-shaped.—Fruit similar in shape to a very large obtuse Pear. Skin smooth, creamy-yellow, with a medium thick skin. Can be used for preserving.

Pomelow.—Fruit very large, round, and rather flattened. Skin yellowish-green, with a thick and very tough rind. Used for preserving.

Australian Species of Citrus.

Among the few indigenous fruits that are deserving of attention are two species of the Citrus family. *Citrus australasica*, vernacularly known as the Finger Lime and Native Lime, is an evergreen shrub or small tree, which attains a height of fifteen to twenty feet, and is indigenous to the coast regions of Queensland and Northern New South Wales. The fruits are two or three inches long, narrow, with a shape that might be likened to a finger, hence the common name.

In flavour they are sharply acid, and the juice may be used as a substitute for the Lemon. The wood is yellow, hard, and close-grained.

Citrus Planchoni (*Citrus australis, Limonia australis*).—This is a fine evergreen tree indigenous to the coast districts of Queensland and Northern New South Wales, which attains a height of forty or fifty feet. It is commonly known as the Native Orange. The fruit is about an inch and a-half in diameter, almost globular in shape, and yields a sharply acid juice. The wood is hard, fine-grained, and takes an excellent polish. Both these species are worthy of attention in the semi-tropical coast regions of Australia as ornamental plants, and possibly their fruits may be improved by cultivation. They may possibly also prove useful stocks for other species of the Citrus family in congenial localities.

PALILLAS.

This is the Peruvian name for the fruit of *Campomanesia linearifolia*, an evergreen small tree indigenous to South America, also known as a species of Psidium, or the Guava family. It belongs to the order Myrtaceæ, and attains a height of twenty or thirty feet. The fruit is the size of a small Apple, and in colour is a deep yellow. It has a pleasant acid flavour, and makes a good preserve. The tree is fairly hardy, and may be grown successfully through the greater part of Australasia, excluding the very cold and also the tropical regions. As an ornamental plant the Palillas is worthy of a place in shrubberies, and it may with advantage be cultivated for its pleasant Guava-like fruit. Propagation may be effected by seeds, which should be covered to the depth of half-an-inch. Plants are readily and quickly obtained from layers, and cuttings from ripened wood of the current season's growth will root in sand if protected from the weather.

PALMS.

Yielding Edible Fruits.

Several genera of the Palm family that yield important commercial fruits, including the Cocoa Nut, Date, and Gingerbread, have been dealt with in special articles, but there are others which, though less prominent, are well deserving of attention as economical plants. The principal of these are dealt with collectively in this article, though possibly one or two useful kinds may have been overlooked by the writer.

Brahea dulcis and *Brahea edulis*, two compact growing species, which attain a height of about twenty feet, and are indigenous to Lower California, yield large clusters of Plum-shaped fruit that often weigh from thirty to forty pounds. The fruit is somewhat harsh, but is

greatly relished by pigs, sheep, and other animals. These Palms are fairly hardy, and will thrive in all except the coldest parts of Australasia.

Borassus flabelliformis, a species indigenous from India to the Persian Gulf, is a noble and useful Palm, commonly known as the "Palmyra." It has fan leaves, attains a height of from eighty to a hundred feet, and produces large bunches of fruit. The fruits are large, and used for food. From the sap a large proportion of sugar and wine, or toddy, is obtained. The sap is obtained by making incisions in the unexpanded flower stalks. *Borassus Æthiopicus*, a kindred species indigenous from Egypt to Zanzibar, also yields an edible fruit and a large amount of sugar and wine from the sap. It is a gigantic Palm, sometimes the stem being eight or nine feet in diameter, and the leaves ten or twelve feet across. Both species attain a great age, and are said to live over two hundred years. In addition to the value of their fruit and sap, the leaves are also turned to good account for making baskets, mats, and ropes. This genus will only thrive in tropical and semi-tropical regions, but in suitable localities either species is well worthy of attention, both as economical and scenic plants.

Attalea funifera, a Brazilian species, yields seeds known as Coquilla Nuts. This species can only be grown in warm regions.

Areca catechu, an Indian species, yields seeds known as Betel Nuts, which possess stimulating properties. It requires a warm climate.

Bactris Gasipœs (*Guilielma speciosa*), a handsome species indigenous to Venezuela and other countries bordering the Amazon and Orinoco Rivers, is known as the "Peach Palm." It is a wing-leaved species which attains a height of forty or fifty feet. The fruit is in form like a hen's egg, but much larger, and is produced in large bunches. The yellow pulp covering the seeds is firm and mealy, and has a sweet pleasant flavour. When cooked the fruit is said to combine the flavour of a Potato and a Chestnut, but to be superior to either. This fine Palm is well deserving of attention in tropical and semi-tropical regions, both for its fruit and as an ornamental plant.

Diplothemium maritimum, a dwarf Brazilian species, yields a fruit, the sweet outside pulp of which is edible. The juice of the stem by fermentation also yields an intoxicating beverage, and, consequently the species is known as the Wine Palm. A kindred species, *Diplothemium campestre*, of dwarf habit, from the same regions, also yields an edible fruit. These plants can only be grown successfully in tropical or semi-tropical regions, but are worthy of attention as handsome ornamental Palms in congenial localities, irrespective of their value as fruit-bearing species. Another recommendation is that they will stand long droughts with impunity, and are, therefore, specially well adapted for dry interior regions.

Elais guinensis and *Elais melanococca*, West African species, yield a valuable commercial oil, which is obtained by crushing and pressing the pulpy fruit. The fruit of the last named species is edible, and it also yields a palatable beverage from the fermented juice, consequently it has received the name of the Wine Palm. Both these Palms are

well deserving of attention in tropical to medium warm regions as economical and ornamental plants.

Jubœa spectabilis, a tall, strong, and comparatively hardy Chilian species, is known as the Coquito Palm. It will attain a height of fifty or sixty feet, but makes slow growth. The kernels of the seeds are edible, and the sap yields a sweet substance somewhat similar to treacle. This handsome Palm is much more hardy than most of the other kinds named, and may be cultivated in localities where the frosts are light.

Phœnix sylvestris, a species belonging to the Date Palm family, is utilized to a great extent in India, its native country, as a sugar-producing plant. It grows to the height of about forty feet, and bears large bunches of reddish-yellow berries, which are edible but greatly inferior to the Date. Sugar is obtained in large proportions from the sap, which flows from incisions made in the upper part of the stems without material injury to the plants. From the sap by fermentation a species of arrack is obtained. This Palm will thrive in dry regions and in almost any soil or situation, even in drift sands near to the sea coast. It is also moderately hardy, and may be grown in all but the colder districts.

Phœnix farinifera, a hardy dwarf species indigenous to India and China, has shining black berries that have a sweet mealy pulp.

Phœnix reclinata, a hardy South African species, grows about forty feet high, and has sweet mealy fruit. The two last-named species can be grown in any locality where frosts are not severe. All the species are handsome ornamental plants.

Sabal umbraculifera is a noble fan-leaved Palm from the West Indies, where it is known as the "Palmetta." It attains a height of from eighty to a hundred feet and a girth of five or six feet. The fruit is large, dark-coloured, and is borne in large panicles or bunches. The sweet mealy pulp is edible and palatable.

Sabal Blackburniana, another West Indian species, also yields edible fruit, and is somewhat similar to the previous one. From the leaves of both these species hats, baskets, and mats are made. Though these Palms belong to tropical regions they will adapt themselves to medium warm districts, and thrive wherever the Citrus family can be cultivated. Several other species of *Sabal* yield edible fruits, and all are handsome ornamental plants.

Washingtonia filifera (*Brahea filamentosa, Pritchardia filifera*).—This is the Fan Palm of California, and is perhaps one of the hardiest of the American species. It attains a height of about fifty feet, and has a noble appearance. The fruit consists of small black berries borne in clusters, the bunches ranging from ten to twenty pounds in weight. The mealy pulp has a sweet and very pleasant flavour, and the fruit is used in its native regions, which extend from Arizona and Colorado to Southern California. *Washingtonia robusta*, another Californian species, is equally hardy, and also yields an edible fruit. These Palms may be generally cultivated from the semi-tropical to the medium cool districts, excepting where frosts are severe. They

will thrive in any ordinary soil, and are worthy of attention both for their fruit and as ornamental plants.

PAPAW.

History and Uses.

The fruit known under this name is the product of *Carica Papaya*, a small evergreen tree belonging to the order Papayaceæ. (By some modern botanists it is classed as a section of Passifloraceæ). It is indigenous to the West Indies and tropical America to Peru, but has been widely distributed through the warmer regions of Asia and Africa. The tree attains a height of about twenty feet, and has no branches, the heads, which have a Palm-like appearance, being composed of masses of large leaves with very long footstalks. The stem is hollow, and this, as also the leaves and fruit, contain a large proportion of acrid milky juice. This juice when diluted with water is used for washing meat, which it preserves and makes tender by slackening the fibres. It is also used medicinally as an anthelmintic and aid to digestion. There are both male and female flowers, which are produced upon different trees. The female flowers are greenish-yellow, bell-shaped, and the fruit, which varies somewhat in shape, is the size of a small Melon. The fruit is palatable, and is eaten raw with sugar in the same way as Melons, when cooked, preserved in sugar, and, when half-grown, pickled in vinegar. A kindred species, *Carica Candamarcensis*, a small slender tree from Ecuador, where it grows on the slopes of the Andes to an elevation of nine thousand feet, also yields a good edible fruit. This fruit, which is from six to nine inches long and nearly as broad, possesses a rich perfume, and is very palatable. The fruits ripen in succession, and are in season for a considerable time.

Papaw.

CULTIVATION AND PROPAGATION.

The Papaw and its kindred species can only be grown successfully in regions that are warm and free from frost. A rich soil, warmth, and shelter are essentials, as also moisture. In congenial localities this fruit is well worthy of attention. In making a plantation the distance apart should be not less than twelve feet, and care must be taken that there is a fair proportion of male plants, say one in ten. But little further care is necessary except keeping down weeds while the plants are small. The trees are not long lived, and a plantation will only last a few years.

Propagation is easily effected by seeds, which germinate freely. They may be sown at any time, and should be covered to the depth of an inch and a-half.

PAPPEA.

This is a South African evergreen shrub or small tree belonging to the natural order Sapindaceæ and known to botanists as *Pappea Capensis*. In its native regions it is generally known in the English vernacular as the "Wild Plum." The fruit is as large as a medium-sized Cherry, but in appearance is similar to a Plum. It has a pleasant flavour, and in its native regions is considered to be a useful fruit. A good preserve is made from the fruit, which also yields by pressure a vinous beverage. From the seeds an oil is obtained which is said to have the same properties as castor oil. The Pappea is fairly hardy, and may be grown successfully in most parts of Australasia, excepting tropical and very cold regions. It will also thrive in almost any soil or situation. Propagation is effected by seeds, which should be planted two inches deep, layers put down in the autumn or spring, or cuttings of the ripened shoots of the current season's growth.

PASSION FRUIT.

Several species of *Passiflora* yield edible fruits, though only a few are utilized. These are the Common, Small, or Purple-fruited Passion Fruit, the Grenadilla, the Large-fruited, the Water Lemon, and another species known as Decaisne's. The Common Passion Fruit is *Passiflora edulis*, a native of Southern Brazil, a species with bright-dark evergreen foliage. This species has purple fruit the shape and size of a hen's egg, which is produced in great abundance. The fruit contains a rich succulent pulp, which is agreeably sub-acid and pleasantly flavoured, and is very cooling and refreshing when taken in hot weather. It is more popular in Australasia than any other species, and is the well-known Passion Fruit of the shops. The

reasons for this popularity are that this species is hardier than other kinds, and, therefore, better adapted to the climate of the cooler regions, and that it bears more profusely and with greater certainty. The fruit is produced in succession, and the plants yield more or less through the greater portion of the year. This kind may be grown successfully in all but the colder parts of Australasia, and it is a very profitable fruit. In localities where frosts are troublesome it will be advisable to plant in sheltered situations. Being a cheerful evergreen, this species is admirably adapted for covering unsightly buildings or fences, and it is a fruit specially deserving of attention from cottagers and others having limited areas of ground. It may be grown successfully in a town or suburban back yard and trained over an out-building, taking up but little space. When grown in this way it serves as a useful ornamental plant and gives a good return in fruit.

Other Edible Species.

The Grenadilla is the fruit of *Passiflora quadrangularis*, a West Indian species, though the term is often applied to the other kinds. This species has fruit six to eight inches in length, and somewhat similar in shape to a small vegetable marrow. It is of a yellowish-green colour when ripe, and yields an agreeable and juicy sub-acid pulp. The quantity of pulp, however, is much less in proportion to the size of the fruit than with the Small Passion Fruit. The plant is also much more tender in habit, and even under the most favourable circumstances bears less freely. It is strong in growth, and has fine deep evergreen foliage, but it is too tender to thrive in any but the warmer districts and in sheltered situations. The Large Passion Fruit is the product of *Passiflora macrocarpa*, which is a native of Brazil and Peru. This species produces fruit from six to eight pounds in weight, and yields a pleasant sub-acid pulp. As with the Grenadilla, however, the quantity of pulp is small in proportion to the size of the fruit. The plant is strong in growth, produces an abundance of bright deep green foliage, but bears much less freely than the Common Passion Fruit, and is only suitable for the warmer regions. The fruit of *Passiflora Decaisniana* is somewhat similar to the Grenadilla in quality, but rather larger. The plant is also somewhat similar in habit and foliage, and is too tender for cultivation except in medium warm regions. The Water Lemon is the fruit of *Passiflora laurifolia*, a species indigenous to tropical South America and the West Indies. It is a strong-growing species, with handsome bright green foliage and beautiful and fragrant flowers. The fruit is about the size and shape of a Lisbon Lemon, and contains in the pulp a large proportion of rather watery but agreeably flavoured juice. It is very popular in the West Indies, where the use of the fruit is supposed not only to allay thirst, but also to promote an appetite and elevate the spirits. This species can only be cultivated successfully in warm regions, and is too tender for the colder parts of Australasia except when grown under shelter. The following species also yield edible fruits:—*Passiflora alata*, a strong-growing species from Brazil, *Passiflora mucronata*, also from Brazil, *Passiflora pedata*, a species

indigenous to the West Indies and Guiana, and *Passiflora tillifolia*, a Peruvian species. These species are all handsome evergreen climbers, and are worthy of attention as ornamental plants in localities suitable for them, and at the same time they will yield palatable fruits. The fruit of all the species may be kept in good condition for several weeks after they are gathered if picked when fully, but not over, ripe.

Cultivation.

All the species of Passion Fruit are strong-growing plants, and require a rich soil to bring them to perfection. Manure should be used freely in preparing the ground except in the case of land that is naturally very rich. Plants may be readily obtained from seed or cuttings, the former being the most general method. Seeds should be sown in rich sandy soil, covering them to the depth of a quarter of an inch. It is better to sow in pots, boxes, or frames, as the cultivator is then in the most favourable position to give any necessary attention. When the young plants are large enough to handle they should be potted singly in small-sized pots or pricked out into sheltered beds, leaving them about six inches apart. They will be ready to plant out the following season. Cuttings of the young shoots will generally strike freely in sand or light soil if put in either in the spring or autumn. When rooted they should be treated as recommended for cuttings. The only species worth troubling about for general cultivation is *Passiflora edulis*, as it is the only one that is sufficiently hardy to give satisfactory returns in all but warm regions. Though the most favourable positions for it are against fences, walls, or out-buildings, as it then gets better shelter, yet it may also be grown in regular plantations when circumstances are favourable. A sheltered situation is, however, necessary, and the plants will not thrive in localities where the frosts are heavy. Plants may be put in rows eight or ten feet apart like vines, leaving the same distance between in the lines. Stakes with wires or battens should be placed to form trellises, and to these the shoots must be fastened from time to time. The ground should be kept as free from weeds as possible, and more especially in the spring and early summer, and before the hot weather fairly sets in it will be advisable to mulch the surface soil. But little further care is required except the tying and trimming of the shoots occasionally. Plants under ordinary favourable conditions will live and yield heavy crops for several years without renewal. There is a good demand for Passion Fruit throughout Australasia, and its cultivation should prove profitable in many localities.

PEACH AND NECTARINE.

History.

The well-known and popular Peach has originated from *Amygdalis*

persica, or, as it is termed by some botanists, *Persica vulgaris* and *Prunus persica*, a tree belonging to the Amygdaleæ section of the natural order *Rosaceæ*, or the Rose family. The Nectarine has originated from the same source, and though classed separately there is no substantial difference between these fruits, excepting that one has a downy, and the other a smooth, skin. It is not known as to which form is the original type of fruit, or as to its native country with certainty. It is widely diffused through the greater part of Asia, and has been cultivated by the inhabitants of that part of the world from time immemorial. It is said to have been first introduced to Europe by the Emperor Claudius, who obtained it from Persia. When first brought to the Roman States it was called *Malum persicum*, or the Persian Apple, and this is the origin of the word *persica*. The word Peach comes by degrees from the same source, and is comparatively modern, the fruit being described by old British writers under the names of *peske*, *peesk*, *peshe*, and *peche*. The generic name *Amygdalis* comes from *amysso* (to lacerate), in allusion to the deep fissures on the stones.

By the ancient nations of Europe the Peach was looked upon with suspicion when first introduced. it being generally considered to possess poisonous properties. Pliny informs us that one of the kings of Persia sent it to Egypt in order to poison the inhabitants. These ideas as to the deleterious properties probably originated through the Peach being confounded with the Bitter Almond, a tree to which it is closely allied, if it has not originated from the same source. The prejudice against this fruit, however, gradually wore away, and in time it became very popular. With the Chinese the Peach has always occupied a prominent position among fruits, and they have many traditions respecting it. One of these gives an account of a Peach tree that only bore once in a thousand years, the fruit of which when eaten conferred immortality upon those who partook of it. According to another of these traditions there was a Peach which had been growing upon a mountain from time immemorial, guarded by a hundred demons, whose fruit if touched produced instant death.

Uses.

The Peach is said to have been first cultivated in England about the middle of the sixteenth century, but as in that country it is somewhat tender and requires to be grown against walls or other shelters, it never became common and popular in the same way as the Apple, Plum, and Cherry. In all the southern countries of Europe, where it thrives to perfection, the Peach has from time immemorial been a favourite fruit, and generally cultivated. By the inhabitants of these countries the fruit is also utilized in many ways. The Peach is also a very popular fruit in America, where it is extensively grown from the Atlantic to the Pacific. The fruit of the Peach when consumed ripe and fresh is very wholesome, and may be eaten without risk by persons having the most delicate stomachs. For culinary purposes it is excellent, either when ripe or in a green state. Peaches are an excellent fruit for canning, large quantities

in America and Europe being utilized in this way. They are also in demand for this purpose in Australasia, and our colonial factories are now using large quantities. This demand is expanding with each succeeding year, and the trade is likely in time to assume large proportions. In the south of Europe and America, and more especially in California, Peaches are utilized to a large extent by drying, and this mode of preservation is deserving of attention from Australasian cultivators. The drying process is easily effected by halving the fruit, removing the stones, and exposing it upon trays or mats to the sun, leaving the cut sides uppermost. Another mode is to slice the Peaches, and when prepared in this way they can be dried somewhat quicker. If drying is carried on upon a large scale, the most economical plan will be to use evaporators specially designed for the purpose, and which may be obtained at a moderate cost. Cultivators must bear in mind that for either canning or drying sorts having a firm flesh and tough fibre are better than the more luscious and melting varieties that are so excellent for the dessert. When halved or sliced, Peaches and Nectarines are often preserved in brandy or other spirit, and in this form make a palatable sweetmeat. The juice of the Peach makes an excellent cider, and large quantities of the fruit are utilized in this way in America. In preparing this beverage the same directions will apply as given for the making of cider from the Apple. (See article upon that fruit, page 112, vol. 1). An excellent spirit called Peach brandy is also obtained from the fermented juice by distillation.

Medicinally the flowers and kernels of the Peach contain a large proportion of prussic acid, as also does the young green fruit. Fatal results have been recorded of children who have eaten these too freely. Formerly, a decoction of the flowers was often used as an aperient for children suffering from worms. The leaves, after being boiled in milk, were also sometimes used for the same complaint. From the leaves bruised in water and distilled, an extract is obtained called Peach water which is used for flavouring in cookery. The bruised leaves are also sometimes steeped in spirits, to which they communicate a flavour somewhat similar to that of the liqueur called Noyau.

Conditions Necessary for Cultivation.

The Peach may be grown successfully in most parts of Australasia, and it will adapt itself to a wide range of climatic conditions. A warm climate where there is a strong heat at the ripening stage is, however, most congenial to the Peach. It is a tree specially well adapted for the warm inland districts of Australia and New Zealand, where it thrives to perfection and develops the finest qualities in its fruit. Peach culture, and more especially in the warmer districts, is likely to prove in the future a profitable industry. The home demand for fresh fruit is increasing rapidly, and will expand still more freely when the supply is larger and more regular, as it will necessarily be as cultivation progresses.

Peaches may be grown successfully in any fairly good soil, but they thrive to the greatest perfection in a rich sandy loam resting upon a

gravelly or limestone formation. Heavy wet deep clay land is the least favourable location. In preparing the land, excepting in very light open soils, it should be invariably stirred to a depth of not less than fifteen inches in order to secure a good root-bed Care must also be taken to secure perfect drainage, as the Peach is rather touchy if its roots are in saturated ground for any length of time. The trees may be planted at any time between the falling of the leaves and the middle of August, but planting should not be delayed till growth becomes active. Vigorous straight-stemmed trees with well-balanced heads and plenty of roots should always be chosen. Peach trees are not so long lived as many other fruits, and more especially in this part of the world, where plantations will rarely last longer than from twenty to twenty-five years, even with the most careful treatment. From twenty-one to twenty-four feet apart will be ample space for Peach trees. It is particularly necessary that the ground should be kept as free from weeds as possible. The Peach, like other deciduous fruits., is liable to suffer from an undergrowth of vegetation. Keep the weeds down with the scarifier or hoe in preference to roughly working the ground with the plough or spade. It is an excellent plan to mulch the surface as far as the roots extend early in the season, before the settled hot weather comes. By adopting this plan the moisture contained by the soil is conserved to a very great extent. Peach trees are very exhausting to the soil, and they must be supplied with manure when necessary to keep them in good condition. Trees often fail to produce crops, or die off prematurely, through the lack of a suitable supply of food. Cultivators should be able to judge from the appearance of the trees as to whether they require more nourishment. After a few years' growth an annual or biennial dressing of farm-yard manure will generally prove serviceable, and if there are any special deficiencies in the soil, such as the lack of lime, potash, &c., they should be made good.

Pruning and Training.

Winter Pruning.—The Peach and Nectarine require more pruning than any other orchard trees to keep them in good bearing condition. In the case of young trees the main object is, as a matter of course, to get a vigorous growth and direct it into certain channels so as to have large, well-furnished plants as soon as possible. The production of wood is at this stage the principal consideration, and the trees must have their branches thinned out rather heavily, taking care, however, to leave enough foliage for shade. As the trees advance in growth the production of fruit will be the primary object. The fruit is produced almost entirely upon wood of the previous season's growth, and, as these shoots only bear once, extra pruning is required to keep the trees shapely and well-furnished. If left unpruned new shoots will be produced near the points of the old ones, and growth will be weak and straggling. It is, therefore, essential that at the winter pruning, the young shoots of the previous season should be shortened back to a few buds. This shortening back is a material check to over-bearing, and at the same time ensures the production of

Fig. 1—Ordinary Shoot of the Previous Season. Line showing where it should be cut back.

Fig. 2—Shoot properly Pruned, with a young one springing from the base, which will be the bearing wood next season.

Fig. 4—Unpruned Branch with Weakly Shoots.

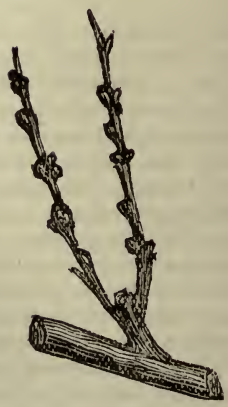


Fig. 3—Double Shoots.

strong fruit-bearing wood for the following season. The practice also enables the cultivator to distribute the bearing wood more regularly and to fill up vacant spaces readily. It should not be forgotten by the operator that he is pruning both for the present and future. As a rule, the wood should be shortened back according to its strength, short if weak, and longer if strong, or say from five to nine inches. Sometimes very short shoots are produced lower down upon the branch than the main ones, which have several flower buds and a terminal wood bud. These shoots do not require to be cut back, and they often produce the finest fruit.

The illustrations will materially assist in showing the effects of pruning. Figure 1 shows an ordinary shoot of the previous season's growth, and how it should be treated. Figure 2—A shoot properly pruned, with young one for next season springing from near the base. The following winter the parent shoot may be cut back to the base of the younger one. Figure 3—Showing the growth of double shoots, one or both of which may be retained, according to circumstances. Figure 4 shows the probable form of growth No. 1 will make if left unpruned. Figure 5 shows an over vigorous shoot with wood buds only. Figure 6 shows a short lower shoot or spur.

Summer Pruning.—Disbudding, or summer pruning, may be practised with great advantage, and more especially in the case of young trees. This practice conserves the energies of the trees, facilitates the ripening of the young wood, and lessens the work of winter pruning. Summer pruning is effected in the first place by rubbing off surplus shoots before growth has made much headway. Care must, however, be taken not to remove too many shoots, as a good supply of foliage is wanted for shade, and is also essential to healthy root action. As growth advances, if necessary, the shoots may be again reduced in number, taking care to distribute the foliage regularly so that it will afford an effective shade. Shoots that make an over strong growth, say when fifteen or sixteen inches in length, should be stopped by pinching off the points with the thumb and finger. This practice will generally be an effective check to excessive growth, but sometimes these branches will again make an over luxuriant growth from the new shoots they put forth. When it will be necessary to pinch back again they are eight or nine inches long. Sometimes shoots show soon after growth commences by their strength and vigour that they are likely to be unfruitful, or what the French term *gourmand* branches, and these should be pinched back short as soon as their character has been ascertained. This will probably induce the formation of two fruitful branches in place of the old one. Sometimes it will be advisable to pinch back shoots though they may not be over luxuriant in order to equalize growth in the case of young trees, or to induce the formation of branches to fill up vacancies.

Root Pruning.—Root pruning is not often required, but when, owing to a very rich soil or other local circumstances, trees are making an over growth of wood and producing but little fruit, it may be practised with advantage.

Heading Old Trees.—When trees have been allowed to grow

WINTER PRUNING.

Fig. 5—Barren Shoot of the Previous Season. Line showing where it should have been cut back in Summer Pruning.

Fig. 6—A short lower Shoot or Spur.

SUMMER PRUNING.

Line showing where the Shoot should be cut back

Lines showing where to cut when a Second Stopping is necessary.

unpruned, or when the shoots have not been properly shortened back every year, they are apt to make a weak and straggling growth of branches and cease to yield satisfactory crops. Then again these trees are specially liable to injury from exposure to strong winds, and the breaking of the branches from the weight of the fruit. Trees of this class, when healthy, may be renovated by cutting back the heads to stimulate a growth of strong young branches. This operation should be performed in the winter or before growth starts in the spring. The better plan is to cut back only half the branches one season and the remainder next year. By adopting this system growth will be more regular, and better protection afforded to the young shoots. Weak and unshapely trees can often, by heading back, be turned into compact well-furnished specimens that will yield good crops. As a matter of course, however, the practice will be of no use if the trees are debilitated from disease.

Training.—Peaches and Nectarines should be invariably trained with low heads, which are not so liable to injury from strong winds as tall trees, and at the same time afford a better shade to the stems, which is a matter of some importance in a warm climate. Low heads also afford greater facilities for gathering the fruit and pruning. Various forms of training may be adopted, according to the fancy of

Young Tree making Natural growth.

Young Tree properly Trained.

A good form for a Peach Tree

cultivators, but none is better for standard trees than the "globular" head, as shown by the illustration. This mode of training enables the trees to withstand the effects of high winds with the least injury, and affords the requisite shade to the stems and branches. In the

United Kingdom and other parts of Europe, owing to climatic conditions, Peaches growing in the open ground have to be trained upon walls with a sunny aspect. This mode of training is not required in Australasia, speaking generally, though the practice might prove useful in some of the coldest districts. It might also prove serviceable in hastening maturity, but this object can be more surely and effectively attained by growing the trees under glass.

Thinning the Crop.

Peach and Nectarine trees are frequently over prolific, and set more fruit than can be brought to perfection. When such is the case it will be an advantage, if practicable, to thin out the crops at an early stage of growth. Fine well-flavoured fruit cannot be obtained from overcrowded branches. Cultivators should bear in mind that a comparatively small number of really good Peaches will give a much better return than twice the quantity of inferior fruit. The best time for thinning is when the fruit is about the size of marbles, and care must be taken not to remove more fruit than is necessary. When circumstances will permit, it will be better not to reduce the crop too much at first, but to thin out a second time after the "stoning" period, which is a somewhat critical stage with the Peach and Nectarine, as during this time a proportion of the fruit is apt to fall. This is more especially likely to be the case in wet soils after heavy rains, or in irrigated land if water is used at the "stoning" stage. Cultivators should remember that though thinning out reduces the number of fruit, yet it does not necessarily lessen the weight of the crop, while at the same time there will be a vast gain in quality. Though the operation of thinning is so much extra labour, yet it will prove a profitable investment for growers, who should adopt it as far as may be practicable.

Propagation.

Propagation may be effected by seeds, cuttings, layers, budding, and grafting. Trees are easily raised from seeds, and plants obtained by this means seem to be more vigorous and better able to withstand disease than others. The greatest drawback to the culture of Peach trees is that in many districts, and more especially the cooler ones, they have of late years been so badly blighted. According to recent observations of the writer in various districts, he found that seedling Peaches *growing where sown* do not so readily get blighted as those that have been planted in the ordinary way. Of course, seedling Peaches cannot be depended upon as regards variety, as they often differ materially from their parents. They may be good or bad, and a Peach-stone may produce a Nectarine, or *vice versâ*. But there is no reason why seedlings should not be raised where the trees are wanted, budding them with the desired varieties. Stones should be sown in the autumn,

covering them to the depth of two or three inches. Plants may be easily obtained from cuttings or layers, which strike readily, but these methods are but little practised and not to be recommended, as trees raised by them are wanting in vigour. Budding is the most general method of propagation, and, as a rule, trees sent out by nurserymen are raised by this means. The operation may be performed at any time during the summer, when the bark separates freely from the wood, but is usually done as soon after mid-summer as is practicable. Grafting is not commonly practised, as in the case of all stone fruits budding is a preferable method of propagation. As a rule, the trees should be worked upon Peach or Nectarine stocks, which, in most localities, will make the most thrifty and durable trees. They will, in ordinary soils and warm to medium climates, yield better crops, be less liable to gumming or other diseases, and live longer than trees worked upon the Almond or Plum, which are used as stocks to a large extent. But in the warmer districts and very dry soils, more especially those containing a large proportion of lime, Peaches sometimes do best upon Almond stocks, and refuse to thrive upon their own. Under such conditions Almond stocks must necessarily have the preference, and these should be raised from robust varieties. On the other hand, the Plum may prove the most suitable stock in the colder districts or in wet heavy soils, as it is far more hardy than the Peach. Plum stocks have also a dwarfing tendency, and hasten maturity, which may be an advantage in cold districts, both as regards earliness of the crop and the ripening of the wood. The Cherry Plum is one of the best kinds for stocks, though others may be used for the purpose.

Injurious Insects.

The Peach suffers from the attacks of various insects, and often to a very serious extent. Cultivators will do well to watch carefully for the appearance of these pests, and apply the best remedies as soon the presence of the insects is ascertained. It will also be advisable, as far as may be practicable, to adopt preventative measures, and reduce the risk of insect attacks to a minimum. The more prominent insect pests are as follows:—

Aphides.—Several kinds of these insects are very troublesome to Peach trees, and if allowed to make headway cause serious injury to both foliage and fruit. The two worst species of these insects are known as the "Black Aphis" and the "Green Aphis." More commonly they are known as the "Black" and "Green Fly." Scientists class them as species of the genus Myzus. The Black Aphis makes its appearance very early in the season, sometimes even before growth commences. The other species makes its appearance somewhat later in the season. These insects are specially injurious to the young leaves and flowers, from which they absorb the juices, and they are also very destructive to the tender shoots. They increase with great rapidity if they are unchecked, and sometimes destroy completely the foliage of a tree. Affected leaves, through their juices being extracted, become contorted and wrinkled, and,

PEACH APHIS.

Branch showing Insects natural size, and Contortions or "Curl" in the Leaves.

Female Insect (Highly Magnified).

as a matter of course, are unable to perform their proper functions. These insects are also a cause for the appearance of the Sooty Blight, or Smut Fungus, which is developed upon their excretions. Aphides are often associated with the "Blister," or "Curl," disease, though they are

not the cause of it as is commonly supposed. Trees affected with the disease, however, afford the insects facilities for concealment in the twisted leaves, and increases the difficulty in dealing with them. Remedies:—1. Tobacco Water. This is an old-fashioned, but an excellent and effective remedy. 2. Quassia Water. 3. Kerosene Emulsion. 4. Resin Compound. 5. Elder Leaf Water. 6. Walnut Leaf Water. Each of these remedies should be used as a fine spray, and, as the young foliage of the Peach and Nectarine is very tender and easily injured, care must be taken not to use strong solutions. Several sprayings may be required, and these should be given at short intervals for as long a period as may be necessary. Full directions for preparing and using the various remedies will be found at pages 99 to 102, volume 1.

Borers.—Peach trees are liable to suffer from the larvæ or grubs of several kinds of beetles and weevils, and they are often affected to a serious extent. Some of these pests are fairly well known to cultivators, but as to others their habits and life histories are more obscure, and there is a wide field for investigation. One of the most destructive of these insects is the Peach-tree Borer (*Trochilium exitiosum*), which also is very troublesome to Plum trees. This insect in its larva stage eats into the bark of the stem just below the surface of the ground, and will sometimes completely girdle the tree. The presence of the insect is indicated, upon

PEACH TREE BORER.

Perfect Insects (Natural Size).

Male.

Female.

scraping away the soil, by the exudation of gum mixed with an excretion resembling sawdust. The perfect insect is a four-winged moth somewhat resembling a wasp (see illustration), which has but a very short existence and is rarely seen. It deposits its eggs, which are very minute, in the bark at the foot of the tree, and these soon hatch, when the young larvæ at once commence the work of their lives. The next season these grubs encase themselves in sawdust-like cocoons, and from these the perfect insects emerge. The Elephant Beetle (*Orthorrhinus cylindrirostris*) often proves destructive to the Peach by boring into the branches in its larval stage. Several kindred species of the weevil family also attack either

branches, stems, or roots. The Cherry Borer (*Maroga gigantella*) is another troublesome insect to Peach trees. Remedies:—The most effective way of dealing with these pests when above ground or just below the surface is hand picking as soon as the insects are discovered. 2. Syringing the affected stems or branches with a strong kerosene emulsion, or hot water after scraping off the loose bark. 3. When the insects attack the roots, holes should be made with a crowbar, and into each one place a small quantity of bi-sulphide of carbon. For full particulars respecting this remedy see page 98, volume 1.

Caterpillars.—Various kinds of these insects attack the foliage, and more especially early in the season. They also feed upon the flowers, and to some extent upon the young fruit. Remedies:—1. Powdered Lime. 2. Hellebore Powder dusted over the trees frequently. 3. London Purple or Paris Green, in solution, used as a spray. 4. Tobacco Water. Full information as to the preparation of these remedies will be found on pages 100 to 102, volume 1.

Red Spider.—This minute insect often affects Peach and Nectarine trees, and more especially during protracted dry weather. It increases with great rapidity and causes serious injury by feeding upon the juices of the leaves. For remedies and full description of the insect see page 82, volume 1.

Scale.—Various species of Scale insects more or less injuriously affect Peach trees, and more especially when they are unhealthy or lacking vigour from the effects of dry weather, poverty of the soil, the want of drainage, or other causes. One of the most common and troublesome species is the one known as Brown Scale (*Lecanium hemisphæricum*), which is very widely distributed. Remedies:—1. Kerosene Emulsion. 2. Resin Compound. 3. Soap and Water applied hot. For particulars as to these remedies see article upon Insecticides, page 98, volume 1.

Thread Worms.—Peach trees sometimes suffer from the attacks of a minute insect commonly known as the Thread Worm, also as the Gall Worm and Nematode Worm. The scientific name of the insect is *Tylenchus arenarius*. These insects bury themselves in the roots and form swellings, or galls as they are commonly called. They increase with great rapidity, and when a tree is attacked by them, are always found in large numbers. When trees are attacked by these pests there is very little chance of their being cured, as the soil becomes infested with them. For a full and complete description of these insects see article upon Root Galls, page 95, volume 1.

Thrips.—These troublesome minute insects often seriously affect Peach trees, and more especially after mid-season and prolonged dry weather. They are found chiefly upon the under sides of the leaves, to which they are very injurious, as they feed upon the juices. For remedies and description see article upon Thrips, page 85, volume 1.

Injurious Fungi.

Curl Blight.—This is one of the most troublesome pests with which cultivators have to contend in localities where it is prevalent. The cause

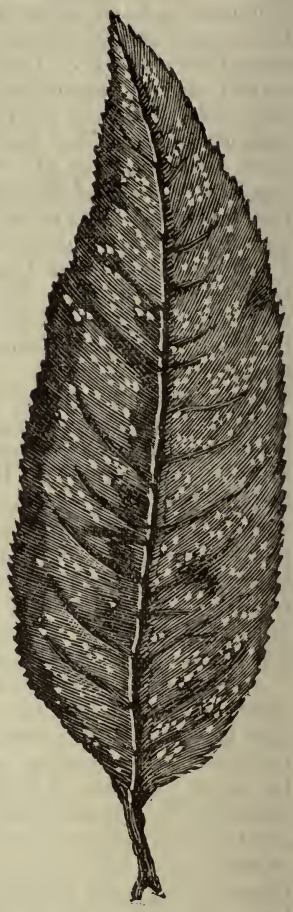
is a minute fungus known as *Exoascus deformans*, which makes its appearance in a somewhat mysterious manner. There is some difference of opinion as to the nature of this fungus, but the most feasible theory is that its appearance is due to a very low temperature after the trees have started into growth. Very often in the spring or early summer, after several mild or comparatively warm days there will be a sudden change to sharp cold winds and a corresponding low temperature. This theory is supported by the fact that the more delicate varieties usually suffer the most, and trees that are well sheltered are the least affected. When attacked by the Curl Blight, which is also known as the Blister Blight, the mid-rib and veins of the leaves become swollen and distorted, forming wart-like masses. During this malformation the leaves twist and curl in a peculiar manner, their tissues are destroyed, and they cease to perform their proper functions. The Curl Blight is a difficult complaint to deal with, and though it may be checked more or less by careful and prompt treatment there is no absolute cure. Preventatives :—1. Provide effective shelter from cold winds. 2. Work the trees upon robust stocks. 3, When practicable raise the stocks from seeds where the trees are required, so that they need not be shifted. 4. Keep the trees in a healthy vigorous condition by the use of manure when necessary. Remedies :—1. Sulphate of Iron. 2. Bluestone and Ammonia. 3. Bluestone and Sodium Carbonate. 4. Eau Celeste. 5. Eau Grison. These remedies are all used as fine sprays, and should be applied several times at short intervals. Care should be taken to use somewhat weak solutions, as the foliage being tender is liable to injury from strong ones ; and whatever remedy is chosen should be used throughout. Full particulars as to the preparation and use of these remedies will be found in the article upon Fungicides, page 98. volume 1.

Mildew.—Peach trees often suffer from various forms of Mildew, and more especially in localities where the temperature at times is very low after growth has commenced. Sometimes Mildew is the result of weakness through over-bearing, poverty of soil, drought, or excess of water at the roots. In fact, debility from any cause predisposes trees to the attacks of Mildew and other fungi. All kinds of Mildew increase with great rapidity when unchecked, and prompt measures should be adopted as soon as any white spots are detected. The most simple and effective remedy is Lime and Sulphur, which is a certain cure if applied in good time. For fuller particulars see article upon Mildew, page 91, volume 1.

Root Fungus.—Various kinds of Fungi often affect the roots of Peach trees, and sometimes to a serious extent. Their origin is somewhat obscure, and their appearance may be due to various causes, such as extreme dryness of the soil or the use of rank manure. It may also make its appearance upon roots that have become ruptured or cankered from rough cultivation, the attacks of root-feeding insects, or the unhealthiness of the trees. Remedy :—The most effective way of eradicating root fungi is to water the surface soil occasionally with a strong solution of Sulphate of Iron.

Rust.—This fungus is widely spread through Australasia, as also other parts of the world, and often causes serious injury to the foliage of Peach

PEACH RUST.



Showing Fungus on the Upper Side of a Leaf.

and Nectarine trees. It is known to scientists as *Puccinia pruni*, and recently it has been re-named *Uromyces amygdali*. Though most commonly known as the Peach Rust this fungus is also common to the Almond, Apricot, and Plum. It generally makes its appearance about mid-summer or soon after, but, as a matter of course, the time will vary according to the climate and season. Sometimes, however, this pest appears much earlier in the season. The fungus first makes its appearance in the form of minute yellow dots upon the upper sides of the leaves, and these expand in size till they run into each other and form blotches. The under sides of the leaves have corresponding dots and blotches, and from these the spores are distributed. The blotches gradually become darker, and finally assume a rusty brown colour. The spores are produced in great abundance, and when discharged are spread widely by the wind. Sometimes this fungus also attacks the fruit, which it causes to assume a blistered or scabby appearance. Owing to the colour of the affected foliage the pest often passes under the name of the Yellows, but is quite distinct from the disease known under that name in Europe and America. The Rust fungus injures the trees by absorbing the sap from the leaves, and preventing them from performing their ordinary functions, causing them to fall prematurely, and, consequently, preventing the proper development of the young wood and fruit buds, which is a matter of material importance. Preventatives:—1. Collecting and destroying by fire all affected leaves before the dispersal of the spores, which is only practicable in the case of small trees. 2. Dressing the stems and branches in the winter with a composition of lime and sulphur or potash. 3. The use of potash manure or wood ashes freely about the roots. Remedies:—1. Sulphate of Iron used as a spray, and watering the soil with a stronger solution, or for the latter purpose this material may be used as a fine powder in the proportion of about half-a-pound to a medium-sized tree. 2. Bordeaux Mixture. 3. Bluestone and Ammonia. 4. Bluestone and Sodium Carbonate. Particulars as to the preparation and use of these remedies are given on pages 99 and 102, volume 1.

Diseases.

Canker.—This somewhat obscure and variable disease often affects Peach trees in different forms, and in all cases causes serious injury. Sometimes the branches are affected, when portions of the bark and wood beneath become discoloured, gradually wither and become dead. Very frequently the disease appears upon the points of the young shoots, which, consequently, wither and die back. Then, again, sometimes the roots are the parts that are affected The disease may arise from various causes, such as extremes of dryness or moisture at the roots, injury by insects, or mutilation either to the roots or branches, &c. Remedies:—The only effective way of dealing with this disease is to amputate the parts that are affected when practicable, either roots or branches. For further particulars as to this disease see article upon Canker, page 93, volume 1.

Gumming.—This is one of the most troublesome and common diseases that affect the Peach and Nectarine, as also other stone fruit trees. As the name implies, it shows itself by the formation of masses of gum, which exude from cracks or wounds in the bark of the trees. The causes of this disease are not known for certainty, and probably they are various. For full particulars respecting this disease and its treatment see article upon Gumming, page 94, volume 1.

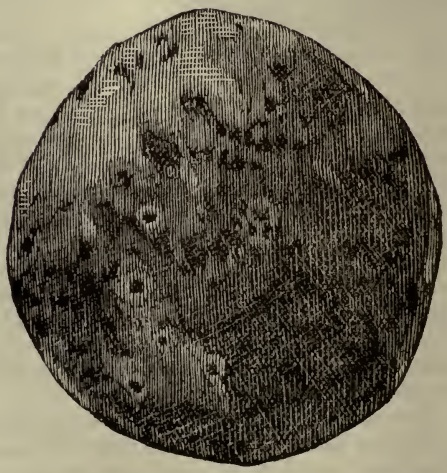
Leaf Galls.—This disease is somewhat common to the Peach, as also various other fruit trees. The "Galls" may be caused by the attacks of either insects or fungi, and though when few in number, as is frequently the case, they do not materially injure the trees, yet when numerous they are a check to healthy leaf action. Remedies:—1. Bordeaux Mixture. 2. Resin Compound. Using both as fine sprays, 3. Lime and Sulphur dusted over the foliage. For further information see article upon Leaf Galls, page 95, volume 1.

Root Gout.—Sometimes the roots of Peach trees are studded with irregular swellings, which assume the form of wart-like knots and rings, and these are often discoloured or cankered. In appearance they are somewhat like roots affected by Thread, or Nematode, Worms, previously described, but the trouble comes from other causes. As in the case of some other diseases the causes are obscure, but probably are the result of injuries causing ruptured roots through rough or careless working among them, the use of over strong manures, or possibly the punctures of minute insects. Roots affected in this way become brittle, and gradually cease to perform their proper functions. They have also a tendency to produce adventitous buds and send up suckers. Remedies:—When but slightly affected, the roots should be opened out and the diseased ones cut away to such an extent as may be practicable. If the roots are badly affected there is but small hope of a cure, and the better plan will be to destroy the trees at once.

Yellows.—This name appears to be applied to several obscure diseases in various parts of the world for the reason that the foliage of affected trees has a yellow or pale appearance. Sometimes it is applied in Australasia to trees that are affected with Rust, but more frequently to those whose foliage is unhealthy through weakness induced by poverty of

Branch showing Weakly Autumn Shoots.

Branch showing an Abnormal Tufted Growth.



Fruit affected by the Disease.

Tree Dying from the Disease.

soil, want of drainage, or other causes. These forms of Yellows, which also pass under the name of Jaundice, may be cured if treated at an early stage of the complaint by removing the causes and amputating such parts of the trees as are affected by disease. There is, however, another form of Yellows which is very destructive in America and to a less extent in Europe, but the writer is not certain as to whether this disease is as yet to be found in Australasia. It is uncertain as to whether this disease is of American origin, but it has caused the destruction of an immense number of Peach trees in the United States. This disease first makes its appearance upon the fruit, which becomes spotted and ripens abnormally early, sometimes a month before the proper time. The spots vary in colour, according to the variety, from a dull red to a deep purple. Underneath the skin, below the spots, the flesh is blotched and streaked with red. The foliage at first is apparently healthy, but as the season advances it assumes a yellowish tinge, which gradually deepens to reddish-brown, and the leaves twist and curl. Another indication of the disease is the starting into growth of the young buds upon the current season's wood as soon as they are formed. Pale weak sprouts also spring from abnormal and obscure buds that are developed in the bark. The flowers of affected trees make a much earlier appearance than usual, and are often produced in the autumn. When trees become affected by this disease they gradually die off, generally branch by branch. Sometimes they will go off after the first season, but often linger on for two or three years. There is no known cure for this disease, and should it make its appearance, affected trees must be promptly rooted out and destroyed. The disease may be transmitted by cuttings, grafts, or buds from affected trees, and, consequently, in propagating great care is necessary.

Selection of Sorts.

Peaches are broadly divided into two classes, called respectively *free-stones*, or *melters*, and *cling-stones*, or *pavies*. The first-named class comprises those kinds that separate freely from the stones. In the cling-stone class the pulp adheres firmly to the seeds. Each class embraces a number of varieties named and cultivated, and the list is being added to every year. The varieties differ widely in size, shape, colour of the skin and flesh, juiciness, flavour, and in the time of ripening. In making a selection cultivators must take all these matters into consideration, as also the purposes for which they are growing the fruit. As dessert fruit, fine-looking luscious juicy varieties are desirable, and earliness and lateness of ripening are considerations that must not be ignored. For canning or drying, the requirements are a firm flesh and a tough fibre. If wanted specially for cider-making or distilling, the varieties should be juicy and free bearing.

Varieties of Peaches.

There are an immense number of varieties in cultivation, and, as new sorts are readily obtained, the list is rapidly extending. The descriptions

given are the normal ones, but cultivators must bear in mind that climate is an important factor in developing the qualities of Peaches. The following catalogue embraces most of the principal varieties :—

Alexandra (*Alexandra Noblesse*).—An excellent English variety, a seedling from the well-known Noblesse. Fruit very large, round, and ripens early. Skin pale, with a few red dots on the sunny side, and covered with a thick down. Flesh pale, very juicy, tender, melting, rich, vinous, and separates freely from the stone.

Alexander's Early.—A recently introduced American free-stone variety. Fruit medium to large, roundish, but slightly pointed, and ripens very early. Skin very dark red. Flesh juicy, melting, and well flavoured.

Amsden's June.—An American free-stone variety of recent introduction. Fruit above medium size, round, and ripens very early. Skin very highly coloured with red. Flesh pale, juicy, melting, with a good flavour.

Barrington (*Buckingham Mignonne*).—An excellent old English free-stone Peach. Fruit large, roundish, inclining to ovate, and ripens at mid-season, a few days after the *Royal George*. Skin greenish-yellow, marbled with red on the sunny side. Flesh yellowish, slightly tinged with red at the stone, melting, juicy, with a rich flavour.

Barton's Newington.—A very good variety raised in Victoria. Fruit medium-sized, roundish, and ripens a little after mid-season. Skin greenish-yellow, tinged with red on the sunny side. Flesh juicy, melting, well flavoured, aad separates freely from the stone.

Bellegarde (*Belle de Tillemont, French Royal George, Galande, Noire de Montreuil, Violette Hâtive*).—An old and excellent French free-stone Peach. Fruit large, round, and regular, ripens about mid-season. Skin nearly covered with deep red, and streaked with a darker tint. Flesh pale yellow, slightly red at the stone, juicy, with a rich vinous flavour. Suitable for canning.

Brigg's Red May. –An American variety of good quality, specially valuable for its earliness. Fruit medium to large, free-stone, and ripens very early. Skin nearly covered with bright deep red. Flesh creamy-white, very juicy, and pleasantly flavoured.

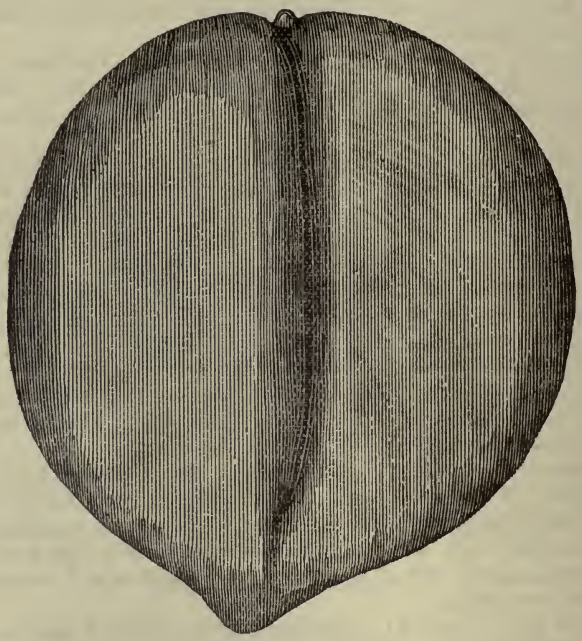
Comet.—An English free-stone variety, a seedling from the *Salway*. Fruit large, round, and ripens a little after mid-season. Skin pale yellow, with a crimson cheek. Flesh pale yellow, juicy, and melting. Suitable for canning.

Conkling.—A newly introduced American free-stone variety. Fruit large, roundish, and ripens a few days later than the *Early Crawford*. Skin yellow, with crimson velvet cheek. Flesh golden yellow, juicy, and well flavoured. A good Peach for canning.

Cooledge's Favourite (*Early Red Rareripe*).—An excellent American free-stone variety. Fruit large, roundish, and ripens medium early. Skin smooth, pale, with a rich crimson mottled cheek. Flesh very juicy, melting, sweet, with a rich high flavour.

Crawford's Early (*Early Crawford, Early Malecoton*).—An American free-stone variety of great excellence. Fruit very large, roundish-oblong, and ripens medium early. Skin yellow, with an orange-red cheek. Flesh

yellow like an Apricot, a little red towards the stone, melting, sweet, with a rich luscious flavour. This is a Peach specially suited for drying or canning, and is worthy of general cultivation.



Crawford's Early

Crawford's Late (*Superb Malecoton*).—Another superior American variety from the same source as preceding one. Fruit similar to *Crawford's Early* in size, form, and colour, but ripens about three weeks later This variety is also specially worthy of attention for canning and drying.

Dagmar.—An English free-stone variety, raised by Mr. Rivers from *Early Albert*, which that gentleman also raised. Fruit medium-sized or over, round, and ripens medium early. Skin very downy, pale yellow, but nearly covered with minute crimson dots, so dense that they nearly form a solid mass of colour, and give the fruit a mottled appearance. Flesh white, very melting, vinous and richly flavoured.

Deardon's Seedling.—A excellent free-stone Peach raised in Victoria. Fruit large, round, and ripens late. Skin yellowish-green, with a red cheek. Flesh melting, very juicy, and finely flavoured.

Desse Tardive.—A first-class French free-stone variety. Fruit large,

round, rather flat at the top, and ripens towards the end of the season. Skin pale, thickly covered with small red dots, and a pale red cheek. Flesh pale greenish-white, with a rosy tinge next the stone, melting, very juicy, sweet, vinous, and highly flavoured. An excellent late Peach

Dr. Hogg.—An excellent free-stone variety raised in England by Mr. Rivers from a French Peach. Fruit very large, round, and ripens early in the season. Skin thin but tough, lemon coloured, dotted with crimson, with a faint red cheek. Flesh yellowish-white, somewhat firm, but melting, with a rich sugary flavour. A large showy Peach, very early, and bears carriage well.

Duke of Edinburgh.—A first-class free-stone variety raised in Victoria. Fruit large, round, and ripens a little after mid season. Skin yellowish-green, with a deep red cheek. Flesh melting, juicy, and well-flavoured.

Early Admirable (*Belle de Vitry*).—A very good French free-stone variety, with large, roundish fruit, which ripens medium early. Skin pale yellow, with a bright red cheek. Flesh creamy-white, with a tinge of red next the stone, juicy, melting, with a rich sweet flavour.

Early Albert.—An excellent English free-stone Peach raised by the late Mr. Rivers. Fruit above medium size, roundish, and ripens early. Skin greenish-yellow, with a dark red cheek. Flesh white, with a faint red tinge next the stone, juicy, with a rich sugary flavour.

Early Alfred.—An English Peach of excellent quality raised by Mr. Rivers from a seed of *Hunt's Tawny* Nectarine. Fruit medium to large, roundish, and ripens early. Skin pale yellow, with a mottled crimson cheek. Flesh yellowish-white, juicy, melting, and richly flavoured.

Early Anne (*Green Nutmeg*).—An old English free-stone variety, with medium-sized, round fruit, which ripens very early. Skin pale, with a faint red cheek. Flesh white, moderately juicy, and fairly well flavoured.

Early Beatrice.—This is a useful free-stone variety of English origin, raised by Mr. Rivers, and valuable for its earliness. Fruit medium-sized, and ripens very early. Skin creamy-white, with a marbled red cheek. Flesh white, juicy, and well flavoured.

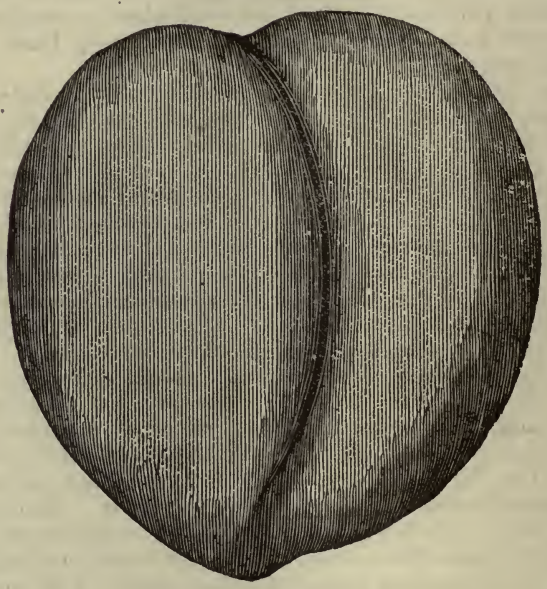
Early Grosse Mignonne (*Mignonne Hâtive*).—An excellent French free-stone variety, with large roundish fruit, which ripens medium early. Skin pale, with a red cheek strewed with bright crimson dots. Flesh creamy-white, lightly veined with red, very juicy, melting, and richly flavoured.

Early Newington (*American Early Newington*).—A fine Peach of American origin, quite distinct from other sorts known as *Newingtons*, which are cling-stones, while this is a free-stone, though sometimes it adheres slightly. Fruit large, round, and ripens early. Skin yellowish-white, with a red cheek, dotted and streaked with crimson. Flesh creamy-white, with red next the stone, juicy, melting, with a rich vinous flavour.

Early Rivers.—A fine English free-stone Peach raised by the late Mr. Rivers. Fruit large, roundish, and ripens very early. Skin pale yellow, with a light red cheek. Flesh white, juicy, melting, with a brisk pleasant flavour.

Early Silver.—Another fine English free-stone variety, raised by Mr.

Rivers from a seed of the *White Nectarine*. Fruit large, roundish-ovate, and ripens medium early. Skin creamy-white, with a faint blush of red on the cheek. Flesh white, very juicy, melting, with a rich brisk vinous flavour.



Early Silver.

Early York (*Chancellor*, *Early Purple*).—An old English free-stone variety, with roundish-ovate fruit, which ripens medium early. Skin pale, dotted with red, and a deep red cheek. Flesh greenish-white, very juicy, melting, with a briskly rich flavour.

Early Victoria.—An English free-stone Peach raised by Mr. Rivers from a seed of *Early York*, which it to a large extent resembles, but ripens rather earlier. Fruit medium-sized, roundish, and ripens early. Skin pale, with a deep red cheek. Flesh creamy-white, very juicy, melting, with a sweet brisk flavour.

Exquisite.—A fine handsome Peach of American origin. Fruit very large, roundish oval, and ripens at mid-season. Skin deep yellow like an Apricot, with a dark crimson mottled cheek. Flesh deep yellow, veined and stained with red next the stone, melting, juicy, rich, and vinous. Suitable for canning.

Flat China (*China Peach, Java Peach*).—A very distinct variety which is useful for its earliness, though only second-rate in quality. Fruit quite flat, from two to three inches across, and about a third of the diameter in thickness. Ripens earlier than any other variety. Skin pale green, with sometimes a tinge of brownish-red. Flesh greenish-white, very juicy, pleasant, but not highly flavoured. This variety is a prolific and very early bearer

Foster.—A popular American free-stone variety. Fruit uniformly large, and ripens early. Fruit roundish, slightly flattened. Skin deep orange, with a red cheek. Flesh yellow, very rich, and juicy. Hardy, productive, and a favourite canning variety in America.

Grosse Mignonne (*Avant, Early Purple, Early Vineyard, Forster's Early, French Mignonne, Royal Kensington, Royal Sovereign, Superb Royal*). —An excellent, well known, and popular free-stone variety of French origin. Fruit large, roundish, somewhat flattened, and ripens at mid-season. Skin pale greenish-yellow, mottled with red, and a brownish-red cheek. Flesh yellowish-white, tinged with red next the stone, juicy, melting, with a rich vinous flavour.

Haines' Early Red.—An American free-stone variety, with round, medium-sized fruit, which ripens early. Skin pale, but nearly covered with deep red. Flesh greenish-white, very juicy, sweet, and well flavoured.

Hales' Early (*Early German*).—A first-class free-stone variety of American origin, which ripens early. Fruit medium size, nearly round, Skin yellowish-green, nearly covered with dark red. Flesh creamy-white, juicy, melting, sweet, and well flavoured.

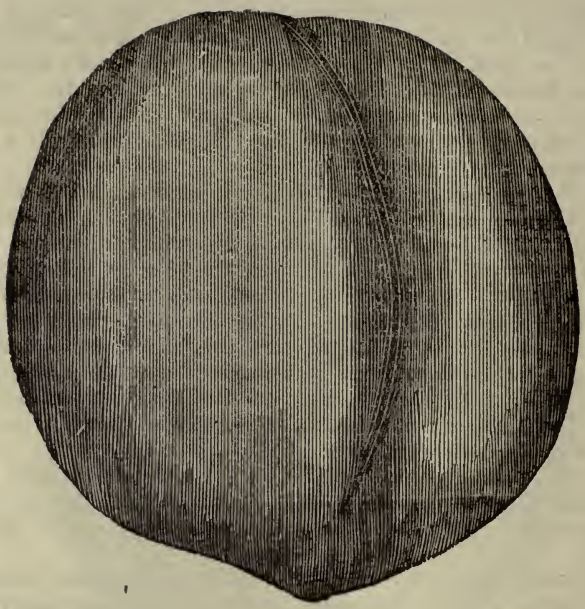
Lady Palmerston.—A fine and popular English variety raised by the late Mr. Rivers from a stone of the *Pine-Apple* Nectarine. Fruit large, roundish, and ripens rather late. Skin deep yellow, marbled and flushed with crimson. Flesh pale yellow, juicy, and well flavoured. A good variety for canning.

Late Admirable (*La Royale, Judd's Melting, Peche Royale, Teton de Venus*).—An old, excellent, and popular French variety. Fruit very large, inclining to oval, terminating with an acute swollen nipple, and ripens rather late. Skin pale yellowish-green, with a light red cheek, and marbled with a deeper tint. Flesh greenish-white, with red veins near the stone, very juicy, melting, and richly flavoured.

Lemon Cling-stone.—A fine American variety, which is a great favourite in the United States for canning. Fruit large, oblong, with a large swollen nipple like *Late Admirable*, and ripens about the same time as that variety. Skin pale bright yellow, with a purple-red cheek. Flesh yellow, slightly red at the stone, firm, with a rich sprightly vinous flavour.

Lord Palmerston.—An English variety raised by the late Mr. Rivers from a seed of the *Princess of Wales*. Fruit very large, and ripens late. Skin pale, with a little red on the cheek. Flesh yellowish-white, deeply stained with red at the stone, to which it adheres somewhat, firm, juicy, and well flavoured.

Magdala.—This fine free-stone variety is of English origin, and was



Lady Palmerston.

raised from a stone of the *Orange* Nectarine. Fruit large, and ripens at mid-season. Skin nearly smooth, creamy-white, marbled with crimson. Flesh juicy, melting, and in flavour a combination of Peach and Nectarine.

Noblesse (*Lord Montague's*, *Mellish's Favourite*, *Vanguard*).—A very popular, and well-known old English free-stone variety. Fruit large, roundish-oblong, terminating with a small nipple, and ripens about mid-season. Skin pale yellowish-green, with a red cheek, and clouded with a darker red. Flesh creamy-white, very juicy, melting, and highly flavoured.

Old Newington (*Newington*, *Large Newington*).—An old and well-known English cling-stone variety, which has been cultivated for over two hundred years. Fruit large, roundish, and ripens a little after mid-season. Skin pale yellow, with a rich deep red cheek, with streaks of a darker tint. Flesh yellowish-white, deep red at the stone, to which it adheres firmly, juicy, with a rich vinous flavour.

Oldmixon Cling-stone.—An American variety that is very popular in the United States. Fruit large, roundish-oval, and ripens a little after mid-season. Skin yellowish-white, with a cheek varying from pale to deep red, and dotted with crimson. Flesh creamy-white, very juicy, firm, with a luscious rich high flavour.

Orange Cling-stone.—An excellent American variety. Fruit large, round, with no point at the apex, and ripens medium late. Skin deep

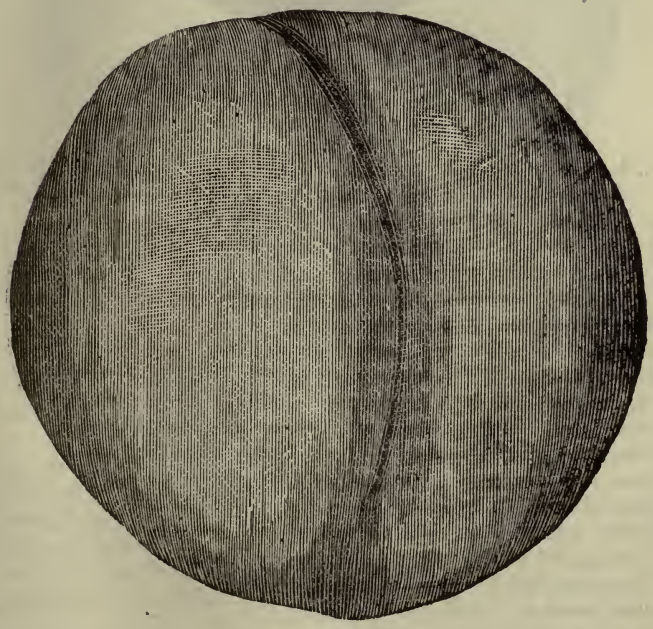
orange, with a red cheek. Flesh deep yellow, firm, juicy, with a vinous flavour. An excellent Peach for canning and drying.

Pavie de Pompone (*Gros Malecoton*, *Pavie Monstrueux*, *Pavie Rouge*). —An old and useful French cling-stone variety. Fruit very large, roundish-oval, terminating with an obtuse swollen nipple, and ripening very late. Skin yellowish-white, but covered to a great extent by deep red. Flesh yellowish-white, deep red at the stone, to which it adheres very firmly, juicy, sweet, with a vinous musky flavour.

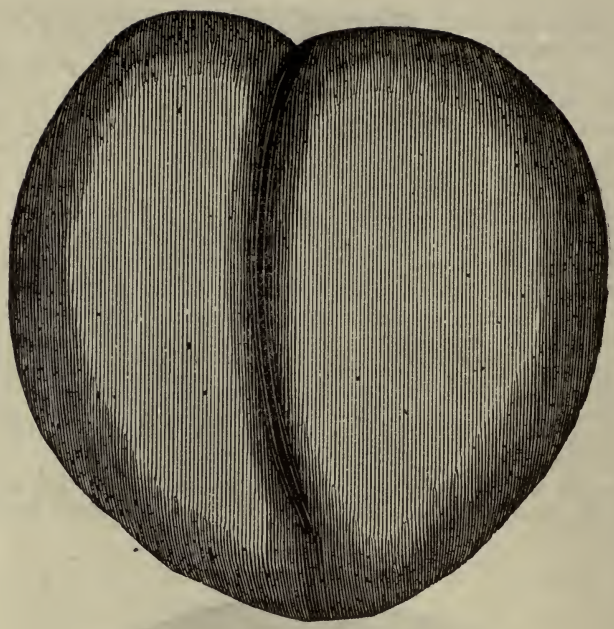
Piquet's Late.—A fine American free-stone variety, with large round fruit, which ripens late. Skin deep yellow, with a red cheek. Flesh yellow, melting, sweet, with a rich aroma. Suitable for canning and drying.

Prince of Wales.—An excellent English free-stone Peach raised by the late Mr. Rivers from a seed of *Pitmason Orange* Nectarine. Fruit very large, roundish, rather flattened, and ripens very late. Skin pale green, with a dark red cheek, and covered with a thick down. Flesh greenish-white, stained with red next the stone, juicy, melting, sugary, with a vinous flavour.

Princess of Wales.—Another good English free-stone variety raised by the late Mr. Rivers from a seed of *Pavie de Pompone*. Fruit very large,



Noblesse.



Old Newington.

round, terminating with a nipple, and ripens very late. Skin creamy white, slightly shaded with pale red. Flesh white, deep red next the stone, juicy, melting, and very richly flavoured.

Red Italian.—A very fine free-stone Peach of doubtful origin. Fruit very large, roundish, and ripens late. Skin bright yellow, with a heavy deep red cheek. Flesh juicy, rich, and highly flavoured. An excellent variety for canning.

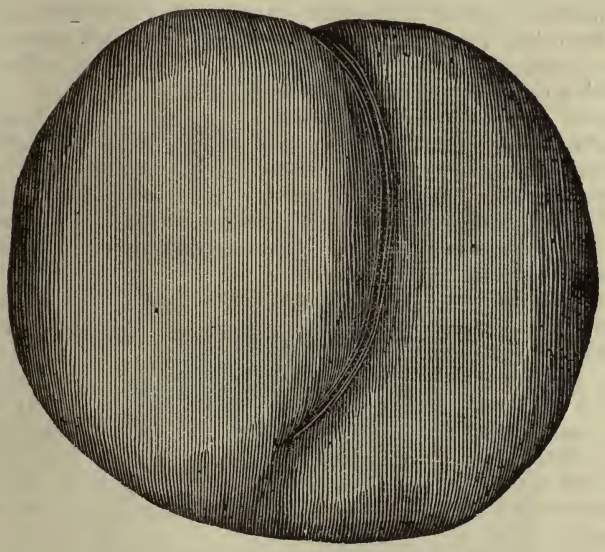
Red Magdalen (*French Magdalen, Madeleine de Courson, Madeleine Rouge*).—A favourite old French free-stone variety. Fruit medium-sized, rather flattened at the stalk, and ripens at mid-season. Skin pale yellowish-white, with a lively red cheek. Flesh white, tinged with red next the stone, juicy, sugary, with a rich vinous flavour.

Reine des Vergers (*Monstrueuse de Doué, Orchard Queen*).—An excellent old French free-stone variety. Fruit very large, roundish-oval, and ripens a little after mid-season. Skin pale green, profusely dotted with red, and a bright red cheek. Flesh greenish-white, deep red next the stone, rather firm, juicy, with a sprightly vinous flavour. An excellent market Peach from its size and because it carries well, and might prove suitable for canning.

Royal Charlotte (*Kew Early Purple, Lord Fauconberg's, Lord Nelson's*).—A fine old and favourite English free-stone variety. Fruit rather large,

roundish-ovate, and ripens about mid-season. Skin greenish-white, with a deep red cheek. Flesh creamy-white, pale red next the stone, juicy, vinous, with a rich flavour.

Royal George (*Early Bourdine, Superb*).—An excellent and well-known English free-stone variety that has been extensively cultivated for many years in Europe, where it ranks as one of the leading Peaches. Fruit large, round, somewhat depressed, and ripens before mid-season. Skin pale, with a broad deep red cheek, and dotted with red. Flesh creamy-white, deep red at the stone, very juicy, melting, with a rich luscious flavour.



Royal George.

Royal George Cling-stone.—A very good Peach which is generally known under this name in the colonies, though why so called is not known. It more properly belongs to the Newington family, and the two varieties under one name cause confusion. Fruit large, round, and ripens about mid-season. Skin pale, with a dark red cheek. Flesh firm, juicy, and well flavoured.

Salway.—A useful English free-stone variety, with medium-sized fruit, which ripens very late. Skin rich deep yellow like an Apricot. Flesh deep yellow, very juicy, and highly flavoured. Suitable for canning.

Shanghai.—A variety of Chinese origin, with large roundish-oval fruit, which ripens a little after mid-season. Skin pale yellowish-green, with a

slightly red cheek. Flesh greenish-yellow, melting, juicy, with a rich flavour, and adheres slightly to the stone.

Smith's Newington (*Early Newington Cling-stone*).—An English variety, with medium-sized roundish-oval fruit, which ripens medium early. Skin pale yellow, with a lively red cheek streaked with a deeper tint. Flesh pale yellow, tinged with light red next the stone, juicy, and well flavoured.

Stump the World.—An excellent American free-stone variety with an uncouth and absurd name. Fruit very large, roundish, inclining to oblong, and ripens about mid-season. Skin pale, thickly dotted with red, and a bright red cheek. Flesh creamy-white, juicy, melting, and richly flavoured.

Susquehanna (*Griffiths' Mammoth*).—Another fine American free-stone Peach. Fruit large, nearly globular, and ripens about mid-season. Skin rich yellow, nearly covered with bright red. Flesh deep yellow, juicy, sweet, with a rich vinous flavour. Suitable for canning.

Walburton Admirable.—An English free-stone variety, with large round fruit, which ripens somewhat after mid-season. Skin pale yellowish-green, with a crimson streak, and mottled with a darker shade. Flesh yellowish-white, juicy, and well flavoured. A good late Peach.

Waterloo.—A cling-stone variety ef excellent quality. Fruit medium-sized, round, and ripens very early. Skin creamy, deeply suffused with red. Flesh juicy and highly flavoured.

Whatmough's March.—An excellent Peach raised in Victoria, with large fruit, which ripens very late. Skin highly coloured with red. Flesh juicy and well flavoured.

Yellow Admirable (*Abricotée, Apricot Peach, Golden Rareripe, Orange Peach*).—A good old French free-stone variety that is worthy of more attention than it receives in this part of the world. Fruit large, roundish-oval, and ripens very late. Skin deep yellow, with a pale red cheek. Flesh yellow, a little red next the stone, firm, not very juicy, with a rich flavour somewhat similar to an Apricot. An excellent Peach for canning and drying.

Yellow Alberge (*Gold Fleshed, Golden Mignonne, Purple Alberge*).—Another good old French free-stone Peach, with medium-sized round fruit, which ripens a little before mid-season. Skin deep golden-yellow, with a dark red cheek which extends over the greater part of the fruit. Flesh deep yellow, and red next the stone, juicy, sweet, with a pleasant vinous flavour. Suitable for canning.

Yellow Italian.—A very fine cling-stone Peach of uncertain origin. Fruit very large, roundish, and ripens very late. Skin bright orange, with a slight flush of red on the cheek. Flesh firm, sugary, and highly flavoured. A first-class Peach for canning or drying.

Varieties of Nectarines.

The following list comprises the best and most popular varieties :—

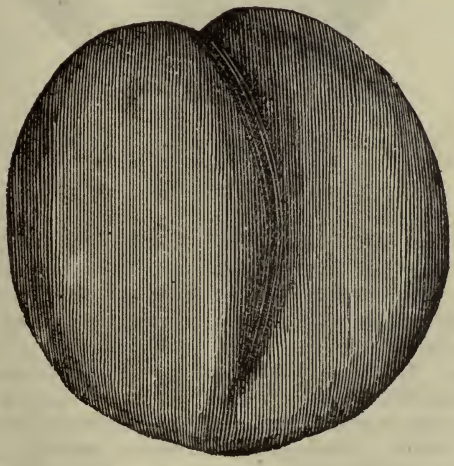
Albert.—A fine English variety, raised from the *White Nectarine*, which ripens at mid-season. Fruit large and round. Skin greenish-

white, with a pale red cheek. Flesh pale red towards the stone, from which it separates freely, juicy, melting, with a brisk pleasant flavour. Somewhat tender in cold districts, but a useful Nectarine for warmer localities.

Balgowan.—An English variety with large, roundish, slightly ovate fruit, and nearly allied to *Violette Hâtive*, but is more hardy and vigorous. Skin pale green, mottled with red on the shaded side, and deeply flushed with red next the sun. Flesh greenish-white, veined with red next the stone, from which it separates freely, melting, juicy, and highly flavoured. Ripens medium early. Tree robust and very hardy.

Downton.—An old but first-class English variety, a cross between *Elruge* and *Violette Hâtive*. Fruit large, roundish-oval. Skin pale green, with a red cheek. Flesh greenish-yellow, tinged with deep red next the stone, melting, juicy, with rich flavour. Ripens a week earlier than the *Elruge*. Free-stone.

Early Newington (*Early Black, Lucombe's Seedling*).—A very early English variety, and one of the best cling-stone Nectarines. Fruit large, roundish-ovate. Skin pale green ground, but nearly covered with bright red, and mottled with a darker tint. Flesh greenish-white, deep red near the stone, juicy, sugary, and highly flavoured. A much earlier and rather better flavoured variety than the *Newington*.

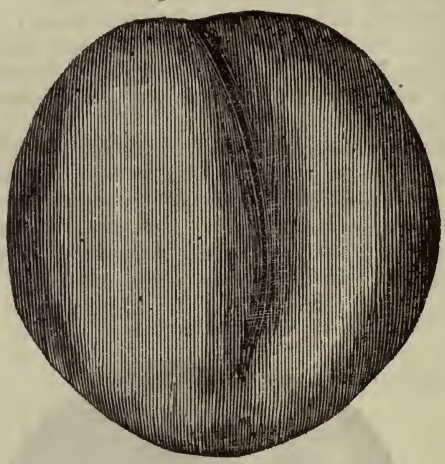


Elruge.

Elruge (*Claremont, Oatlands, Springrove*).—An old and very popular English free-stone variety, which deserves a place in every collection. Fruit large and oval. Skin pale green, richly suffused with dark red, and

dotted with small spots. Flesh greenish-yellow, tinted with red next the stone, melting, very juicy, and highly flavoured. Ripens at mid-season.

Hardwicke.—A very hardy and prolific English variety raised from the *Elruge*. Fruit very large, almost round, and inclining to oval. Skin pale green, and covered to a large extent with dark purplish-red. Flesh greenish-yellow, with a tinge of red next the stone, from which it separates freely, melting juicy, and rich. Ripens a little before the *Elruge*.



Hunt's Tawny.

Hunt's Tawny.—An excellent old English free-stone Nectarine, and one of the best of the early varieties, as it is very hardy and prolific. Fruit medium-sized, roundish-ovate. Skin pale orange, with a dark red cheek, dotted with specks of russet. Flesh deep orange, juicy, melting, and highly flavoured.

Imperatrice.—This is a hardy and prolific free-stone variety which somewhat resembles *Violette Hâtive*, but is not so red near the stone. Fruit medium size, roundish-ovate. Skin yellowish-green, with a heavy purplish-red cheek. Flesh yellowish-white, melting, juicy, and very richly flavoured. Fruit will hang on the trees till it shrivels and becomes a perfect sweetmeat. Ripens at mid-season.

Lord Napier.—An English free-stone variety raised from a stone of the *Early Albert* Peach. Fruit large, and ripens very early in the season. Skin cream colour, with a delicate red cheek. Flesh creamy-white, juicy, and luscious.

Newington (*Old Newington, Smith's Newington, Rough Roman*).—A very old and popular English cling-stone variety. Fruit large and nearly

round. Skin nearly covered with deep red, and mottled with a darker hue. Flesh yellowish-white, tinged with deep red next the stone, firm, juicy, and richly flavoured. Fruit will hang till it shrivels, when its flavour is most perfect. Ripens at mid-season.

Pine-Apple.—This is an English free-stone variety raised from the *Pitmaston Orange*, and by some considered to be superior to the parent. Skin deep orange, with a red cheek. Flesh orange, juicy, with a piquant vinous flavour. Ripens medium late, and is an excellent variety.

Pitmaston Orange (*Williams' Orange*).—An excellent English yellow free-stone variety of vigorous habit. Fruit large, roundish-ovate. Skin deep orange, with a brownish-red cheek. Flesh deep yellow, tinged with red next the stone, melting, juicy, sweet, and richly flavoured. Ripens at mid-season.

Prince of Wales.—A fine free-stone variety raised by Mr. Rivers, of Sawbridgeworth, England, from a Peach stone. Fruit very large, slightly oval, and will hang long on the tree after it is ripe. Skin greenish-yellow, with a deep dull red cheek. Flesh yellowish-white deep red near the stone, juicy, with a rich vinous flavour. Ripens rather late.

Rivers' Orange.—A variety raised by Mr. Rivers from the *Pitmaston Orange*, which it resembles to some extent, but is somewhat hardier and more prolific. Fruit large, roundish-ovate. Skin deep orange, with a brown-red cheek. Flesh yellow, sweet, and well flavoured. Ripens at mid-season.

Rivers' White.—This is another variety raised by Mr. Rivers from a stone of the *White Nectarine.* Fruit large, nearly round. Skin greenish-white, with a slightly red cheek. Flesh white, very juicy, high flavoured, and separates freely from the stone. Ripens at mid-season.

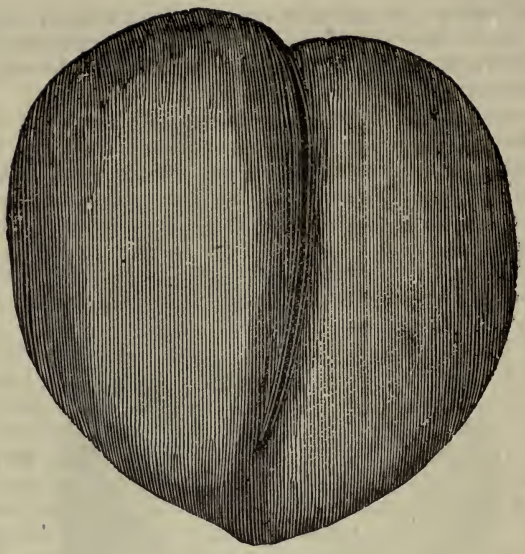
Roman (*Red Roman, Old Roman*).—This is the oldest variety on record, being mentioned by Parkinson, an English writer, in 1629. It has retained its popularity to the present time, and is to be found in most collections. Fruit cling-stone, large, roundish, a little flattened at the top. Skin nearly covered with brownish-red, with russety specks. Flesh greenish-yellow, deep red next the stone, rich, juicy, with a high vinous flavour. Ripens a little after mid-season. Tree very vigorous and productive.

Stanwick.—A very good late free-stone variety of English origin, but raised from a stone brought from Syria. Fruit large, roundish-oval. Skin pale green, with a deep purplish-red cheek. Flesh white, melting, sugary, and highly flavoured.

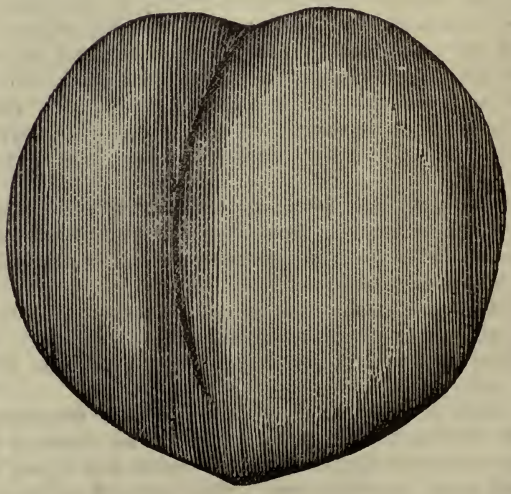
Stanwick Elruge.—A fine free-stone Nectarine of English origin, obtained by crossing two well known and popular varieties. Fruit large, and ripens medium late. Skin pale green, richly suffused with deep red. Flesh juicy, and combines the flavour of both parents.

Victoria.—This is a prolific, hardy, and excellent free-stone Nectarine, raised by Mr. Rivers from a cross between the *Stanwick* and *Violette Hâtive.* It is somewhat similar to the *Stanwick*, but ripens several days earlier. Fruit large, roundish-oval. Skin greenish-yellow, with a deep crimson cheek. Flesh yellowish-white, juicy, sweet, with a rich flavour.

Violette Grosse.—A free-stone variety of French origin, which is



Pitmaston Orange.



Stanwick Elruge.

somewhat similar to *Violette Hâtive*, but the fruit is larger, not quite so good in flavour, and ripens about a fortnight later. Fruit large, roundish-ovate. Skin yellowish-green, flushed and marbled with violet-red. Flesh yellowish-green, sweet, and pleasant, though less vinous than *Violette Hâtive*.

Violette Hâtive (*Early Violet*, *Violet Aromatic*, *Hampton Court*).—This is an excellent and useful French free-stone variety. Fruit large, roundish-ovate. Skin yellowish-green, largely covered with purplish-red, and mottled with a deeper colour. Flesh yellowish-green, deep red next the stone, melting, juicy, with a very rich flavour. Ripens early.

PEA NUT.

History and Uses.

The plant that yields what are variously known as Pea Nuts, Earth Nuts, or Ground Nuts is known botanically as *Arachis hypogœa*, and belongs to the large natural order *Leguminosæ*, or the Pea family. It is an annual plant and a Native of Brazil. The Nuts are the seeds which are formed in pods, and these in a singular manner approach the earth, which they penetrate to the depth of several inches. The pods are developed and matured when buried in this way. The plant attains the

Plant.

Fruit (Natural Size).

height of fifteen to eighteen inches, is of a spreading habit, and covers the ground quickly. In its native country the Pea Nut is grown extensively for eating, after being roasted, as also for the manufacture of oil, of

which it yields a large proportion. The plant is also extensively cultivated in the United States, India, China, and other countries, both for its Nuts and the manufacture of oil. The oil is obtained by pressure, and the Nuts are said to contain nearly fifty per cent. This oil is said to be equal to that obtained from the Olive, and is not so liable to become rancid very quickly. The cake that remains after the oil is expressed is a valuable material for feeding stock, and more especially dairy cattle or pigs. From the tops of the plants, when cut green and dried, a very nutritious hay is obtained, which is said to materially increase the milk of cows. For the Nuts there is an enormous demand in some countries, and more especially in the United States, where they are eaten very generally. In these colonies there is but a comparatively moderate demand as yet, but probably it will be greatly increased in the future. The plant may be grown successfully in all but the coldest parts of Australasia, and is certainly worthy of more attention than it now receives. Cultivators would probably find the Pea Nut a profitable crop, as considerable quantities are now imported, which might be raised in the colonies, and if the demand for the produce is not equal to the supply, the surplus may always be utilized for making oil.

Cultivation.

The Pea Nut may be grown successfully in any ordinary good soil that is not too heavy, but it thrives to the greatest perfection in light calcareous or sandy ground. In preparing the land it must be remembered that deep and thorough cultivation is essential to the obtaining of a strong growth and a heavy crop. Ordinary deep ploughing may be sufficient in the case of very open soils, but when the ground is heavier it will be advisable to subsoil. The seeds should be planted in rows about three feet apart, leaving half that space between in the lines. The seed should be covered to the depth of about two inches. As regards the proper time for planting, the middle of August will be early enough in the more forward districts, and, as a matter of course, some weeks later in the cooler regions. Special care must be taken to keep the plants free from weeds in the early stages of growth, but after they get well started they will be able to hold their own without much attention. As soon as the flowers make their appearance it will be advisable to earth up the rows, as is done with potatoes and some other crops, so that the pods will readily reach the soil. In harvesting the crop care should be taken to lift the plants free from the soil, using a fork, as a spade is likely to injure many of the pods. After the plants are lifted they should be left on the ground for a day or two to dry, when the pods may be gathered and stored away. The shells, however, must be allowed to get thoroughly dry before the pods are stored in bulk, or otherwise they are in danger of heating or rotting. When carefully dried they will keep for a considerable time, but fresh seeds are sweeter and more palatable than old ones. Should the weather be unfavourable for drying on the ground when the pods are lifted, they should be spread out in a loft, or some other place under cover, till they are fit for storing. The Pea Nut is a very prolific

plant, and a return of fifty bushels per acre is regarded as a fair average crop in ordinary favourable soils. But returns up to as high as one hundred and twenty bushels to the acre have been recorded.

African Earth Nut.

Voandzeia subterranea (*Glycine subterranea*), an annual plant belonging to the order Leguminosæ, is somewhat similar in appearance to the Pea Nut, and can be utilized in the same way, but is less valuable as a commercial plant. It is indigenous to Africa as far south as Natal and the island of Madagascar, where the native name is Voandzou, hence the generic one. In some parts of Africa the plant is most generally known as the Bambarra Nut. The plant grows in the same way as the Pea Nut, forcing its pods into the soil, and the seeds have similar properties. In cultivation precisely the same treatment is required as also in making use of the seeds.

PEAR.

History.

The Pear is very closely allied to the Apple, and ranks highly among the fruits that flourish in temperate climates. Botanically it is known as *Pyrus communis*, and it belongs to the Pomeæ section of the large natural order *Rosaceæ*, or the Rose family. The common, or English, name comes from the French *poire*, which is supposed to be derived from the Latin *pyrus*. The Pear is indigenous to the United Kingdom and various other parts of northern Europe, as also to northern Asia, China and Japan. In its wild state the Pear is a thorny tree bearing harsh, tough, and unpalatable fruit, which differs widely in qualities from that produced by the cultivated varieties.

Other species yielding edible fruits which may be classed as Pears are *Pyrus auricularis* (*Pyrus Bollwylleriana*, *Pyrus Polvaria*), the Bollwiller Pear, a species indigenous to Germany and other parts of northern Europe; *Pyrus sinensis*, a Chinese species which yields a serviceable fruit, one of its most prominent varieties being known as the Sand Pear. Useful hybrids have been obtained between this species and varieties of *Pyrus communis*, and more will possibly be done in the same direction. *Pyrus nivalis*, a species indigenous to middle and southern Europe, yields a fruit known as the Snow Pear. This species grows in high mountain regions that are too cold for the ordinary Pear, and the fruit does not ripen till the advent of snow, hence the common name. The fruit is palatable, though greatly inferior to the best varieties of the ordinary Pear, and makes very good perry.

From historical records the Pear appears to have been generally used and cultivated by several of the nations of antiquity. It appears to have been equally popular with the Syrians, Egyptians, Greeks, and Romans.

Homer mentions this fruit as being cultivated in the garden of Laertes, the father of Ulysses. This fruit is also mentioned by Virgil, Theophrastus, and Pliny. The last-named writer informs us that a number of varieties were cultivated by the Romans in his day, including both summer and keeping (or winter) Pears. He also particularly mentions a popular fermented liquor made from the juice of the fruit, which appears the earliest record relating to the beverage known as perry. Though the Pear is indigenous to the United Kingdom, yet there are good grounds for believing that the Romans, after the conquest, introduced improved varieties to Britain and cultivated them. As in the case of many other fruits, there are no very reliable accounts of the Pear through the middle ages, but it appears to have been popular and generally cultivated. But it was by slow degrees that the fruit became plentiful and commonly used in England. There is a tradition that King John was poisoned at the monastery of Swinsted by a dish of Pears, and whether true or false, the story implies that the fruit was deemed worthy of being offered to a monarch as a luxury. In an old book of household accounts of Henry VIII. there is an item of two pence "to a woman who gaff the Kyng peres." Gerard, one of the earliest English writers, says that in his time great attention was paid to this fruit by the nurserymen around London. The neighbourhood of Worcester at an early period became celebrated for the cultivation of this fruit, and that city has three Pears included in its arms.

But though the Pear has been popular and generally cultivated in the United Kingdom and in other parts of Europe for centuries, the varieties of the present time are very different to the kinds formerly known. It was not until late in the seventeenth century that any substantial improvements in the fruit were obtained, but kinds then introduced were far behind the modern varieties. It is only since the commencement of the present century that the skill and perseverance of horticulturists have raised the Pear to its present high standard of excellence. The highly developed varieties now generally cultivated greatly excel most of the older kinds in desirable qualities. To Belgian and French horticulturists we are indebted for the greater number of our cultivated varieties, and this fact accounts for so many French names. Professor Von Mons, who is the raiser of many of our most esteemed varieties, is said to have devoted the whole labour of his life to the improvement of the Pear, and during his career raised and fruited no less than one hundred thousand seedlings. British growers, however, have to be credited with the raising of many sterling varieties as well as their Belgian and French *confrères*. Several excellent varieties have also been raised in America. The Chinese claim to have cultivated the Pear to great perfection for centuries before it received attention in Europe, and to have raised some choice varieties. The celebrated traveller, Marco Polo, states that when in China he saw Pears of the enormous weight of ten pounds each, which were white-fleshed, melting, and richly flavoured. This account must have been a grossly exaggerated statement, as there are no such Pears cultivated by the Chinese at the present time, and, in fact, their Pears are greatly inferior to the European varieties.

Uses.

The Pear is extensively used as a dessert fruit, and as such is highly esteemed. For this purpose the fruit is in season for eight or nine months in the year. There is a large home demand for Pears which is rapidly expanding, and a good outlet for a considerable surplus may be found in exporting fresh fruit to England. As in the case of Apples, Pears can be delivered in the English market, owing to the difference between our season and that of Europe, when there will be but little competition from other countries. Many kinds are suitable for culinary purposes, though they are not used nearly to the same extent as Apples. Some sorts are excellent for canning, and there is a considerable and growing demand for this purpose. The culinary sorts may be preserved by drying in the same way as Apples and other fruits. and will keep a long time, if required, when carefully prepared. They should, for this purpose, be treated precisely the same as recommended for Apples. In France, Belgium, and the United States large quantities of Pears are preserved in this way, and the method is worthy of attention from Australasian growers. The fermented juice of the Pear, known as perry, is a favourite beverage in some parts of England, France, and Germany, as also in the United States. It is made precisely in the same way as cider, and for full directions see article upon the Apple, page 112, volume 1. Some people prefer perry to cider, as it is stronger and more richly flavoured. Perry can be made from all kinds of Pears if gathered before they are fully ripe, but the best varieties for the purpose are those that have plenty of juice and a somewhat sharp flavour. The making of perry may be made a safety valve against over-production, and, consequently, should receive more attention from growers. The wood of the Pear tree is closer grained than that of the Apple, and less liable to decay or the attacks of insects. In Europe it is extensively used by turners, and in the manufacture of picture frames. When stained black, Pear wood is frequently used by cabinetmakers and others as a substitute for ebony. Sometimes the leaves are used in the preparation of a yellow dye.

Hardiness and Longevity.

The Pear is the hardiest of our cultivated fruits, and will adapt itself to a wide range of soils and climates. It may be grown with more or less success in nearly every soil and situation, and it will stand, when long established, more neglect than any other fruit tree. But the Pear thrives to perfection in a strong rich loamy soil of moderate depth, with an open gravelly subsoil. Very rich or deep soils are not so suitable for Pears, as the trees, when planted in them, have a tendency to produce wood too freely at the expense of their fruitfulness. Very wet soils are also uncongenial, as the trees are impatient of their roots being in saturated ground for long periods. When growing under favourable conditions Pear trees have been known to attain a great age and size. In Europe various instances are on record of trees attaining ages of from

one hundred and fifty to two hundred years, and still being vigorous, and in one case a tree is said to have been over four hundred years old.

Preparation of the Soil.

As with all other fruit trees, in preparing the ground the work should be done well at starting. If heavy and retentive, the ground should be broken up to the depth of at least fifteen inches. In the case of lighter soils the necessity for deep working is not so great, as the roots will be able to push their way. Drainage must be provided for whenever necessary, and this will generally be the case in heavy land. When the soils are sandy or gravelly there may be sufficient natural drainage. When grown upon free stocks Pears require plenty of room for the development of the trees, and should not stand closer than from twenty-four to thirty feet apart. Some growers, however, prefer to have a dwarfer class of trees, and this object can be attained by propagating upon Quince stocks. Trees upon Quince stocks may be planted twelve to fifteen feet apart.

Pruning.

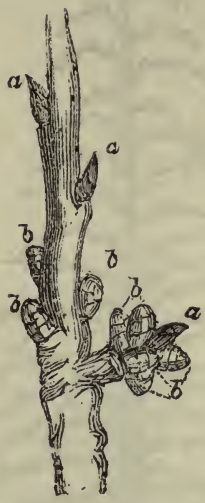
As a rule, the trees should be trained with low heads to afford shade to the stems in the early stages of growth and to better withstand the effects of high winds. Young trees should be pruned so as to obtain a strong wood growth, through a few of the branches, in the required directions. Summer pruning, or disbudding, early in the season will be serviceable in the case of young trees, as it conserves their strength and lessens the necessity for heavy winter cutting. Mature trees, as a rule, will require but little pruning if they have been properly treated when young. All that is necessary is to thin out when the branches are too crowded, the removal of rank, misplaced, or diseased shoots, and stopping those that are straggling. Pears on free-growing stocks, and more especially when growing in deep rich soils, have too often a tendency to make an over-luxuriant growth of wood and produce but little fruit. The most effective remedy in these cases is root pruning, and for directions as to how this should be done see page 45, volume 1. Ordinary pruning may be done at any time when the trees are at rest, but the writer prefers to wait till the latter part of the winter.

Training.

Pear trees may be trained in various forms, according to the fancy of the cultivator, the habit of the variety, and the nature of the climate. They are most usually grown as standards in Australasia, either with globular or pyramidal heads. The upright-growing kinds adapt themselves readily to the latter form, and the spreading trees are better trained in the first-named style. Sometimes trees are trained in the conical, or "quenouille," style, but this form necessitates a good deal of attention, though it is useful for small places where space is limited.

FRUIT AND WOOD BUDS.

a a—Fruit Spurs on Two Year old wood.



a a a—Wood Buds.
b b b b b b—Fruit Buds.

TRAINING.

Espalier with several Arms.

Pear Tree trained in the Conical or Quenouille Style, with Weeping Branches.

Dwarf Pyramid.

Some growers prefer dwarf trees worked upon the Quince to larger ones, and there is a good deal to be said in their favour. In the first place, both trees and crops are more readily managed by cultivators, and there is less risk from high winds. The next consideration is that the trees usually come into bearing earlier. Then, again, this class of trees takes up less space than larger ones, and, therefore, is better adapted for small gardens or orchards where space is limited and many varieties are wanted. Dwarf trees may be either trained in the bush or pyramid style, according to the habit of the variety. But whether the trees be large or dwarf, or in whatever form they may be trained, it is advisable to distribute the foliage in such a manner as to shelter the stems and branches from the full power of the sun. It is a bad practice to open the centres of the trees, as is often done, except in cold regions, where it may be an advantage to admit the sun's power freely. The Pear gives good results

when trained on the cordon system under certain climatic conditions, which, however, are unfavourable through the greater part of Australasia, as the trees are too much exposed to the full power of the sun. In some of the colder regions, and more especially in Tasmania and New Zealand, the system may be practised with advantage. For particulars as to cordon training see volume 1, page 60.

Cultivation.

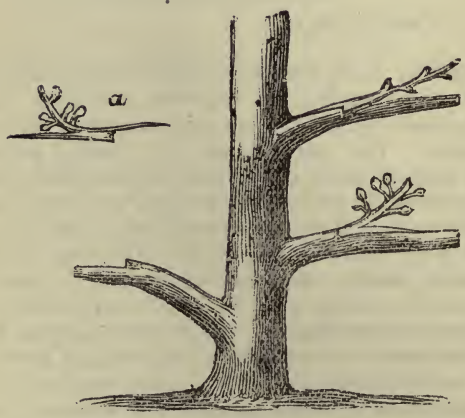
It is advisable to keep the ground as free from weeds as possible, and more especially in a plantation of young trees. An undergrowth of weeds speedily exhausts the surface moisture, to the great detriment of the trees. Large well-established trees do not suffer to the same extent from this cause as young ones, but they will be in a better position if the land is kept clean. Let the land be kept as clean as possible by frequent light surface stirrings, which are better than deep ploughing or digging as a rule. Sometimes, however, if root pruning is required, a deep ploughing or digging may prove serviceable. As a matter of course, suckers must be kept down by constant attention, as if allowed to make headway they are troublesome to deal with. Mulching is serviceable to the Pear, and more especially in the case of young trees. It should be done before the hot weather sets in, covering the surface soil as far as the roots extend. Old trees will often require assistance in the shape of manure, and their wants should be attended to before their health is impaired. Care must, however, be taken not to overfeed the trees when supplying them with manure, as when this is done they are apt to make too much wood. Small and frequent supplies are more effective than heavy manurings at long intervals.

Propagation.

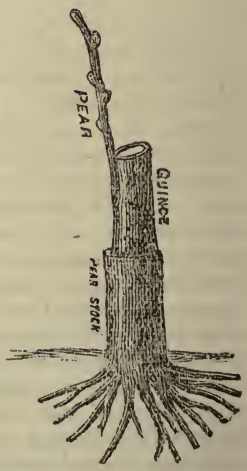
Propagation may be effected by seeds, cuttings, suckers, layers, grafting, and budding. Seeds are used for raising new varieties, and stocks for grafting and budding. The pips should be sown in the autumn or spring, covering them an inch deep. The next season the young plants should be planted out in nursery lines, and will be fit for working the following winter. Plants will readily strike from cuttings or layers, but these, as a rule, do not make such good stocks as seedlings. Suckers are often used as stocks, but they are inferior to seedlings. Grafting is the method of propagation most usually adopted, and should be done immediately the sap begins to rise in the spring. Budding is less frequently practised, though it is preferred to grafting by some growers, as it can be done after mid summer, when there is less work in hand than in winter. If necessary, trees may be budded in the spring with either wood or fruit buds. This is a useful practice for filling vacancies on branches with either class of buds. The buds are cut off in the ordinary way, but instead of removing the wood it is allowed to remain. Insert the buds with the attached wood in the usual way, and tie securely. Though the union may be not so readily effected as in ordinary budding, yet the thin

GRAFTING OLD TREES.

Tree before it is headed back. | Tree worked with many Grafts. | Tree worked with a few Grafts.



Tree worked with Fruit Buds.
a—Bud prepared.



Double Grafting.

piece of wood seems to lessen the risk of absolute failure. This method of budding may also be practised late in the summer and autumn. Very frequently this method will prove useful when the ordinary budding has failed. The stocks used most generally are seedling Pears for free-growing trees, and Quinces for dwarf-growing specimens. Seedlings will, as a matter of course, vary considerably in habit, but those raised from sorts that naturally make but a moderate growth will be likely to give better stocks than plants obtained from very strong kinds. Stocks doubtless have a material influence upon the varieties worked upon them, and, consequently, their selection should receive greater care from cultivators than it usually does. No rules for selection can be laid down absolutely, as at present our knowledge as to the influence of the stocks is too limited for positive conclusions to be arrived at. Trees on Quinces are dwarfer in habit than those worked upon free stocks, come to maturity sooner, and bear shifting better. Some kinds that have naturally a tendency to rampant growth bear more freely upon Quince stocks, and in others the flavour of the fruit is improved. Dwarf trees also offer advantages in gathering the fruit and pruning, and they are specially useful for small places where a good collection is required upon a limited area. On the other hand, however, growers must remember that trees worked upon Quince stocks will be much shorter lived than others. Neither will they be able to withstand the effects of severe droughts with such impunity as trees worked upon Pear stocks. As regards the Quince for a stock there is, however, some uncertainty, as though many varieties do very well upon it, yet it appears to be quite obnoxious to others. In some cases, too, though the trees may grow freely, yet the influence of the Quince stock deteriorates the quality of the fruit. But, on the other hand, some varieties of Pears are improved in quality when worked upon Quinces. When varieties refuse to thrive upon Quince stocks or become deteriorated in quality, the difficulty may be surmounted by what is known as double grafting. Under this system kinds that are known to take well upon the Quince stocks are grafted direct, and then other varieties are worked upon them. This practice is now very generally adopted, and is usually successful in attaining the object in view. Among the kinds that have proved specially suitable for working direct upon the Quince are *Beurre d'Amanlis*, *Beurre Diel*, *Duchesse d'Angoulême*, *Easter Beurre*, *Glou Morceau*, *Louise Bonne of Jersey*, and *Vicar of Winkfield*. It is usual to graft the Quince low, as the stem does not expand freely and increase proportionately with the Pear worked upon it. Another mode of double grafting, which may prove serviceable in certain cases, is to use Pear stocks, work them with Quinces, and upon these again graft Pears. This practice has been successfully adopted with over-vigorous stocks, and the modifications resulting from the check caused by the sap passing through the Quince wood has materially influenced the growth and fruitfulness of the trees. We have yet a great deal to learn as to the effects of double, triple, and even multiple grafting, and experiments in that direction may prove of great value. When the effects of these methods are thoroughly understood, it may be possible to have trees prepared to suit every variety of soil and

climate, and to place them under such conditions as will make them yield regular and heavy crops of the finest quality. Formerly, European cultivators grafted the Pear extensively upon the Whitethorn (*Cratægus oxycantha*), White Beam (*Pyrus aria*), True Service (*Pyrus domestica*), Mountain Ash (*Pyrus aucuparia*), Wild Service (*Pyrus torminalis*), and Medlar as dwarfing stocks. Though still used to some extent these stocks are going out of fashion, as the Quince is found to answer a deal better, and none of them are worthy of much consideration in Australasia.

Injurious Insects.

The Pear does not suffer from the attacks of insects to the same extent as many other fruits, but it is liable to injury more or less from certain orchard pests.

Aphides.—Sometimes, soon after starting into growth in the spring, the trees are attacked by a species of aphis that often does considerable damage to the young shoots and flowers. Should the insects appear when growth is further advanced, they do not produce such injurious effects. They are, however, undesirable visitors at all times, as they feed upon the juices of the leaves, young shoots, blossoms, and fruit, and must necessarily cause injury to the trees more or less. Therefore, these insects should be kept down by every practicable means. Remedies: 1. Tobacco Water. 2. Quassia Water. 3. Kerosene Emulsion. 4. Resin Compound. Directions for preparing and using these remedies will be found at pages 99 to 102, volume 1.

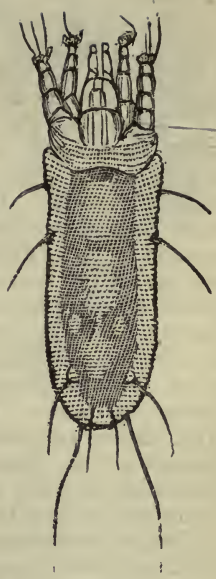
Borers.—The larvæ of several kinds of beetles or weevils sometimes attack Pear trees, which, however, suffer less from this class of pests than the Apple, Peach, and some other fruits. The more prominent of these insects are the Apple Borer Beetle, Apple Root Borer, Cherry Borer, and Elephant Beetle. Full descriptions of these insects and their habits and the remedies for them will be found in volume 1.

Caterpillars.—Various species of Caterpillars feed upon the foliage of the Pear, and more especially in the spring or early summer. The most troublesome of these is what is commonly known as the Pear or Cherry Slug (*Selandria cerasi*), which often causes a considerable amount of injury to trees This insect is widely distributed throughout the world, being very troublesome to European and American cultivators, as also in many parts of Australasia. A full description of this pest will be found in the article upon Injurious Insects, page 81, volume 1. Remedies: 1. Powdered Lime. 2. Hellebore Powder. 3. Dry wood ashes or finely pulverized earth dusted over the trees. 4. London Purple or Paris Green used as a spray. Information as to the preparation and use of these remedies will be found at pages 100 to 102, volume 1.

Pear Mite.—This very common and troublesome insect is known scientifically as *Phytoptus pyri*, and it specially affects Pear trees. It is a very minute insect, so small as to be scarcely visible with the naked eye, and it belongs to the same class that causes scab, itch, and other skin diseases in animals. The eggs are supposed to be deposited in the buds, and the young insects attack the bursting leaves in the spring. They

PEAR MITE.

Showing affected Leaves.



Perfect Insect, magnified 400 Times.

work their way under the surface of the leaves, and more especially the under sides, and these have a blistered appearance. The insects remain in chambers within these blisters, and are seldom to be found upon the surface of the leaves. As the season advances, the blisters increase in size and number, and those first formed assume a brown appearance very similar to that caused by the Scab Fungus. In fact, the effects of the insect are often supposed to be those of the fungus, which is unfortunate, as the remedies for these pests differ widely. Remedies and preventatives: 1. Burn the leaves of affected trees when practicable. 2. Kerosene Emulsion used as a spray when the buds are bursting into leaf, again after the fruit has set, and a further spraying after the crop has been gathered. 3. Resin Compound used as recommended for Kerosene Emulsion. 4. Paint the trees in the winter with a mixture of two parts lime, one of sulphur, and one of soft soap, adding sufficient water to make the composition workable. Further information about the remedies recommended will be found at page 98, volume 1.

Red Spider.—This troublesome minute insect will sometimes attack the foliage of Pear trees, and more especially towards the end of the summer after protracted dry weather. For treatment see page 82, volume 1.

Scale.—Several kinds of this class of insects are injurious to Pear and other trees, and various species have been described in the articles upon the Apple, Olive, Orange, and Peach. One, however, is especially troublesome to the Pear in America, and more especially in California, where it is commonly known as the Pernicious Scale and San Jose Scale. Scientifically it is known as *Aspidiotus perniciosus*. This insect has been found in New South Wales, but it is uncertain as to whether it has as yet spread to any of the other colonies. The adult female Scale measures about one-sixteenth of an inch in diameter, is circular, rather flat, and of a grey colour. The male Scale is longer than the female, and much darker in colour. This insect attacks the leaves and fruit, as also the wood of the branches and trunk. It increases with great rapidity, and sometimes three distinct broods are hatched in a season. The insects also spread themselves quickly, and, if once introduced, will soon affect a whole neighbourhood. Another specially troublesome species is the Greedy, or White, Scale (*Aspidiotus rapax*), which particularly affects the Pear, though it attacks many other trees. It is about one-sixteenth of an inch in diameter, grey in colour, and more convex than the Pernicious Scale. It is rather widely distributed throughout the Australasian colonies. Remedies for all Scale insects: 1. Kerosene Emulsion. 2, Resin Compound. 3. Soap and Water applied hot. Particulars as to the preparation and use of these remedies will be found in the article upon Insecticides, page 98, volume 1.

Thrips.—Sometimes these minute insects attack the leaves of Pear trees, and more especially late in the summer They seldom, however, cause any material injury to the trees, though they are undesirable visitors. For full description and remedies see page 85, volume 1.

Injurious Fungi.

The Pear, like most other trees, is liable to the attacks of various fungi, some of which do a good deal of injury.

Mildew.—Though several fungi classed as Mildew more or less affect Pear trees, yet, generally speaking, they are not very common, and do not usually cause serious damage. Sometimes the young growth is affected by a Powdery Mildew, which causes the foliage to shrivel, dry up, and assume a brown appearance. Very commonly the effects of this fungus is supposed to be Fire Blight, which is quite a different complaint. Not unfrequently some form of Mildew may be found upon the roots of trees that are unhealthy from various causes Mildew will also at times appear upon mutilated roots Remedies: When the Mildew is upon the leaves or branches, 1. Ammoniacal Solution of Copper Carbonate. 2. Bluestone and Sodium Carbonate. When the Mildew is at the roots those affected should be cut away when practicable, and a dressing of lime applied to the soil. Watering the ground with a solution of Sulphate of Iron will also prove serviceable. For full particulars as to the preparation and use of the remedies named see article upon Fungicides, page 98, volume 1.

Pear Scab.—This fungus, which is also known as the Pear Blight, is

PEAR SCAB.

Showing effect upon Foliage and Fruit.

very widely distributed throughout the Australasian colonies, and causes a vast amount of injury. The fungus is known to botanists as *Fusicladium pyrinum*, and is very closely allied to the species that causes the Apple Scab. In fact, some authorities consider them to be identical, though differing slightly in form. The fungus makes its appearance early in the season in the form of dark green spots or patches upon the leaves, fruit, and young shoots. These spots in time turn grey or brown, crack, and dry up, leaving holes in the leaves. When the young fruit is attacked, it either falls from the trees or cracks and shrivels up, and is worthless. If attacked at a later stage, the Pears may reach maturity, but they will have unsightly scars, and are often drawn out of their proper shapes. Remedies and preventatives: 1. Burn the leaves from affected trees to the extent that is practicable. 2. Bordeaux Mixture. 3. Ammonia Carbonate of Copper. 4. Eau Celeste. Full directions for preparing and using these remedies will be found at page 98, volume 1.

DISEASES.

Canker.—Pear trees are often affected by various forms of Canker, which frequently make their appearance without apparent causes. Sometimes it appears at the roots, at others upon the branches, and, again, it may attack the stems. Canker may be produced by excess, or lack, of moisture at the roots, or follow as a result of mutilation, and the attacks of insects or fungi. It may be caused by the roots penetrating into a bad subsoil, the use of rank or over-stimulating manures, and various other causes. For the fullest information as to this obscure disease see article upon Canker, page 93, volume 1.

Fire Blight.—This is another obscure disease which specially affects Pear trees, and often causes serious injury. Opinions differ somewhat as to the nature of this disease and its causes, but it is probably due to influences upon the circulation of the sap. Complete information upon this subject will be found in an article upon Fire Blight at page 94, volume 1.

Gathering, Storing, Packing and Exporting.

Unlike most other fruits, Pears, as a rule, should not be allowed to ripen on the trees. Most varieties are finer in flavour and keep better if gathered before they are fully ripe. Many sorts that are insipid and comparatively worthless when allowed to hang till they are fully ripe possess the highest qualities if gathered at the proper time. There is a great difference in the requirements of various sorts as to the time of ripening after the fruit is gathered. From three to six days will be sufficient to bring the fruit to perfection after it is gathered in the case of some of the summer Pears. As regards the winter kinds, five or six weeks up to ten or twelve will often be required. The proper time for gathering Pears is, as a rule, when the stalks will separate easily from the wood when the fruit is gently raised. The seed test may also be adopted, as in the case of Apples. If the seeds are black or brown, hard, and plump, it is a fairly good sign that the fruit is sufficiently ripe for gathering. Every care should be taken to gather Pears at the proper time. When gathered too soon they are apt to shrivel, and seldom attain their proper flavour. On the other hand, when left too long upon the trees the fruit is apt to become mealy and wanting in flavour. In gathering the greatest care should be taken in handling the Pears so as to avoid bruising. Pears are stored for a double purpose, in the first place to preserve them, and, secondly, to get them to ripen perfectly. The storehouses should be dry, well ventilated, and be kept at a fairly even temperature at all times. Sudden changes of temperature are injurious, and should be avoided by every practical means. A fruit room for Pears should be kept somewhat drier than one for Apples, as more moisture is given off by the fruit. Consequently, it is not advisable to store long keeping Pears and Apples in the one room. The most favourable temperature is one ranging from forty to forty-five degrees Fah. The fruit should be placed upon shelves formed of battens with spaces between, in single layers, taking care to exclude all blemished specimens, though touched ever so slightly. Light should be carefully excluded from the store room unless for special reasons, as it is an exciting agency, and accelerates the ripening of the fruit. After being placed in store Pears should be handled as little as possible and, as a rule, left to ripen naturally. Sometimes, however, it may be necessary to hasten the ripening period, and this may be done by raising the temperature and admitting light. In packing Pears more care is required than for Apples, as owing to their shapes the stalks are apt to damage the adjoining fruit if not properly arranged. When Pears are packed for export extra care must be taken in the first place that the kind is suitable and will not be

over-ripe when it arrives at its destination. As a matter of course, fruit for shipment to the United Kingdom and other distant countries should be packed several weeks before it would ripen in the ordinary course. Each Pear should be carefully wrapped in white tissue, or thin blotting, paper and placed in close layers so that they cannot move in the cases. Probably the best mode of packing would be to have a tray for each layer of fruit so as to avoid undue pressure. This plan could be easily adopted at a small additional expense. Packing in trays would also give an advantage in allowing a better circulation of air among the fruit, a matter of some importance during a long voyage. For the same reason, in shipping Pears, care should be taken that the place set apart for them on board ship can be well ventilated and kept at a medium low and even temperature throughout the voyage. These remarks will apply more or less to all fruits exported, but more especially to the Pear, which requires far more care than the Apple, Orange, or Lemon.

Selection of Varieties.

As in the case of other popular fruits, there are a great number of varieties in cultivation, and several hundreds have been introduced to Australasia. In fact, there are far too many for practical purposes, and the lists are perfectly bewildering to ordinary cultivators. All the leading European kinds are to be found in nurserymen's catalogues, which also include several Australasian seedlings of merit. As a rule, growers of Pears, whether upon a large or small scale, will find it to their interest to confine themselves to a limited number of varieties. More satisfaction is likely to be obtained from a dozen sorts than a hundred. The qualities desirable in dessert Pears are that they should not be too large, but juicy, sugary, tender, melting, and highly flavoured. For culinary purposes Pears should be large, juicy, firm, and crisp. If wanted for canning, those kinds are best whose flesh remains white instead of changing to pink or red, as the majority do. For drying the same qualities are required as for culinary Pears. The kinds specially adapted for making perry are those that bear freely and produce juicy and rather sharply flavoured fruit.

Principal Forms of Pears.

Pyriform.—When tapering from the eye to the base, and the sides more or less hollowed (concave).

Long Pyriform—When long and narrow and tapering to a point at the stem.

Obtuse-pyriform.—When the lower part of the fruit is broader than in the other pyriform types.

Obovate.—When the fruit is nearly in the form of an egg, the small end being next to the stalk.

Turbinate or *Top-shaped.*—When the sides are rounded and the fruit tapers to a point at the stalk.

PRINCIPAL FORMS OF PEARS.

Pyriform.

Long Pyriform.

Obtuse Pyriform.

Oval.

Obovate.

Round.

Turbinate.

Oval.—When the fruit is largest in the middle and tapers more or less at both ends.

Round.—When the outline is round or nearly so.

There are numerous modifications of all these forms to be found among Pears, and sometimes in order to describe fruit correctly it is necessary to combine two terms, such as roundish-oval, roundish-obovate, &c.

VARIETIES.

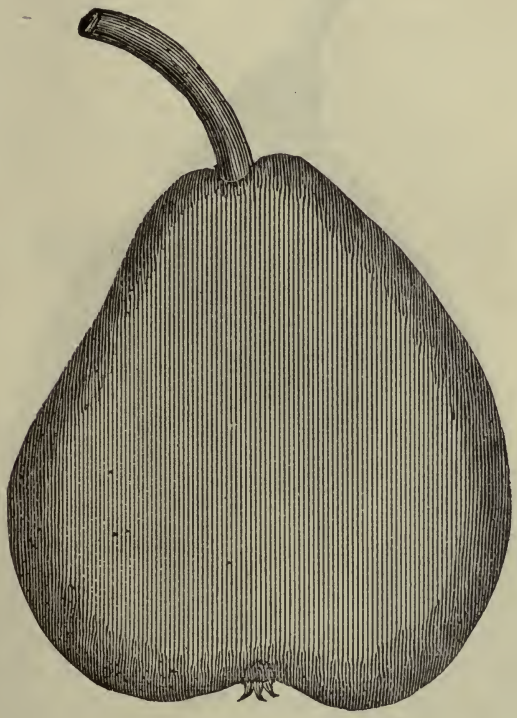
The following list embraces many of the leading varieties. The descriptions given are the normal ones, but it must be understood that Pears often vary considerably in form. Climate also materially influences the colour and quality of the fruit, and the same variety will often differ considerably from its normal type owing to local conditions. Variations in size, form, and quality may be also brought about by the influence of the stocks the trees are worked upon.

Alexandre Bivort.—An excellent Belgian variety with medium-sized obtuse-pyriform fruit, which ripens late. Skin pale yellow, dotted and patched with russet. Flesh white, with a slight reddish tinge, juicy,

melting, and richly flavoured. Tree vigorous and compact in growth. Suitable for export.

Althorp Crasanne.—A good Pear of doubtful origin with medium-sized roundish-obovate fruit, which ripens at mid-season. Skin pale green, dotted with russet. Flesh white, juicy, and well flavoured. Tree hardy, robust, and prolific.

Ananas (*Ananas d'Ete*).—A Dutch variety with large pyriform fruit, which ripens at the beginning of summer. Skin yellowish-green, thickly covered with brown russet dots. Flesh white, melting, with a pleasant aroma. Tree robust and prolific.

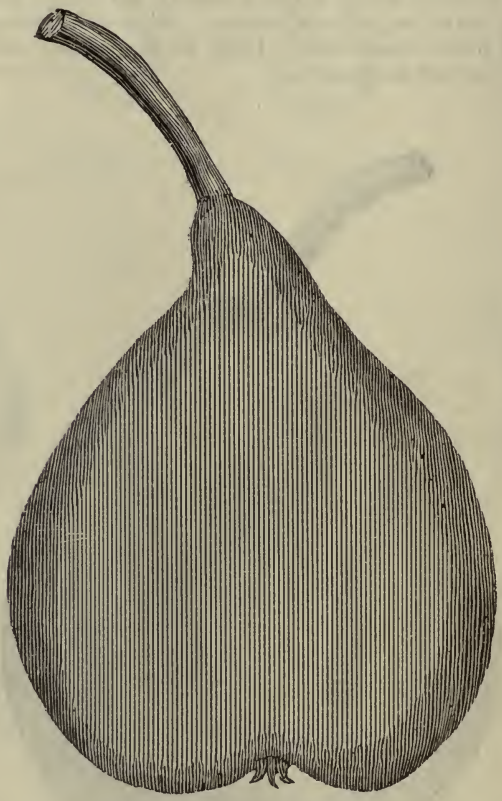


Ananas.

Aston Town.—An English variety of high quality with small roundish fruit, which ripens about mid-season. Skin greenish-yellow, thickly dotted with russet. Flesh yellowish-white, melting, and highly flavoured. Tree vigorous, attains a large size, and bears freely.

Autumn Bergamot (*Bergamot, English Bergamot, York Bergamot*).—

An old English variety of good quality with medium-sized rather flattened fruit, which ripens towards the end of summer. Skin yellowish-green, flushed with red, and dotted with grey russet. Flesh greenish-white, sugary, juicy, with a moderately rich flavour. Tree vigorous and a free bearer.



Baronne de Mello.

Autumn Colmar (*De Bavay*).—A French Pear of fairly good quality, but not equal to many others. Fruit medium size, obtuse-pyriform, and ripens somewhat after mid-season. Skin pale yellow, dotted with russet. Flesh yellowish-white, sugary, a little gritty at the core, with a pleasant rich flavour. Tree robust and bears freely.

Baronne de Mello (*Beurré Van Mons*).—A Belgian variety of excellent quality with large irregular pyriform fruit, which ripens towards the end

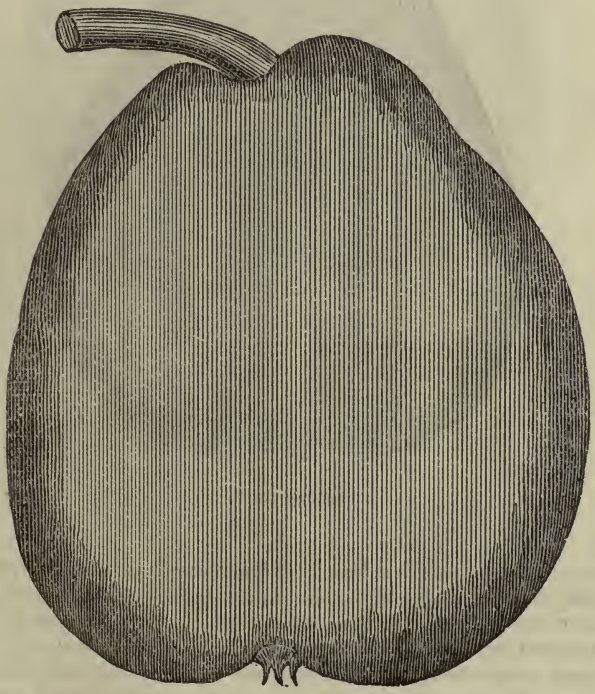
of summer. Skin greenish-yellow, nearly covered with dark russet, and thickly dotted. Flesh greenish-yellow, fine grained, sugary, melting, with a rich flavour. Tree hardy, vigorous, and productive.

Belle Julie.—A Belgian variety of first-rate quality with medium-sized obtuse-pyriform fruit, which ripens about mid-season. Skin greenish-yellow, thickly marked with russet. Flesh yellowish-white, juicy, melting, sugary, with a rich aroma. Tree vigorous, forms a pyramid, and bears freely.

Bellissime d'Hiver (*Belle Noisette, Teton de Venus*).—An old French Pear that is excellent for cooking. Fruit large, obtuse-pyriform, and ripens late. Skin greenish-yellow, with a slight flush of red, and thickly dotted with russet. Flesh white, sweet, mellow, and free from grittiness. Tree robust and fairly prolific.

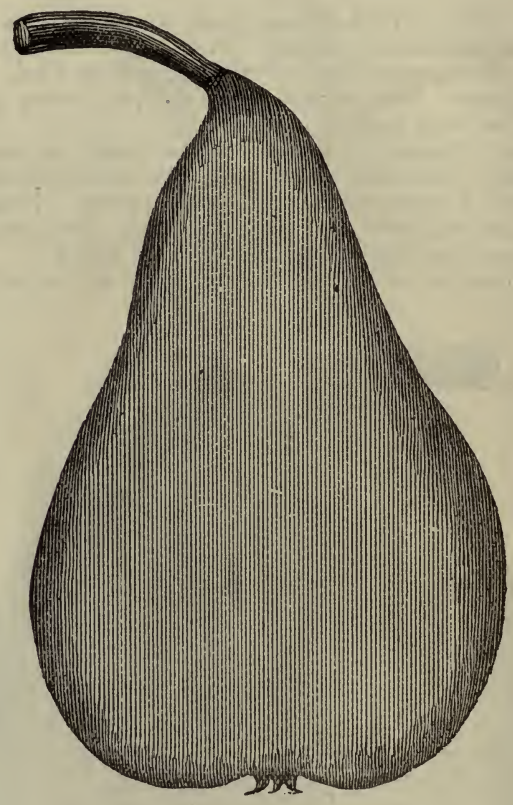
Bergamotte d'Esperen.—A first-class Belgian variety with medium-sized irregular-oblate fruit, which ripens late. Skin greenish-yellow, thickly covered with dark brown russet, which makes it rough. Flesh yellowish white, juicy, melting, sweet, and highly flavoured. Tree robust, forms a compact pyramid, and bears freely. Suitable for export.

Beurré d'Amanlis.—A Belgian Pear of high quality with large some-



Beurrè d'Anjou

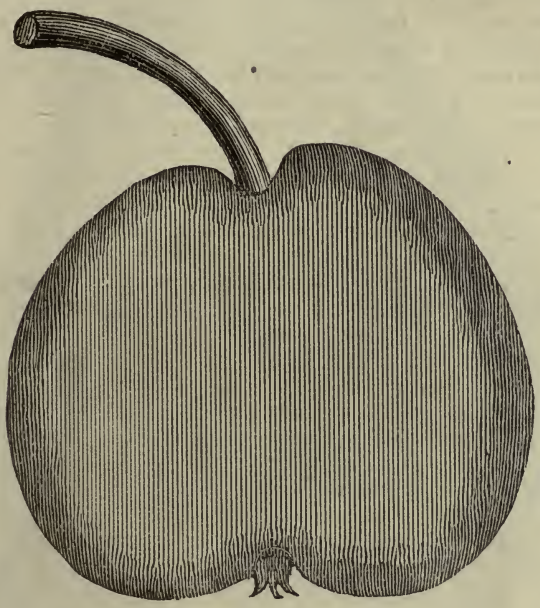
what irregular obovate fruit, which ripens late. Skin yellowish-green, flushed with reddish-brown, and thickly dotted and splashed with russet. Flesh white, melting, sugary, with a slight and pleasant aroma. Tree hardy but somewhat straggling in habit, and though fairly prolific is rather uncertain in its yield. Better adapted for cold than warm districts. Suitable for export.



Beurrè Bosc.

Beurré d'Anjou (*Ne Plus Meuris* of the French, but quite distinct from the variety known under that name in Australasia).—A superior variety, supposed to be of French origin. with large obtuse-pyriform fruit, which ripens towards the end of summer. Skin greenish-yellow, with a slight flush of red, freely dashed with russet, and sprinkled thickly with reddish-brown dots. Flesh white, tender, very juicy, melting, with a brisk and pleasant flavour. Tree vigorous and productive. Suitable for export.

Beurré d'Aremberg (*Beurré Deschamps, Beurré Burchardt, Colmar Deschamps, Duc d'Aremberg, L'Orpheline*).—A French variety of great excellence with medium-sized obovate fruit, which ripens late and keeps well. Skin yellowish-green, thickly dashed, veined, and dotted with reddish-russet. Flesh white, melting, very juicy, vinous, with a rich aroma. Tree pyramidal and a good bearer. Suitable for export.



Beurré de Brignais.

Beurré de l'Assomption.—A French variety, which ripens before mid-season, with large irregular obtuse-pyriform fruit. Skin yellow, dotted, marbled, and splashed with reddish-brown. Flesh white, juicy, melting, slightly sub-acid, and pleasantly flavoured.

Beurré Berckman's.—An excellent Pear of Belgian origin with obovate-pyriform fruit, medium-sized or slightly larger, which ripens late and keeps well. Skin pale yellow, thickly covered with splashes and specks of russet. Flesh white, tender, juicy, sugary, and richly flavoured. Tree vigorous, pyramidal in form, and a free bearer. Suitable for export.

Beurré Bosc (*Beurré d'Apremont, Beurré Rose, Calebasse Bosc*).—This is a well-known and popular Belgian Pear of great excellence. Fruit large, pyriform, sometimes a little uneven, ripens late, and keeps well. Skin thickly covered with brown russet. Flesh white, juicy, rich, and

pleasantly aromatic. Tree strong, pyramidal in habit, a regular and good bearer. Suitable for export.

Beurré Brettoneau (*Calebasse d'Hiver, Dr. Brettoneau*).—An excellent and useful variety of Belgian origin with large somewhat irregular pyriform fruit, which ripens late and keeps well. Skin thickly covered with brown russet. Flesh yellowish-white, firm, sugary, vinous, with a pleasant aroma. An excellent Pear for stewing, canning, and drying, and also for the dessert when fully ripe. Tree vigorous, hardy, and prolific, but is somewhat long in coming into bearing.

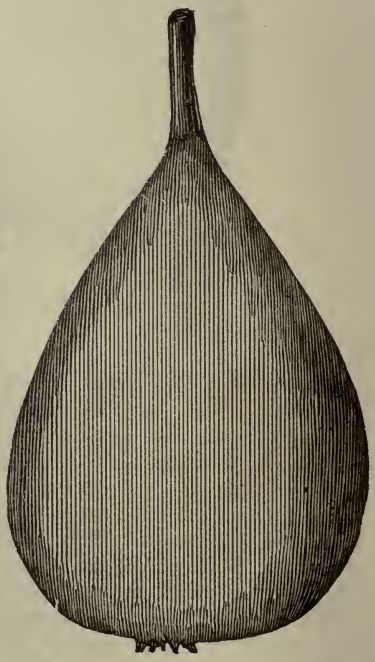
Beurré de Brignais (*Des Nonnes, Nun's Pear, Poire des Nonnes*).—An excellent variety of uncertain origin. Fruit medium-sized, roundish-oblate, ripens early in the autumn, and keeps well. Skin greenish-brown, with numerous grey dots. Flesh white, melting, very juicy, with a rich aromatic flavour. Tree hardy, vigorous, and prolific.

Beurré de Capiaumont (*Beurré Aurore, Calebasse Vasse*).—A very popular and excellent Pear of Flemish origin which should be included in every selection. Fruit medium-sized, pyriform, ripens late, and keeps well. Skin thickly covered with cinnamon, with an orange red blush, and strewed with small grey dots. Flesh white, juicy, melting. sugary, and highly flavoured. Tree robust, hardy, and a very free and regular bearer. Suitable for export.

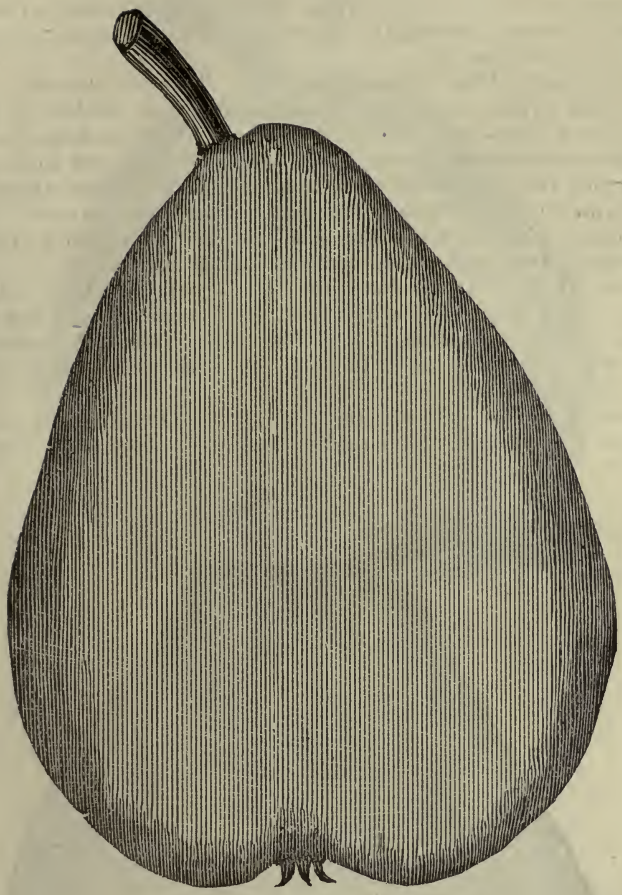
Beurré Clairgeau (*Clairgeau de Nantes*).—A French variety with large showy pyriform somewhat irregular fruit, which ripens towards the end of summer. Skin lemon yellow, with a slight flush of orange red, and thickly covered with patches and dots of russet. Flesh yellowish-white, juicy, sugary, slightly gritty, with a vinous musky flavour. Tree hardy, very productive, and comes into bearing early. Suitable for export.

Beurré Defais.—A French Pear of good quality. Fruit rather large, obtuse-pyriform. Skin pale yellow, dotted and netted with russet. Flesh white, juicy, melting, sweet, and slightly aromatic. Tree vigorous and productive.

Beurré Diel (*Beurré Incomparable, Beurré Magnifique, Beurré Royal, Beurré Vert*).—A well-known and popular Belgian variety with large fruit varying from obovate to obtuse-pyriform, which ripens late and keeps well. Skin yellow,



Beurré de Capiaumont.



Beurré Clairgeau.

thickly dotted and marbled with russet. Flesh yellowish-white, tender, juicy, sugary, rich, with a fine aroma. Tree very hardy, robust, and a free bearer. Suitable for export.

Beurre Giffard (*Poire Giffard*).—A French Pear of good quality which ripens early in the summer. Fruit medium-sized, pyriform. Skin greenish-yellow, mottled with red. Flesh white, melting, juicy, sugary, with a vinous and aromatic flavour. Fruit must be gathered early, and will only keep a few days, like the Jargonelle. Tree of moderate growth and a fairly good bearer.

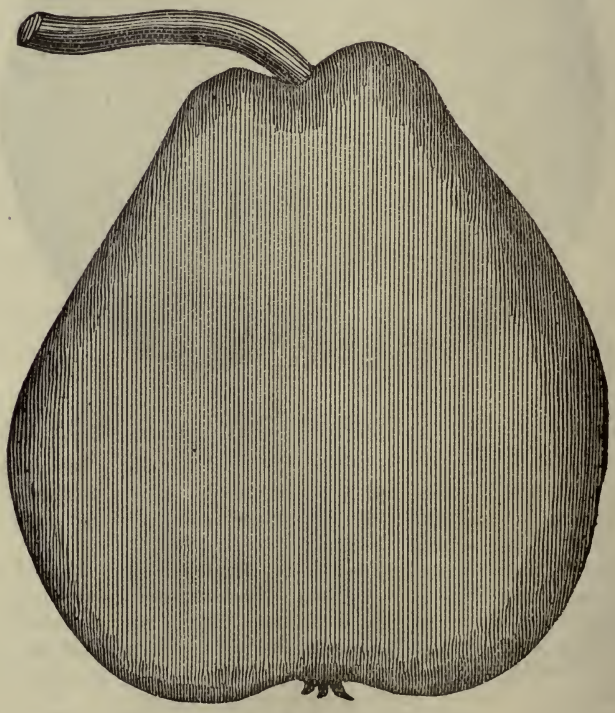
Beurré Goubalt (*Poire Goubalt*).—A French variety with medium-sized, roundish-obovate fruit, which ripens a little before mid-season.

Skin green even when quite ripe. Flesh white, melting, juicy, and pleasantly, though not highly, flavoured. Tree vigorous, productive, and a very early bearer.

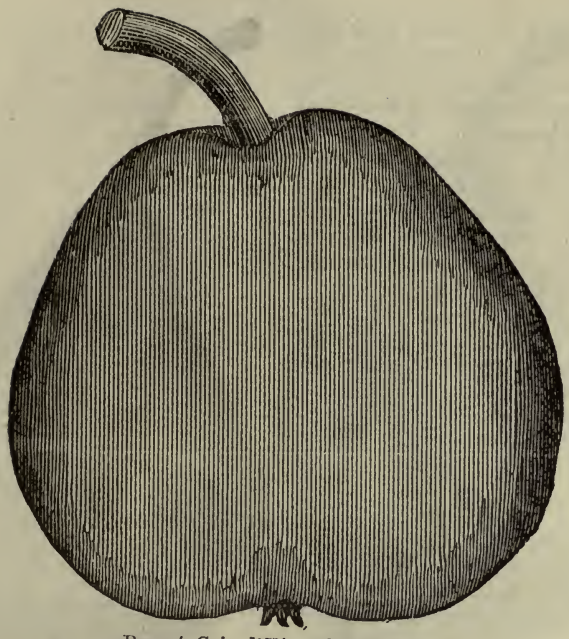
Beurré Gris d'Hiver Noveau (*Beurré de Fontenay, Beurré de Lucon, Beurré Gris d'Hiver, Beurré Gris Superior, Doyenne Marbre, St. Michael d'Hiver*).—A first-class French variety. Fruit medium to large, roundish to obtuse-pyriform. Skin nearly covered with light golden russet and thickly dotted, with a blush cheek. Flesh white, juicy, sugary, melting, with a rich and slightly aromatic flavour. Ripens late, keeps a long time, is a first-class dessert Pear, and suitable for exporting. Tree moderately vigorous and bears freely.

Beurré Hardy.—An excellent dessert Pear supposed to be of Belgian origin. Fruit large, obtuse-pyriform, and ripens towards the end of summer. Skin yellowish-green, thickly covered with russet dots. Flesh white, melting, very juicy, sweet, with a rich aroma. Tree robust and a free bearer.

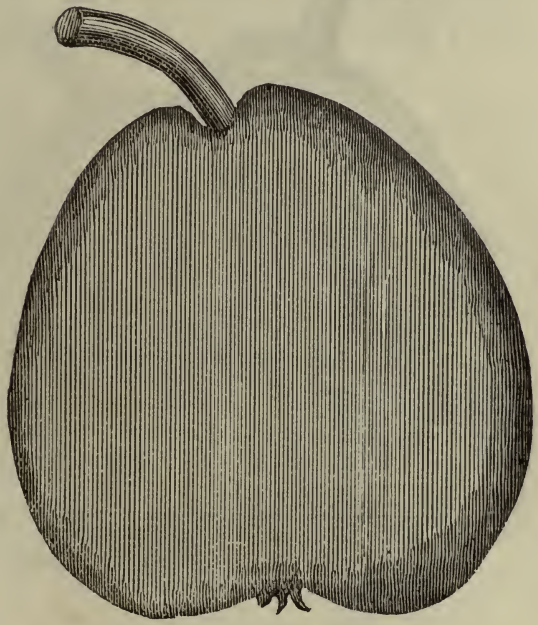
Beurré de Jonghe.—A very good Belgian variety with large obovate-pyriform fruit, which ripens rather late in the summer. Skin dull



Beurré Diel.



Beurré Gris d'Hiver Nouveau.

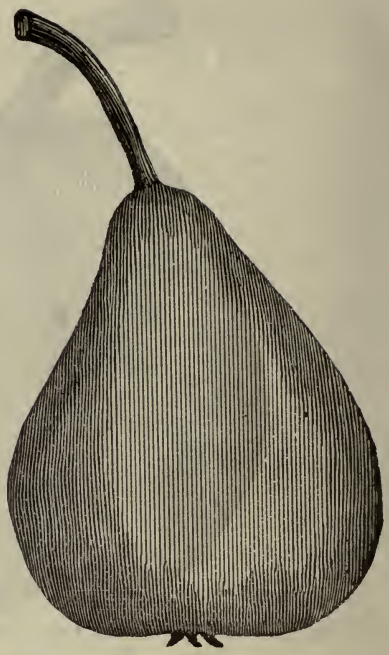


Beurré Hardy.

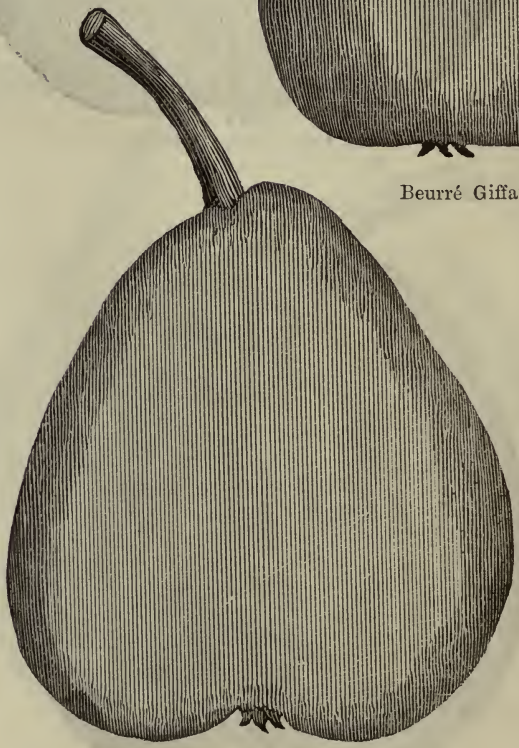
yellow, thickly covered with pale brown russet. Flesh yellowish-white, fine grained, juicy, melting, and richly flavoured. A first-class Pear that keeps well. Tree robust and prolific. Suitable for export.

Beurré de Koning (*August de Maraise, Conning, De Conick*).—A Belgian variety. Fruit medium, ranging from obovate to obtuse-pyriform, and ripens early in the autumn. Skin yellowish-green, with russet dots and marblings. Flesh white, juicy, and well flavoured.

Beurré Langelier.—An excellent dessert Pear raised in Jersey.



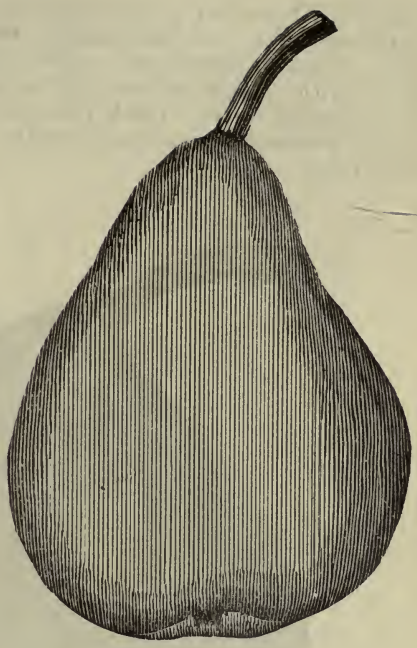
Beurré Giffard.



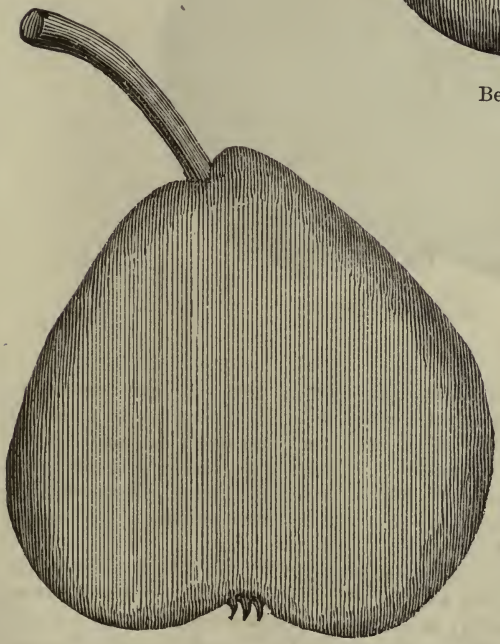
Beurré de Koning.

Fruit medium-sized, obtuse-pyriform, ripens late in the summer, and keeps well. Skin greenish-yellow, with a crimson flush on one side, and thickly dotted with russet. Flesh white, juicy, melting, somewhat gritty, with a brisk rich vinous flavour. Tree vigorous and productive.

Beurré de Nantes (*Beurré Nantais*). — A very good variety. Fruit medium to large, pyriform. Skin greenish-yellow, nearly covered with pale russet, and a flushed cheek. Flesh somewhat coarse grained, with a sweet vinous flavour. Ripens medium late, and will keep for several weeks.



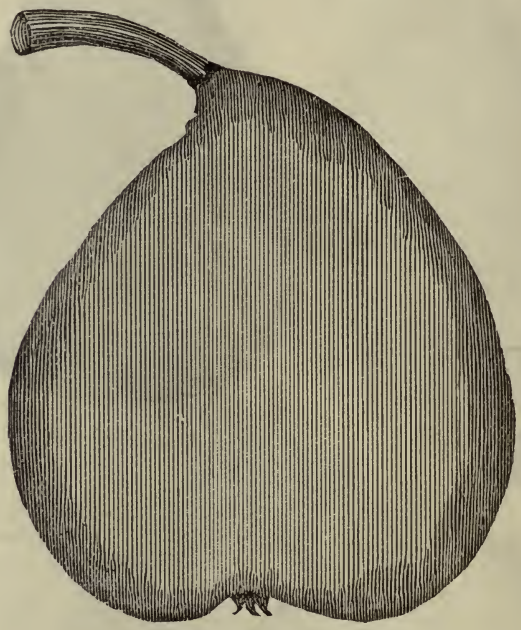
Beurré de Nantes.



Beurré Sterckman's.

Beurré Rance (*Beurré de Flandre, Beurré Epine, Beurré d'Hiver*). — An old, well-known, and popular Belgian Pear, valuable for its lateness and good-keeping property. Fruit varying from medium to large, obtuse-pyriform. Skin dark green even at maturity, dotted with numerous russet specks. Flesh greenish-white, melting, a little gritty at the core, very juicy, sweet, and highly flavoured. Tree hardy, a free bearer, and somewhat pendulous in habit Suitable for export.

Beurré Sterckman's (*Belle Alliance*, *Calebasse Sterckman's*, *Doyenné Sterckman's*).—A first-class Belgian dessert Pear. Fruit medium to large, oblate-pyriform, and ripens late in summer. Skin bright green, with a flush of red on one side, and thickly dashed and speckled with russet. Flesh yellowish-white, melting, juicy, sugary, with a pleasant vinous and aromatic flavour. Tree vigorous and bears freely.

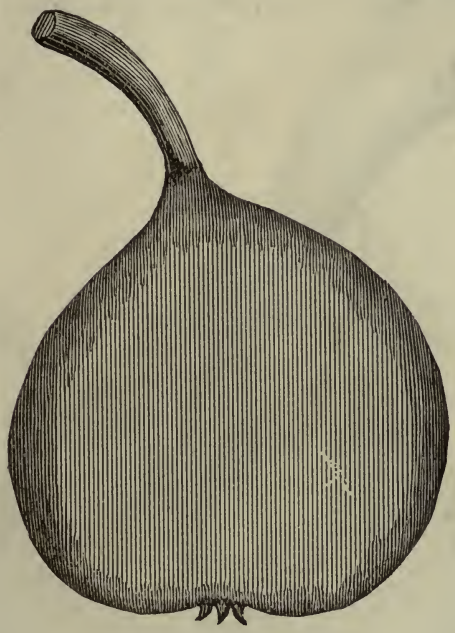


Beurré Superfin.

Beurré Superfin.—An excellent and useful French variety. Fruit medium size or above, roundish-pyriform, and ripens at mid-season. Skin lemon yellow, with a slight red flush on one side, and thickly covered and dotted with cinnamon russet. Flesh fine grained, very juicy, with a brisk vinous flavour and rich aroma. Tree hardy, moderately vigorous, rather slow in coming into bearing, but a good and free cropper when at full age.

Bishop's Thumb.—A very old English variety but little known in this part of the world, but an excellent dessert Pear. Fruit large, oblong, tapering irregularly, and ripening after mid-season. Flesh greenish-yellow, juicy, melting, sugary with a rich vinous flavour. Tree very hardy and an abundant bearer.

Black Achan (*Achan, Black Bess, Winter Beurre*).—An old and well-known Scotch Pear, which may be found serviceable in the colder districts, but it is unsuitable for warmer regions. Fruit medium-sized, obovate. Skin dark greyish-green, with dull brownish-red on one side. Flesh yellowish-white, tender, juicy, melting, sugary, with a strong aroma. Tree hardy, and bears freely in cold regions, but somewhat shy in other localities.



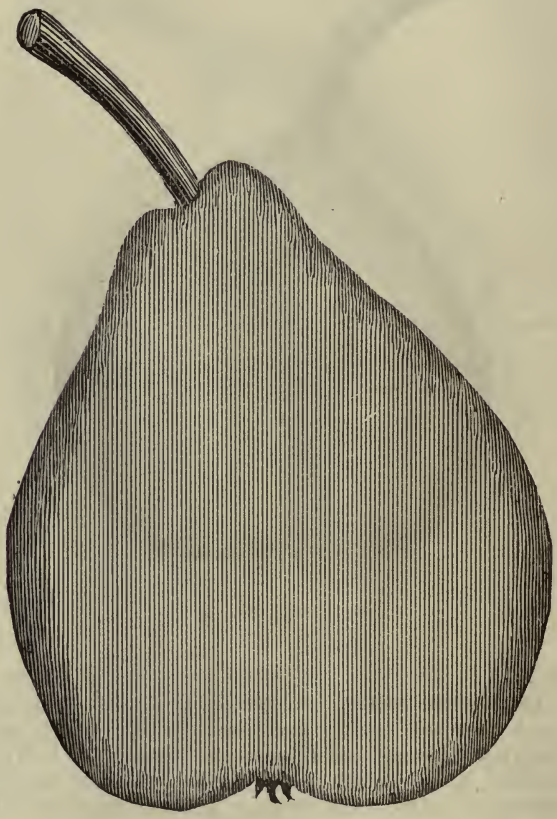
Bloodgood.

Bloodgood.—An American early dessert Pear, which is very popular in the United States. According to American authorities it possesses a higher and better flavour than any other early Pear. Fruit medium size, obovate, and ripening very early. Flesh yellowish-white, melting, juicy, sugary, with a rich aromatic flavour. Skin yellow, netted and dotted with russet. Tree moderately robust, and bears early and regularly.

Bon Chretien Fondante.—A Flemish Pear of high quality. Fruit rather large, regular, roundish-obovate, and ripens the latter part of summer. Flesh yellowish-white, very juicy, melting, somewhat gritty round the core, with a rich and pleasant flavour. Skin pale green, to a large extent covered with russet, and freely dotted. Tree moderately hardy, bears early and freely.

British Queen.—An English Pear supposed to have been raised from Marie Louise, which it somewhat resembles. Fruit large obovate-pyriform, and ripens towards the end of summer. Skin smooth and almost covered with a thin coat of cinnamon russet, with a blush of red on one side. Flesh yellowish-white, fine grained, melting, sugary, and highly flavoured. Tree hardy and vigorous.

Brockworth Park (*Belle de Zees, Bonne d'Ezée, Bonne d'Haies, Bonne de Zees, Charles Frederic*).—An excellent and useful Pear of French origin. Fruit large, obtuse-pyriform, and ripens medium late.



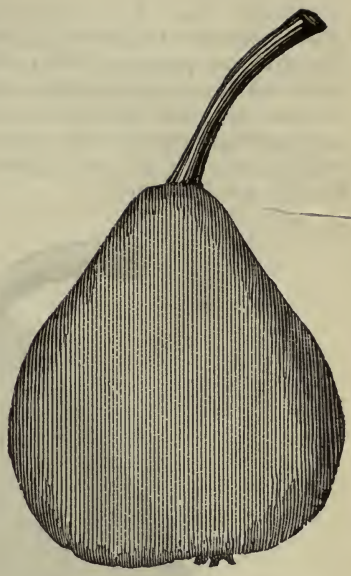
Conseiller De La Cour.

Skin light yellowish-green, with patches and dots of russet. Flesh white, juicy, and well flavoured.

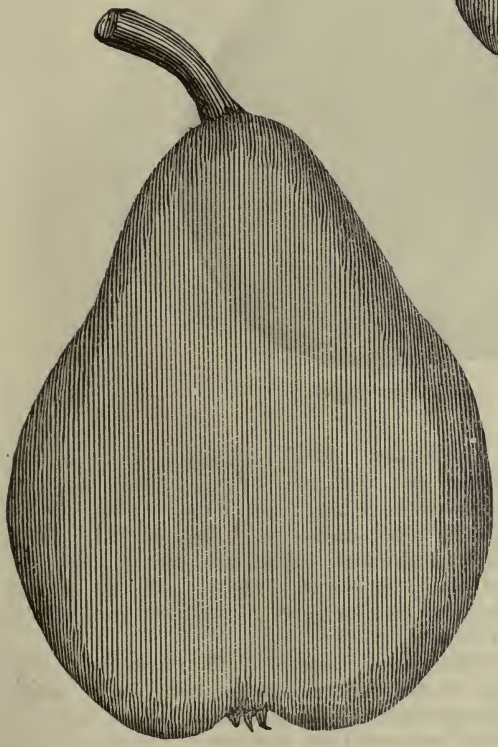
Broom Park.—An English variety of great excellence as a dessert Pear. Fruit rather above medium size, roundish-obovate, and ripens

towards the end of the summer. Skin yellow, sprinkled with cinnamon russet. Flesh yellowish-white, melting, juicy, sugary, with a rich musky flavour. Tree hardy, vigorous, and an excellent bearer. Suitable for export.

Brown Beurré (*Beurré Gris, Beurré Rouge, Golden Beurré, Grey Beurré, Red Butter*).—An old French Pear of great excellence. Fruit large, obovate, and ripens soon after mid-season. Skin almost covered with brown russet, with a faint tinge of red on one side. The colour, however, varies to some extent in various localities, which accounts for the different names. Flesh yellowish-white, tender, juicy, buttery, with a rich vinous flavour and musky aroma. Tree robust and a free bearer.



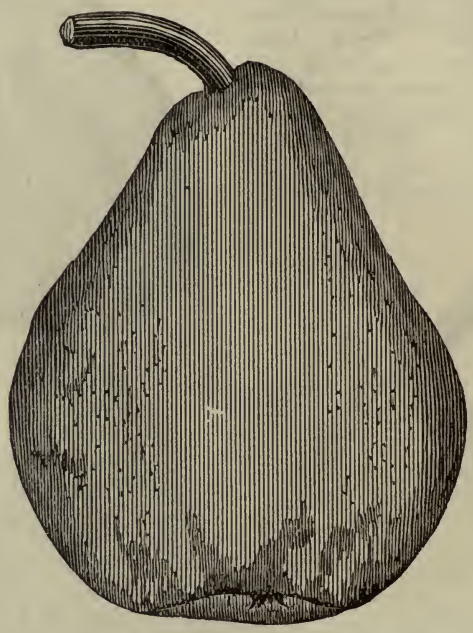
Citron des Carmes.



Clapp's Favourite.

Calebasse Grosse (*Calebasse Royale*).—A Belgian variety with very large pyriform fruit, often over six inches long, which ripens towards the end of summer. Skin greenish-yellow, thickly strewed and dotted with russet. Flesh coarse grained, crisp, juicy, and sweet. Tree vigorous and fairly productive. Not equal to many other varieties, but suitable for stewing.

Catillac (*Bell Pear*, *Chartreuse*, *Grand Mogul*, *Grand Monarque*, *Pound Pear*).—A very old and useful French Pear that is excellent for culinary purposes. Fruit very large, broadly turbinate, ripens late, and keeps some time. Skin brownish-yellow, tinged with red on one side, and freely covered with large russet specks. Flesh white, crisp, gritty, firm, with a fairly good flavour. Suitable for stewing, drying, and possibly for canning. Tree hardy, robust, and a fairly good bearer.

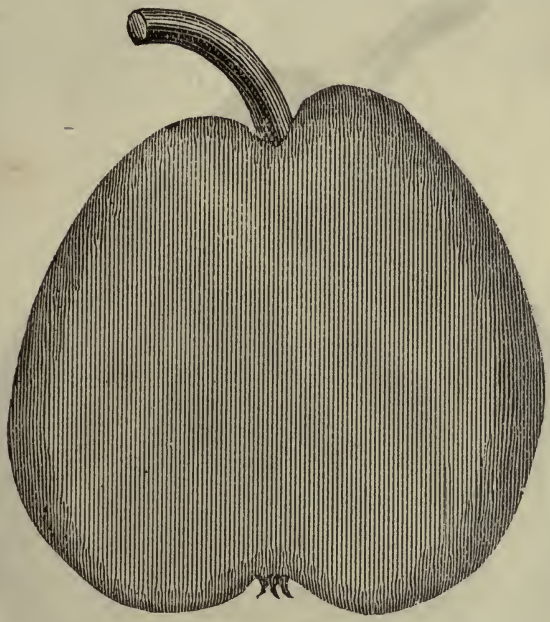


Compte de Flandre.

Chaumontel (*Beurre de Chaumontel*, *Beurre d'Hiver*, *Grey Achan*, *Winter Beurre*).—A very old and favourite French Pear largely cultivated in Europe, but not much in this part of the world. Fruit large, pyriform, ripens late in the summer, and keeps well. Skin yellowish-green, a little rough, brownish-red on one side, and thickly covered with patches and spots of russet. Flesh yellowish-white, melting, sugary, with a rich and pleasant aroma. Tree vigorous and bears freely. Suitable for export.

Citron des Carmes (*Early Chaumontel*, *Madeleine*, *Magdalen*).—A very early French Pear, and one of the first in the market. Fruit small, obovate-pyriform. Skin yellowish-green, with sometimes a faint tinge of red on one side. Flesh white, juicy, melting, and sweet. Useful for its earliness. Tree strong and prolific.

Clapp's Favourite.—An American dessert Pear that is very popular in the United States. Fruit large, obovate or obtuse-pyriform, and ripens at mid-season. Skin pale lemon yellow, thickly sprinkled with brown dots, and sometimes patches of russet, and dashed with red on the sunny side. Flesh white, fine grained, juicy, rich, sweet, with a vinous aromatic flavour. Tree vigorous, upright, and prolific.



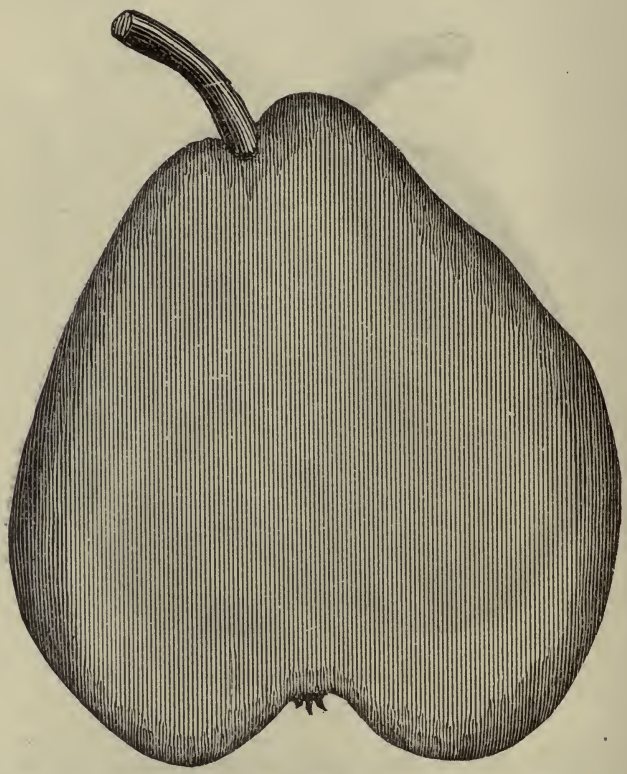
Doyenné Boussoch.

Compte de Flandre (*St. Jean Baptiste*).—An excellent Belgian variety with large obtuse-pyriform fruit, which ripens late and keeps well. Skin nearly covered with russet. Flesh yellowish-white, juicy, melting, rather gritty, sweet, and richly flavoured. Tree vigorous and a free bearer. Suitable for export.

Compte de Lamy (*Beurre Cartet, Beurre Quetelet, Dingler, Marie Louise Nova*).—A first-class dessert Pear of Belgian origin. Fruit medium size, roundish-obovate, and ripens late in the summer. Skin yellow, with a brownish-red cheek, sprinkled with patches and dots of russet. Flesh yellowish-white, tender, juicy, melting, sugary, and richly flavoured. Tree hardy, spreading, and prolific. Suitable for export.

Conseiller De La Cour (*Duc d'Orleans, Grosse Marie, Marechal De La Cour*).—An excellent Belgian variety, and one of the best Pears in

cultivation. Fruit large, oblong-pyriform, and ripens after mid-season. Skin greenish-yellow, with patches and dots of russet. Flesh yellowish-white, juicy, melting, with a rich vinous flavour. Tree moderately vigorous, bears freely, and retains its foliage for a long period.



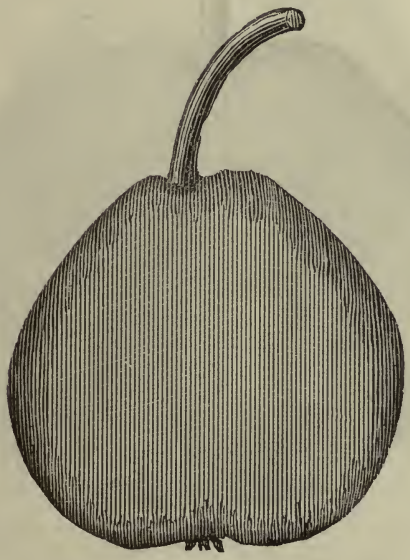
Doyenné du Comice.

Crassane (*Bergamotte Crassane*, *Beurre Plat*, *Crassane d'Automne*, *Flat Butter*).—A very old and popular variety supposed to be of French origin. Fruit medium size or larger, roundish-oblate, flattened, and ripens rather late. Skin yellow, thickly veined and dotted with grey russet. Flesh white, rather coarse grained, juicy, sugary with a pleasant flavour. Tree hardy, vigorous, but sometimes a shy bearer. Suitable for export.

Doyenne Boussock (*Albertine*, *Beurre de Merode*, *Beurre Magnifique*,

Beurre de Waterloo, Double Phillippe).—An excellent Belgian variety. Fruit very large, roundish-obovate to oval-pyriform, and ripens a little after mid-season. Skin rough, deep yellow, netted and dotted with russet. Flesh yellowish-white, tender, melting, juicy, vinous, with a delicate agreeable aroma. Tree hardy, vigorous, spreading in habit, and bears freely. A good market variety.

Doyenne du Comice.—A first-class French variety with large fruit varying from roundish to obtuse-pyriform, which ripens after mid-season. Skin pale yellow, thickly sprinkled with dots and patches of russet. Flesh yellowish-white, very tender, melting, juicy, rich, sugary, vinous, with an agreeable musky flavour. Tree moderately vigorous, upright, and bears freely. Suitable for export.



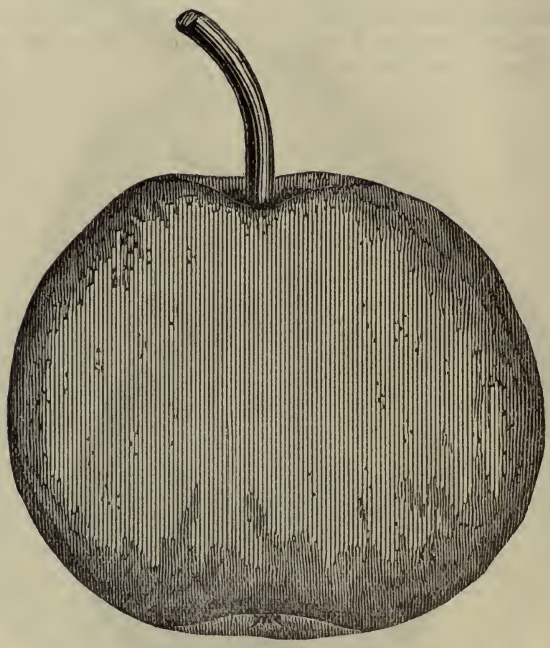
Doyenné d'Eté

Doyenne Defais.—A fine and useful French dessert Pear. Fruit medium size or under, roundish-obovate, ripens late, and keeps well. Skin pale yellow, thickly covered with light russet dots and splashes. Flesh white, melting, juicy, sweet, with a fine musky aroma. Tree hardy, moderately vigorous, and an excellent bearer.

Doyenne d'Ete (*Doyenne de Juillet, Jolimont, Summer Doyenne*).—A well-known very early Pear of Belgian origin, and valuable because it comes in about the first in the season. Fruit small, roundish-obov Skin yellow, thickly covered with small russet dots, and someti slight red blush on one side. Flesh white, juicy, melting, and su

Useful for its earliness, but the fruit soon decays. Tree hardy, bears early and abundantly.

Doyenne Robin.—A French variety of high quality. Fruit above medium size, round to roundish-obovate. Skin pale yellow, mottled and dotted with russet. Flesh melting, juicy, with a rich and delicate aroma. Ripens early in the autumn.

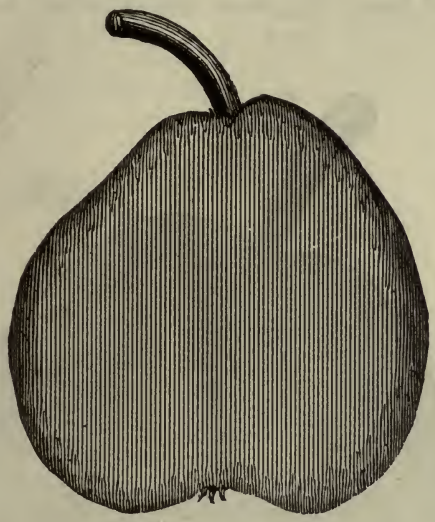


Doyenné Robin.

Dr. Nelis.—An excellent Belgian variety with small to medium-sized obovate fruit, which ripens a little after mid-season. Skin greenish-yellow, with a tinge of red on one side, with patches, streaks, and dots of russet. Flesh yellowish-white, juicy, tender, sweet, with a pleasant slight, vinous flavour. Tree moderately vigorous and bears freely.

Duchesse d'Angoulême (*Beurre Soule, Duchesse*).—An excellent and popular French variety. Fruit large to very large, roundish-oblong to obovate, and ripens a little after mid-season. Skin dull greenish-yellow, thickly streaked and freckled with pale brown russet. Flesh white, tender, rich, juicy, with a fine aroma. Tree strong, upright in growth, and bears well.

Duchesse de Berri d'Eté (*Duchess de Berri, Duchesse de Berri de Nantes*). —A good and useful early French variety. Fruit below medium size, roundish-obovate to obscure pyriform. Skin smooth, shiny, pale yellow, strewed with small russet dots and patches round the eye and stalk. Flesh white, juicy, with a pleasant vinous flavour. Ripens before mid-season.



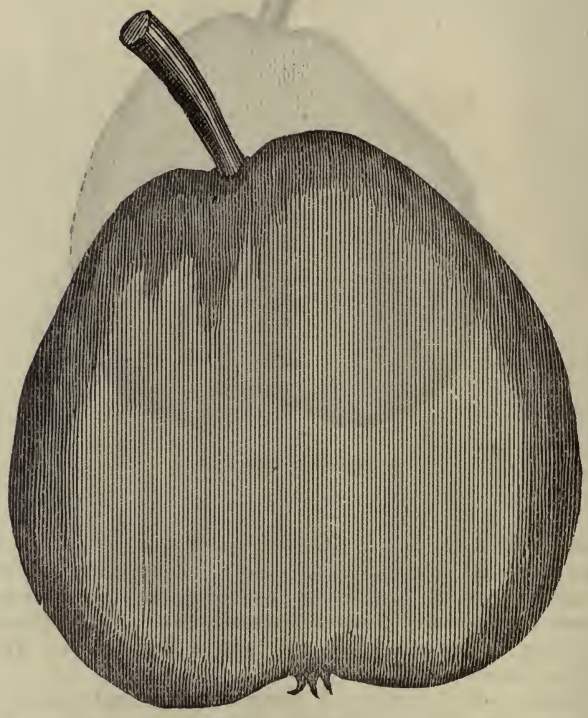
Duchesse de Berri d'Eté.

Duchesse d'Orleans (*Beurre St. Nicholas, Duc d'Orleans, St. Nicholas*). —A first-class and popular French Pear. Fruit rather above medium size, elongated pyriform, and ripens at mid-season. Skin yellowish-green, with brown dots, and sometimes a faint red cheek. Flesh yellowish-white, melting, juicy, rich, sugary, vinous, with a fine aroma. Tree strong, upright, and a very good bearer.

Durandeau (*De Tongres*).—A French variety and one of our finest dessert Pears. Fruit large, obtuse-pyriform, ripens late, and keeps well. Skin pale yellow, thickly covered with cinnamon russet, which is deeper on the sunny side, the whole being thickly sprinkled with brown dots. Flesh white, very juicy, tender, melting, vinous, with a rich sugary flavour. Tree vigorous, bears early, and is very productive. Suitable for export.

Duchess d'Hiver (*Tardive de Toulouse, Winter Duchess*).—An excellent French Pear which ripens very late and keeps well. Fruit large, obovate-pyriform. Skin dull green, thickly shaded and spotted with russet. Flesh white, juicy, sweet, and pleasant. Tree vigorous, prolific, and an early bearer. Suitable for export.

Easter Beurre (*Bergamotte d'Hiver*, *Bergamotte Tardive*, *Beurre Anglaise*, *Beurre de Roques*, *Beurre Roupe*, *Doyenne d'Alencon*, *Doyenne d'Hiver*).—An old and very popular variety of doubtful origin, and in Europe considered to be one of the very best late Pears. Fruit large, obovate, inclining to oval. Skin brownish-green, with a darker cheek, strewed with patches and large dots of russet. Flesh white, juicy, melting, with a sweet rich flavour. Tree strong, upright, and a good bearer. A good dessert Pear, keeps well, and suitable for exporting.



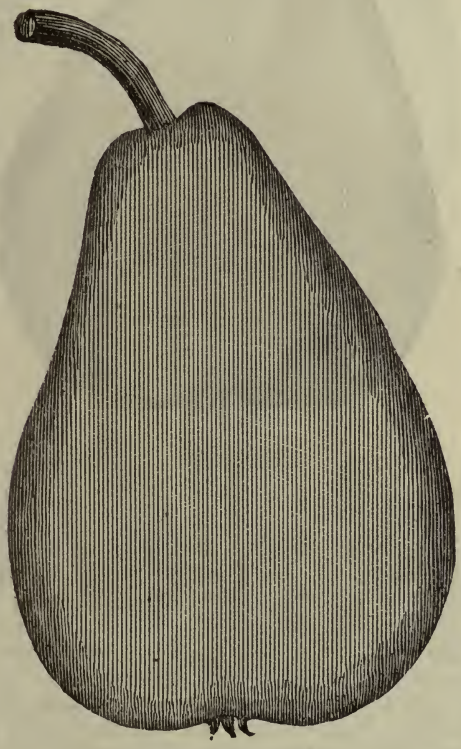
Easter Beurré.

Emile d'Heyst.—A Belgian variety with large oblong-pyriform fruit, which ripens after mid-season. Skin bright yellow, with an orange cheek, thickly netted, patched, and dotted with russet. Flesh yellowish-white, juicy, melting, very sweet, with an aromatic flavour. Tree hardy, spreading, and a very prolific bearer.

Eyewood.—An old and excellent English variety with Bergamot-shaped fruit below medium size, which ripens late in the summer and keeps well.

Skin greenish-yellow, thickly covered with dots and patches of russet. Flesh yellowish-white, very juicy, tender, melting, with a fine aroma, and sprightly vinous flavour. Tree very hardy, vigorous, and an excellent bearer. Suitable for exporting.

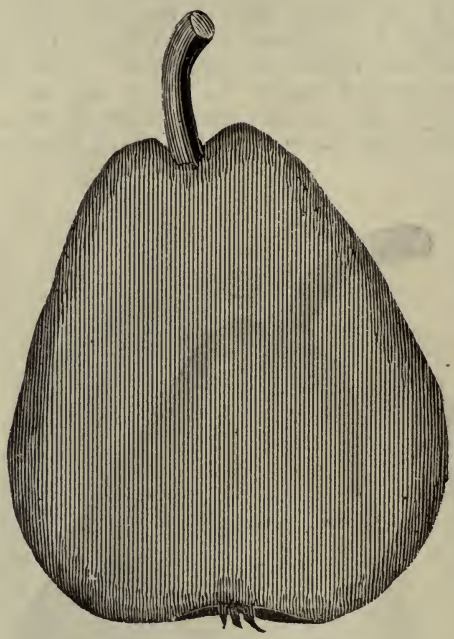
Figue de Naples (*Beurre Bronzee, Comtesse de Frenol, Fig Pear of Naples, Fourcroy*).—A Belgian Pear of excellent quality, though from the name it might be supposed to be Italian. Fruit medium size, obovate-pyriform, and ripens at mid-season. Skin greenish-yellow, shaded and marbled with red on the sunny side, and thickly netted, patched, and dotted with russet. Flesh yellowish-white, juicy, sweet, and well flavoured. Tree vigorous, upright, and a fairly good bearer.



Emile d'Heyst.

Flemish Beauty (*Belle de Bois, Belle de Flanders, Beurre de Bois, Beurre de Bourgogne, Beurre Davy, Beurre d'Elberg, Beurre Froidard, Beurre St. Amour, Beurre Spence*).—A very old and well-known variety

supposed to be of Belgian origin. Fruit medium size to large, obtuse pyriform, and ripens at mid-season. Skin nearly covered with reddish-brown russet, and red on the sunny side. Flesh yellowish-white, juicy,

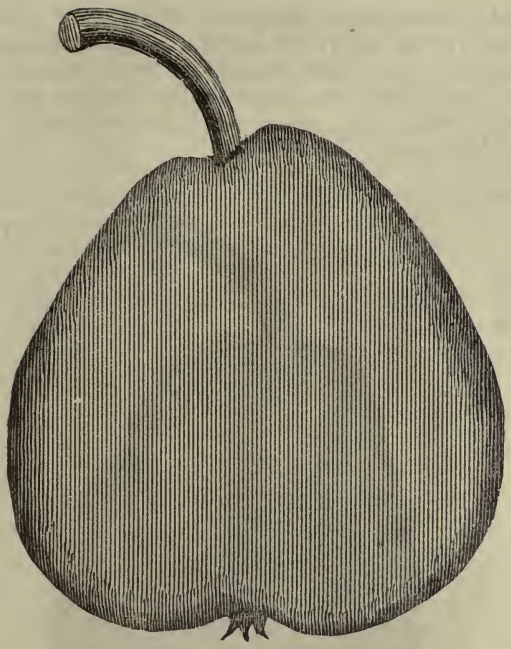


Flemish Beauty.

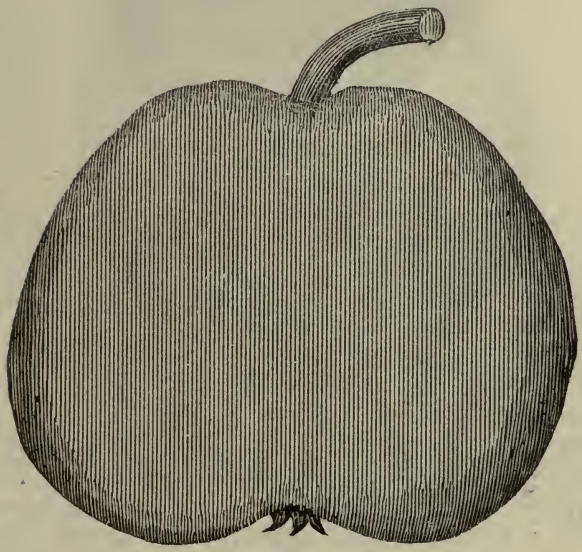
tender, sugary, with a rich flavour. Tree hardy, robust, bears early, and is a wonderfully free bearer. An excellent variety, but the fruit must be gathered somewhat earlier than most Pears; as if left too long it becomes inferior.

Fondante d'Automne (*Arbre Superbe*, *Belle Lucrative*, *Bergamotte Fievee*, *Bergamotte Lucrative*, *Beurre d'Albret*).—An excellent Flemish dessert Pear. Fruit medium size, varying in form from globular to obtuse-pyriform, and ripens late in the summer. Skin pale green, with light patches of russet. Flesh white, juicy, melting, with a rich sugary flavour. Tree moderately vigorous and a free bearer.

Forelle (*Trout Pear*).—An excellent German variety called Trout Pear from its speckled appearance. Fruit medium size, ovate-pyriform, ripens in the autumn, and keeps well. Skin bright yellow, with red dots, and washed with red on the sunny side. Flesh white, melting, juicy, slightly vinous, and well flavoured. Tree hardy, robust, and prolific.

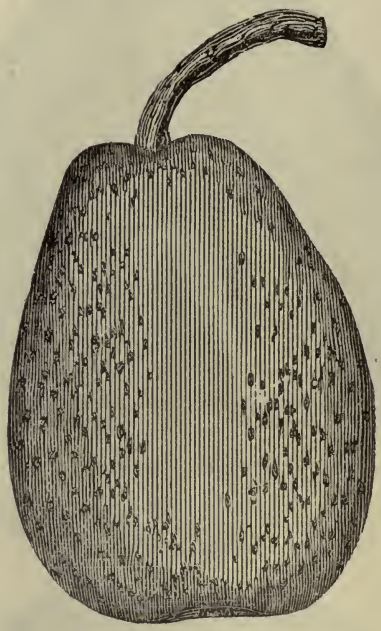


Fondante d'Automne.



Gansel's Bergamot.

Frederic de Wurtemburg (*King of Wurtemburg, Medaille d'Or, Vermillion d'Ete*).—A variety of doubtful origin with medium to large irregular pyriform fruit, which ripens about mid-season. Skin deep yellow, with a rich crimson cheek, and thickly marbled and dotted with dull red. Flesh white, juicy, sweet, and highly flavoured. Tree strong and a fairly good bearer.



Forelle.

Gansel's Bergamot (*Bonne Rouge, Brocas Bergamotte, Diamant, Gurles' Beurre, Ives' Bergamot, Staunton*).—An old and well-known English Pear. Fruit medium to large, roundish-obovate, much flattened, and ripens about mid-season. Skin rough, yellowish-brown, thickly sprinkled with russet dots. Flesh white, juicy, melting, sweet, with a rich aromatic flavour. Tree very robust, but a somewhat uncertain bearer.

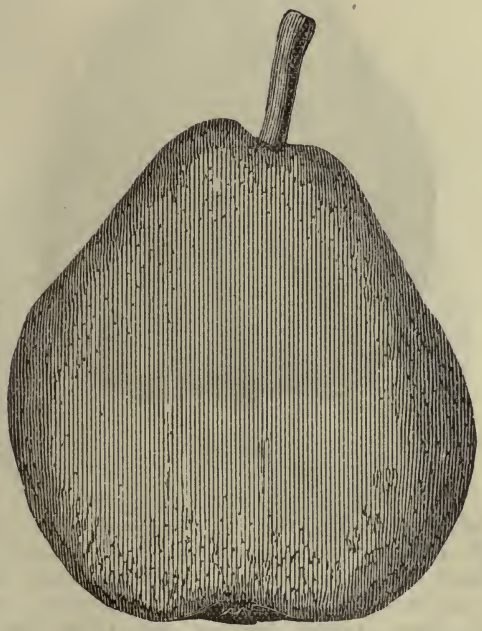
General Todtleben.– An excellent Belgian Pear. Fruit above medium size or large, obtuse-pyriform, and ripens in the autumn. Skin greenish-yellow, patched, netted, and dotted with brown russet. Flesh whitish-yellow, juicy, melting, slightly vinous, with a pleasant aroma. Tree vigorous, spreading, and productive.

Glou Morceau (*Beurre de Cambron, Beurre d'Hardenpont, Beurre de Kent, Beurre Lombard, Colmar d'Hiver*).—An old and well-known Flemish Pear which is very popular in Europe. Fruit medium to large,

varying in form, from obovate to obtuse-pyriform, ripens late, and is a good keeper. Skin greenish-yellow, with markings and dots of grey russet. Flesh white, juicy, melting, sugary, and pleasantly flavoured. Tree robust, spreading, and a free bearer. An excellent late dessert Pear. Also suitable for canning.

Green Chisel (*Madeleine Vert*).—An old English Pear which formerly was very popular, but is now excelled by other kinds. Fruit small, and grows in clusters, roundish-ovate, and ripens about mid-season. Skin green, with sometimes a brownish cheek. Flesh juicy, sweet, and well-flavoured. Tree hardy, vigorous, and generally bears freely.

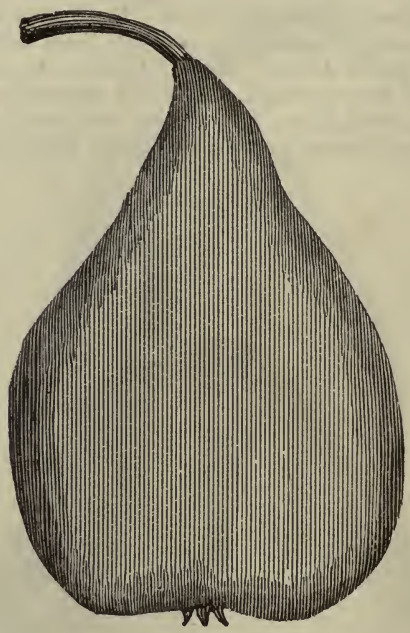
Gros Figue (*Figue d'Alencon, Figue d'Hiver*).—An excellent French variety with large long pyriform fruit, which ripens late. Skin golden yellow, with a brownish cheek, with patches and dots of russet. Flesh greenish-white, juicy, tender, melting, sweet, and richly flavoured. Tree hardy and prolific.



Glou Morceau.

Hacon's Incomparable (*Downham Seedling*).—An excellent English dessert variety with medium-sized, or over, roundish fruit, which ripens late and keeps well. Skin dull yellowish-green, strewed with russet dots and streaks. Flesh white, melting, sugary, vinous, with a rich aroma. Tree very hardy and an unusually free bearer.

Huyshe's Prince Consort.—A first-class English Pear, a cross between *Beurre d'Aremberg* and *Passe Colmar*. Fruit large to very large, oblong, ripens late, and keeps well. Skin yellowish-green, thickly covered with russet dots. Flesh yellowish-white, melting, rather crisp, very juicy, sweet, vinous, and has a peculiar rich flavour, which is quite distinct. Tree robust, and a fairly good bearer.



Jargonelle.

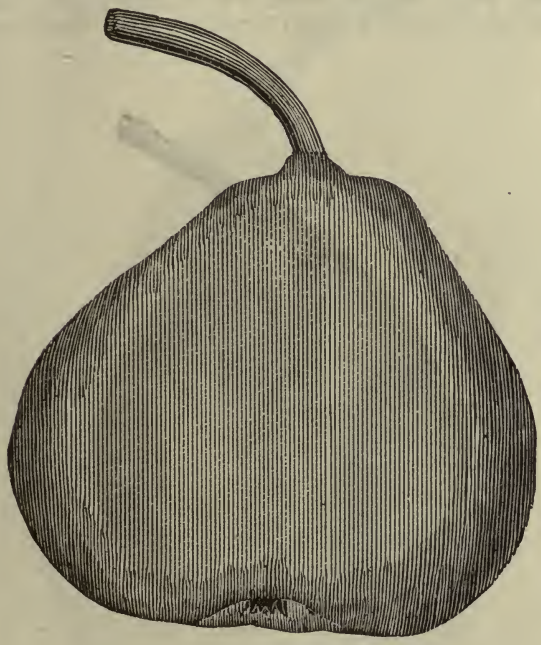
Huyshe's Prince of Wales (*Huyshe's Bergamot*).—An English variety obtained by Mr. Huyshe from a cross between *Marie Louise* and *Gansel's Bergamot*. Fruit large, roundish-oval to oblong, ripens late, and keeps well. Skin yellow, thickly covered with cinnamon russet. Flesh yellowish-white, juicy, tender, melting, and richly flavoured. Tree vigorous, spreading, and productive. A first-class Pear suitable for exporting.

Huyshe's Princess of Wales.—This is also an excellent English variety raised by Mr. Huyshe. Fruit medium or above, oblong, ripens late, and a good keeper. Skin lemon yellow, sprinkled with patches, veins, and dots of cinnamon russet. Flesh yellow, very juicy, melting, rich, with a fine aroma. Tree robust and productive. Suitable for exporting.

Huyshe's Victoria.—Another first-class English Pear, raised by Mr.

Huyshe from a cross between *Marie Louise* and *Gansel's Bergamot*, Fruit medium, ovate-pyriform, ripens late, and keeps well. Skin yellow, heavily patched, netted, and dotted with russet. Flesh yellowish-white juicy, melting, slightly vinous, with a rich sugary flavour. Tree strong spreading, and productive. Suitable for exporting.

Jalousie de Fontenay (*Belle d'Esquermes, Fontenay Vendee*).—A very good French dessert Pear. Fruit medium size, obtuse-pyriform, and ripens after mid-season. Skin greenish-yellow, with a reddish cheek, and thickly patched and dotted with russet. Flesh white, melting, and richly flavoured. Tree vigorous, yields early, and an abundant bearer.

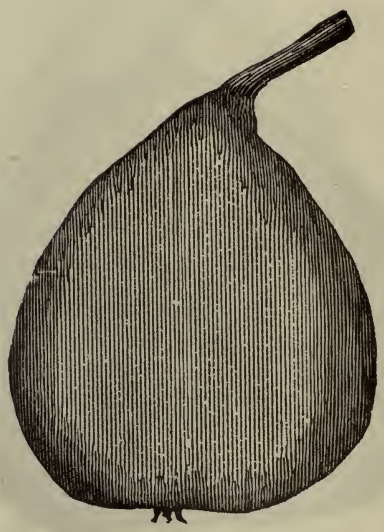


Josephine de Malines.

Jargonelle (*Beau Present, Belle Vierge, Beurre de Paris, St. Lambert, St. Samson, Sweet Summer*).—A very old and well-known variety of uncertain origin, though probably it first came from France. Fruit medium size or over, long-pyriform, and ripening early in the season. Skin yellowish-green, and sometimes a little reddish-brown on the sunny side. Flesh yellowish-white, very juicy, with a pleasant flavour. Tree vigorous, hardy, and bears very freely. This variety is useful for its earliness, but it decays very quickly, and must be used within two or three days after it is gathered.

Jean de Witte (*Beurre de Hamptienne, Dial, Passe Colmar François*).—An excellent Flemish variety with medium-sized roundish obovate-pyriform fruit, which ripens late and keeps well. Skin yellowish-green, thickly dotted, splashed, and netted with russet, with a red blush towards the sun. Flesh white, juicy, melting, sugary, and highly flavoured. Tree vigorous, upright, and prolific.

Josephine de Malines.—A Belgian variety of great excellence, and one of our best long-keeping Pears. Fruit medium size or over, roundish-oblate, and slightly pyriform, ripens late, and will keep for several months. Skin greenish-yellow, thickly patched and netted with russet, and strewed with minute brown spots. Flesh yellowish-white, with a tinge of pink, juicy, melting, sweet, with a rich aroma. Tree hardy, vigorous, and productive. A good Pear for the home market or an export trade.



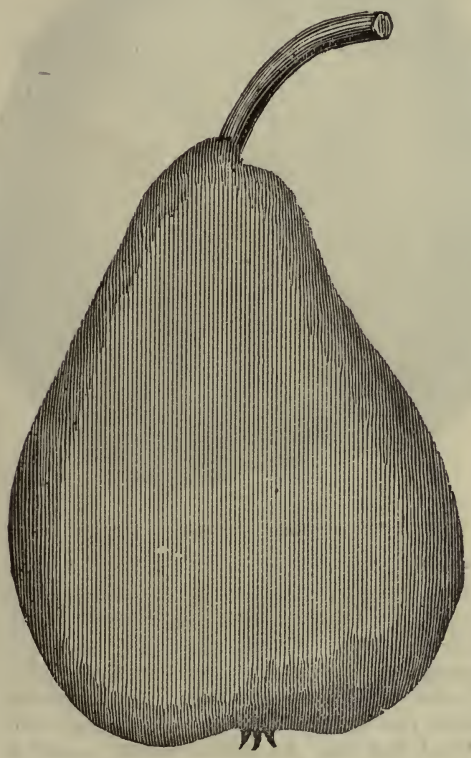
L'Inconnue.

Keiffer (*Keiffer's Hybrid, Keiffer's Pear*).—An American Pear said to be a hybrid between the Chinese *Sand Pear* and *Williams' Bon Chretien.* Fruit large, ranging from oval to pyramidal. Skin golden yellow, often tinged with red. Flesh juicy, melting, and generally well flavoured, but is somewhat variable in quality. Ripens late, keeps a long time, and is an excellent stewing and canning Pear. Tree hardy, robust, and very prolific.

Knight's Monarch (*Monarch*).—An excellent English dessert Pear. Fruit medium size, roundish, ripens late, and may be kept for some time. Skin yellowish-green, thickly covered with patches and dots of russet.

Flesh yellowish-white, very juicy, melting, rich, sugary, with a piquant and pleasant aroma. Tree hardy, pyramidal, and very productive. Suitable for exporting.

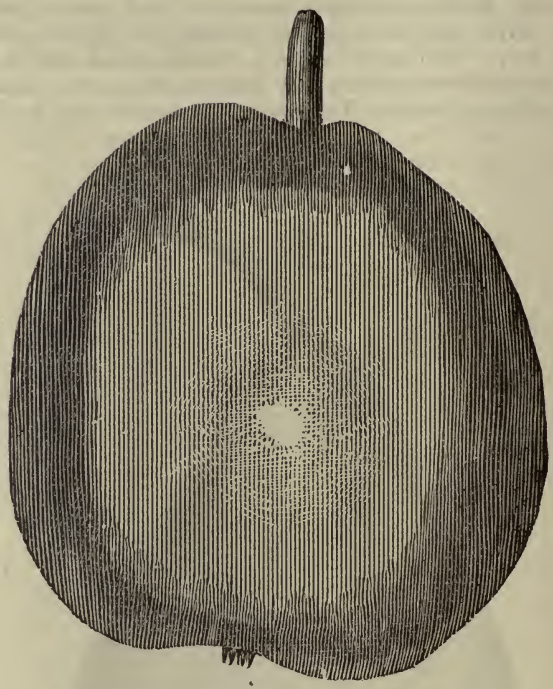
Leopold the First.—A Belgian variety of good quality, and a useful late Pear. Fruit medium size, oval, inclining to pyriform, ripens late, and keeps well. Skin greenish-yellow, thickly flaked and dotted with russet. Flesh yellowish-white, very juicy, melting, rich, sugary, with a pleasant aromatic flavour. Tree hardy, pyramidal, and a fairly good bearer.



Louise Bonne of Jersey.

L'Inconnue (*Inconnue Van Mons*).—An excellent Belgian Pear, and one of the best of the late keeping sorts. Fruit medium or under, oval-pyriform, ripens late, and may be kept for several months. Skin rough, greenish-yellow, very thickly patched and dotted with russet. Flesh creamy-white, firm, juicy, sugary, rich, with an agreeable aroma. Tree

hardy, vigorous, upright, and a free bearer. A good Pear for exporting to Europe.



Madame Cole.

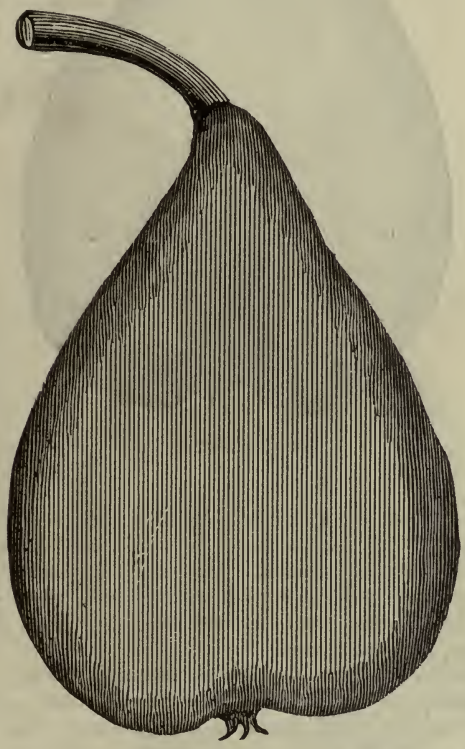
Louise Bonne of Jersey (*Bergamotte d'Avranches, Beurré d'Arandore, Bonne de Longueval, De Jersey, William the Fourth*).—An excellent and popular French dessert Pear. Fruit medium size or over, pyriform, and ripens at mid-season. Skin pale green, brownish-red next the sun, and thickly covered with brown and grey dots. Flesh greenish-white, juicy, and melting, with a rich vinous flavour. Tree vigorous and very prolific.

Madame Cole.—A first-class Australian variety raised in Victoria by the late Mr. J. C. Cole from the *Winter Nelis*, hybridised with *Beurre Clairgeau.* Fruit medium size, roundish-ovate, frequently irregular. Skin almost covered with reddish russet. Flesh yellowish, juicy, sugary, with a rich flavour. Ripens late and keeps well.

Madame Elize (*Madame Eliza*).—A popular Belgian variety. Fruit large, ovate-pyriform. Skin pale yellow, with patches, tracings, and dots of reddish-brown russet. Flesh melting, juicy, with a rich and slightly vinous flavour. Ripens late, and will keep two or three months. Tree robust and prolific.

Madame Henri Desportes.—A French Pear of good quality. Fruit medium size, roundish-obovate, and ripens about mid-season. Skin rough, thickly covered with cinnamon russet. Flesh yellowish-white, tender, juicy, sweet, and highly flavoured. Tree moderately vigorous and prolific.

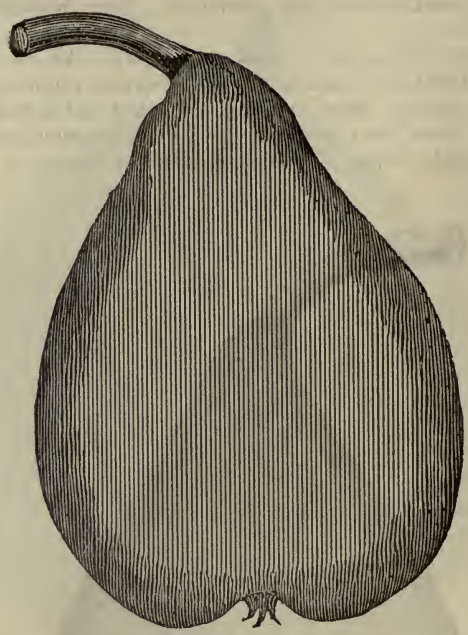
Madame Treyve (Souvenir de Madame Treyve).—An excellent French dessert Pear. Fruit medium size or over, obovate-pyriform, and ripens a little after mid-season. Skin pale yellow, dashed and dotted with russet, and a reddish cheek next the sun. Flesh white, juicy, melting, sweet, rich, with a delicate aroma. Tree vigorous and a very good bearer.



Madame Elize.

Marie Louise (Braddick's Field Standard, Marie Chretienne, Marie Louise Delcourt, Princess de Parme, Van Donckelaar.—A well-known and very popular Belgian Pear. Fruit medium to large, oblong-pyriform, and ripens a little after mid-season. Skin rich yellow, sprinkled and mottled with light russet on the sunny side. Flesh white, melting, very juicy,

with a rich saccharine and vinous flavour. Tree vigorous and an excellent bearer.



Madame Treyve.

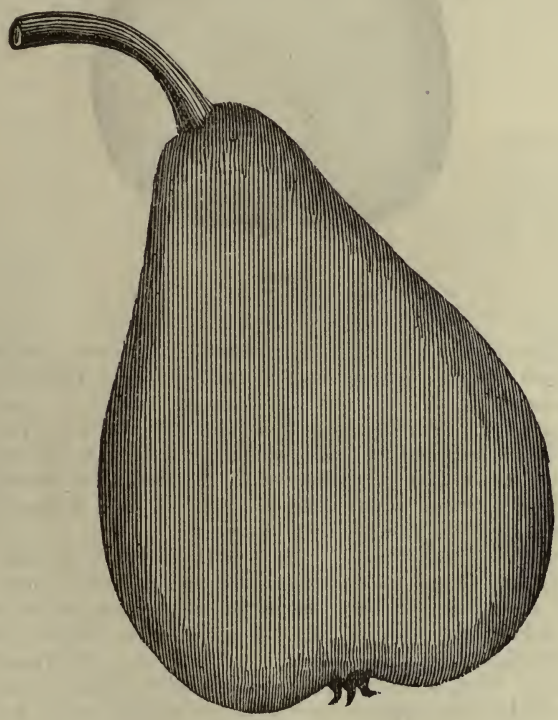
Marie Louise d'Uccle.—An excellent Belgian variety raised from a seed of *Marie Louise.* Fruit rather above medium size, roundish-pyriform, and ripens soon after mid-season. Skin thickly netted, patched, and dotted with russet on a yellow ground, with a brown tinge on the sunny side. Flesh white, juicy, melting, with a rich vinous flavour. Tree vigorous, upright, and productive.

Millot de Nancy.—A Belgian variety of first-rate quality. Fruit above medium size, oblong-obovate, and ripens towards the end of summer. Skin dull yellow, very thickly dotted with brown, with a coppery red cheek. Flesh yellowish-white, juicy, melting, with a rich aromatic flavour. Tree vigorous and bears freely.

Napoleon (*Beurre Autien, Beurre Napoleon, Bon Chretien Napoleon, Napoleon d'Hiver, Roi de Rome, Sucree Doree*).—A French Pear of excellent quality. Fruit large, obtuse-pyriform, ripens late, and keeps well. Skin pale yellowish-green, covered with numerous minute brown dots. Flesh white, melting, very juicy, with a rich sugary and pleasant flavour. Tree thrifty, comes into bearing early, and yields heavy crops as a rule.

Ne Plus Meuris.—A first-class Belgian dessert Pear. Fruit medium size, roundish-turbinate, and somewhat irregular, ripens late, and keeps for some time. Skin rough, dull yellow, thickly covered with dark brown russet. Flesh yellowish-white, melting, juicy, with a rich sugary and vinous flavour. Tree vigorous, upright, and a fairly good bearer. Suitable for exporting.

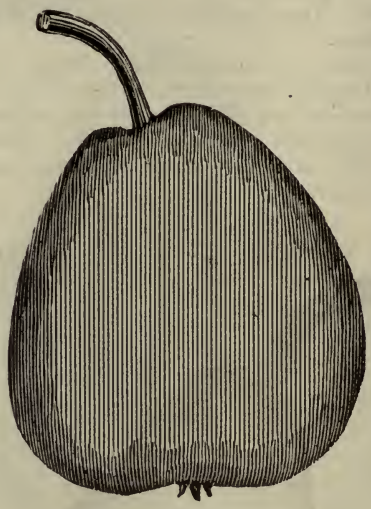
Paradise d'Automne (*Calebass Bosc, Marie Nouvelle, Princesse Marianne*).—A Belgian dessert variety of high quality. Fruit medium size, pyriform, and ripens late in the summer. Skin nearly covered with rough dark cinnamon russet. Flesh creamy-white, melting, juicy, with a rich vinous aromatic flavour. Tree very vigorous and productive.



Paradise d'Automne.

Passans de Portugal (*Poire Chenille, Summer Portugal*).—A mid-season dessert variety of doubtful origin. Fruit medium size and under, roundish-oblate. Skin pale yellow, with a reddish-brown

cheek. Flesh white, crisp, juicy, sugary, with a fine aroma. Tree fairly robust, comes into bearing early, and yields well.



Seckle.

Passe Colmar (*Ananas d'Hiver, Beurre de Argenson, Beurre Colmar Gris, Colmar Bonnet, Colmar Dore, Colmar Epineux, Colmar d'Hardenpont, Fondante de Mons*).—A well-known, excellent, and popular Belgian variety. Fruit medium size and over, varying from obovate to obtuse-pyriform, and ripening in the autumn. Skin deep yellow, thickly sprinkled with brown russet. Flesh yellowish-white, very juicy, tender, melting, sugary, vinous, with a rich aromatic flavour. Tree strong, pyramidal, and a free bearer.

Peach Pear (*Poire Peche*).—An excellent early dessert Pear of Belgian origin. Fruit medium size to large, roundish or irregularly oval, and ripens very early. Skin smooth, greenish-yellow, with a blush of red on the sunny side, and netted and dotted with russet. Flesh yellowish-white, very juicy, melting, sugary, vinous, with a rich flavour. Tree moderate in growth and very productive.

Pitmaston Duchess (*Pitmaston Duchesse d'Angouleme*).—An excellent English variety raised from *Duchesse d'Angouleme.* Fruit large, oblong-obovate, and ripens late in the summer. Skin yellow, marked with light russet. Flesh yellowish-white, juicy, melting, and finely flavoured. Tree vigorous and prolific.

Poire de Berriays.—A first-class variety of French origin. Fruit medium size, roundish-obovate, and ripens at mid-season. Skin greenish-yellow, with a shade of brown on the sunny side, and

thickly sprinkled with brown and grey dots. Flesh white, juicy, melting, with a slight vinous flavour. Tree robust and bears freely.

Rousselet de Stuttgardt (*Bellisime de Provence*).—A good early German variety. Fruit medium size or under, pyriform, and ripens before mid-season. Skin yellowish-green, splashed, netted, and dotted with russet, and a brownish blush on the sunny side. Flesh very juicy, melting, sugary, and highly flavoured. Tree robust, pyramidal, and an excellent bearer.

Sand Pear (*Chinese*).—A vigorous Chinese species with large glossy foliage. Fruit medium size to large, roundish-pyriform, and ripens after mid-season. Skin greenish-yellow, and covered with rough sand-like russet. Flesh firm, juicy, and suitable for stewing. Might prove serviceable by crossing with other Pears.

Seckle (*New York Red Cheek, Shakspeare*).—A first-class American Pear, quite distinct from other varieties. Fruit small, obovate, regular, and ripens after mid-season. Skin brownish-green, with a lively red russet cheek. Flesh creamy-white, buttery, very juicy, melting, with a peculiar and rich spicy aroma. Tree very hardy and a prolific bearer.

Soldat Esperen (*August Van Krans, Soldat Laboureur*).—An excellent Belgian dessert variety. Fruit rather large, roundish-obovate, and ripens after mid-season. Skin yellow, patched, netted, and dotted with russet. Flesh yellowish-white, very juicy, sugary, with a rich aromatic flavour. Tree vigorous, upright, bears early and abundantly.

Souvenir du Congress.—An excellent French variety. Fruit large to very large, ranging from obtuse to long pyriform, and ripens in the summer. Skin bright yellow, with a flushed cheek. Flesh juicy and melting, with a flavour somewhat like *Williams' Bon Chretien*.

Spanish Bon Chretien (*Bon Chretien d'Automne, Saffran d'Automne, Spanish Warden, Vandyck*).—A very old and useful culinary Pear of uncertain origin. Fruit large, pyriform, ripens late, and keeps a long time. Skin greenish-yellow, well covered with cinnamon russet, and a deep flush next the sun. Flesh white, crisp, with a musky aroma and brisk flavour. Tree hardy and bears freely. An excellent Pear for stewing or drying and exporting.

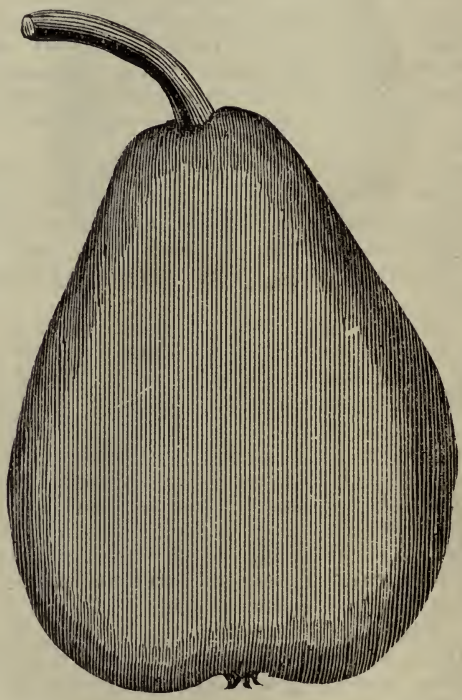
St. Michael Archangel.—A French dessert Pear of good quality. Fruit rather above medium size, obovate-pyriform, and ripens after mid-season. Skin smooth, golden yellow, speckled with small red dots like *Forelle*, and a crimson cheek on the sunny side. Flesh yellowish-white, tender, juicy, melting, sugary, with an agreeable aromatic flavour. Tree robust and productive.

Summer Beurre d'Aremberg.—A first-class early English variety. Fruit medium size or under, short obovate, and ripens soon after the Jargonelle. Skin pale yellow, netted and patched with russet. Flesh white, tender, juicy, melting, vinous, with a brisk aroma. Tree hardy, robust, and a very free bearer.

Summer Bon Chretien (*Florence d Ete, Gratioli, Large Sugar*).—This Pear is of uncertain origin, but is one of the oldest, having been

cultivated in Europe for over three hundred years. Fruit rather large, bell-shaped or pyriform, and ripens a little before mid-season. Skin yellow, with an orange red blush next the sun, and dotted with small green specks. Flesh yellowish-white, crisp, juicy, sweet, and pleasantly flavoured. Tree robust and prolific.

Swan's Egg.—An excellent old English variety. Fruit medium size, roundish-ovate, and ripens in the autumn. Skin smooth, yellowish-green, covered with pale brown russet, and flushed with brownish-red next the sun. Flesh very juicy, tender, with a piquant musky flavour. Tree robust, very hardy, and an excellent bearer. Suitable for exporting.



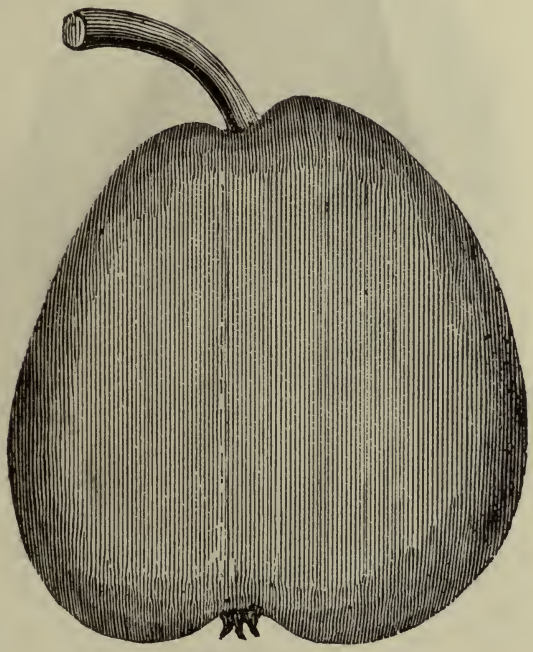
Theodore Van Mons.

Tardif de Mons.—A good dessert Pear of Belgian origin. Fruit medium size, oblong-obovate, and ripens in the autumn. Skin yellow, strewed with russet dots, and an orange cheek next the sun. Flesh white, tender, juicy, with a rich sugary flavour. Tree moderately robust and a fairly good bearer.

Theodore Van Mons.—A Belgian variety of excellent quality. Fruit medium size or above, oblong-pyriform, and ripens after mid-season. Skin greenish-yellow, strewed with traces and dots of russet. Flesh creamy-white, juicy, melting, and well flavoured. Tree vigorous, upright, and productive.

Thompson's.—An English variety, and one of the finest dessert Pears. Fruit medium size, obovate-pyriform, ripens late, and keeps for some time. Skin pale yellow, with patches, streaks, and dots of russet. Flesh white, very juicy, melting, rich, and sugary, with a fine aromatic flavour. Tree hardy, vigorous, and a good bearer. Suitable for exporting.

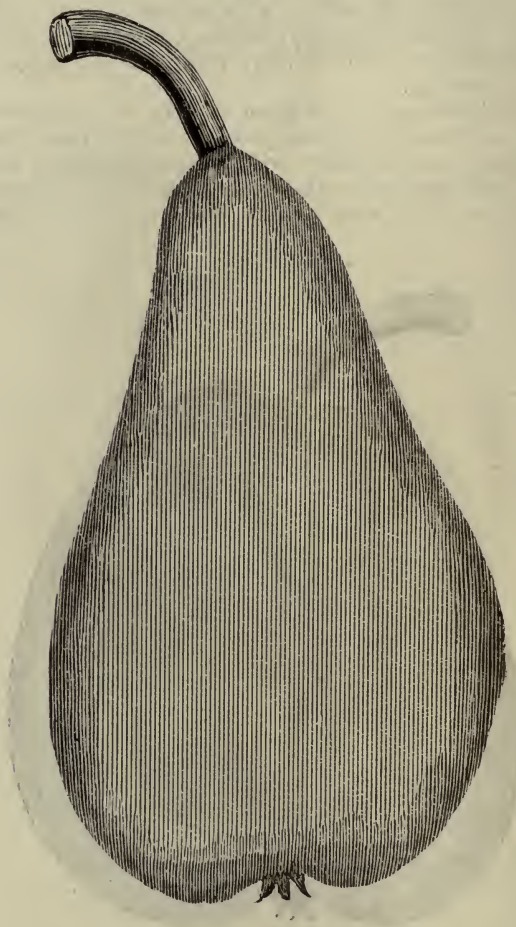
Triomphe de Jodoigne.—A Belgian variety of excellent quality. Fruit large, obovate to obtuse-pyriform, and ripens late in the summer. Skin greenish-yellow, with patches, nettings, and dots of russet, and a reddish cheek on the sunny side. Flesh yellowish-white, juicy, sugary, with a brisk musky flavour. Tree vigorous and productive.



Urbaniste.

Urbaniste (*Beurre Drapiez, Beurre Gens, Beurre Piequery, Louis de Orleans*).—An excellent Flemish dessert variety, and one of the most

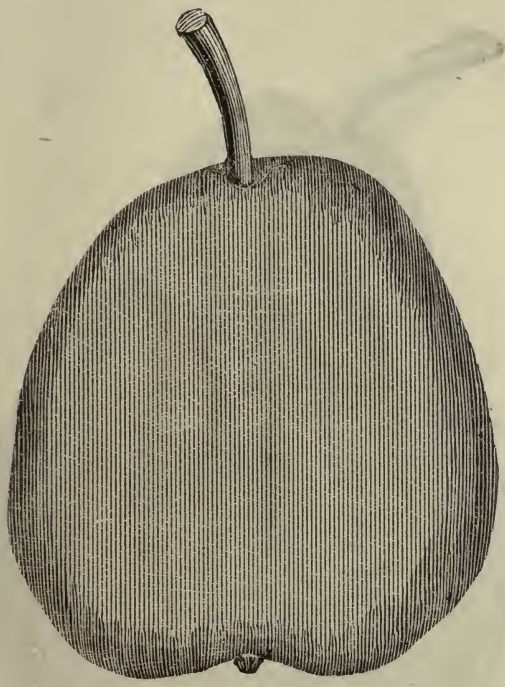
serviceable. Fruit medium size or over, obovate-pyriform, ripens after mid-season, and will keep for several weeks. Skin pale yellow, thickly covered with markings and dots of russet, and mottled with reddish-brown. Flesh white, juicy, tender, melting, rich, sugary, with a slight aroma. Tree hardy, vigorous, pyramidal, and a very free bearer.



Vicar of Winkfield.

Uvedale's St. Germain (*Abbe Mongein, Anderson, Belle de Jersey, Bolivar, German Baker, Pickering's Warden, Winter Bell*).—A variety of uncertain origin, and the largest Pear known, the fruit weighing

from three to four pounds. Fruit long pyriform, ripens late, and keeps for a long time. Skin dark green, with a brownish-red cheek, thickly sprinkled and dotted with russet. Flesh white, firm, crisp, and juicy. Tree very robust, hardy, and an excellent bearer. One of the best stewing Pears, and may be turned to account by drying. Also suitable for exporting.

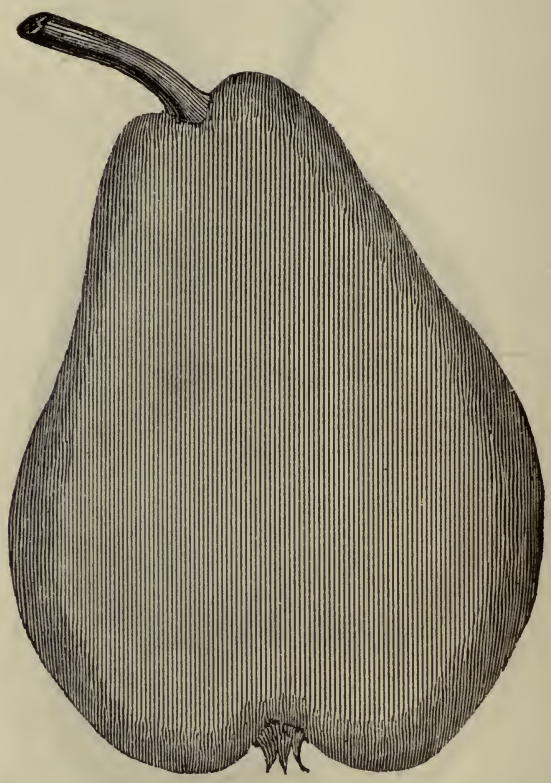


White Doyenne.

Van Mons Leon le Clerc.—An excellent French variety. Fruit large, oblong-obovate, ripens late, and will keep for several weeks. Skin dull yellow, covered with dots and tracings of russet. Flesh yellowish-white, very juicy, melting, with a rich sugary flavour. Tree strong, pyramidal, and bears freely. A fine dessert Pear, and suitable for exporting.

Van de Weyer Bates.—A Belgian variety, and an excellent late Pear. Fruit below medium size, roundish-obovate, ripens late, and will keep a long time. Skin pale lemon, thickly covered with small dots and tracings of russet. Tree vigorous and a fairly good bearer. Suitable for exporting.

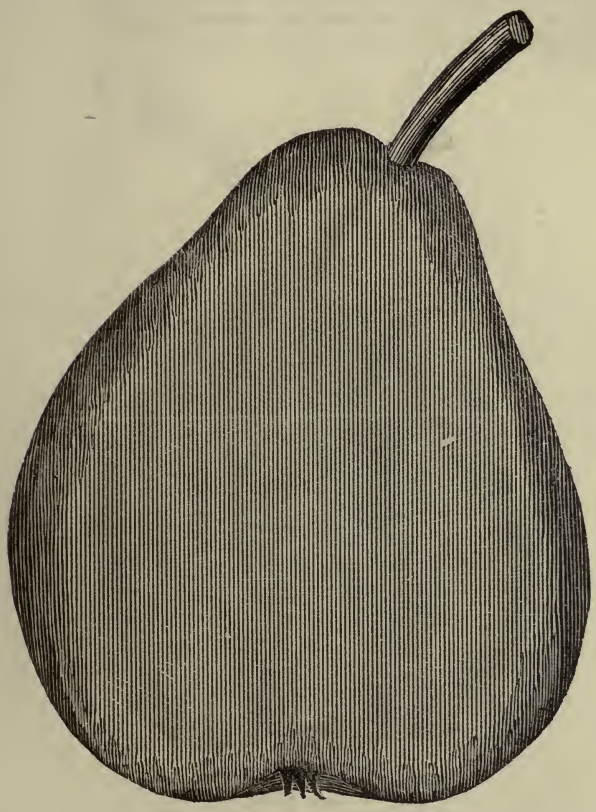
Verulam (Black Beurré, Spring Beurré).—An old English variety, useful as a cooking Pear. Fruit rather large, obovate, ripens late, and will keep for several months. Skin dull green, thickly covered with brown russet and grey dots. Flesh white, crisp, firm, and juicy. When stewed assumes a fine deep red colour. Tree very hardy, robust, and prolific. An excellent Pear for stewing and drying, and suitable for exporting.



Williams' Bon Chretien.

Vicar of Winkfield (Belle Andrienne, Belle de Berri, Belle Heloise, Bon Papa, Clion, Comice de Toulon, Monsieur Le Cure).—An excellent and popular French variety, and one of our finest and most useful Pears. It was introduced to England by the Vicar of Winkfield, in Berkshire, and hence its name. Fruit large, pyriform, frequently one-sided, ripens late, and will keep for several months. Skin greenish-yellow,

with a tinge of red on the sunny side. Flesh white, melting, juicy, sweet, with a rich flavour. Tree vigorous, hardy, and very prolific, bearing more regularly than most kinds. This variety is somewhat similar to Napoleon, with which it is often confounded. It is an excellent market Pear, and suitable for an export trade. If used before it is fully ripe, this variety is also a good cooking Pear. Also suitable for canning.

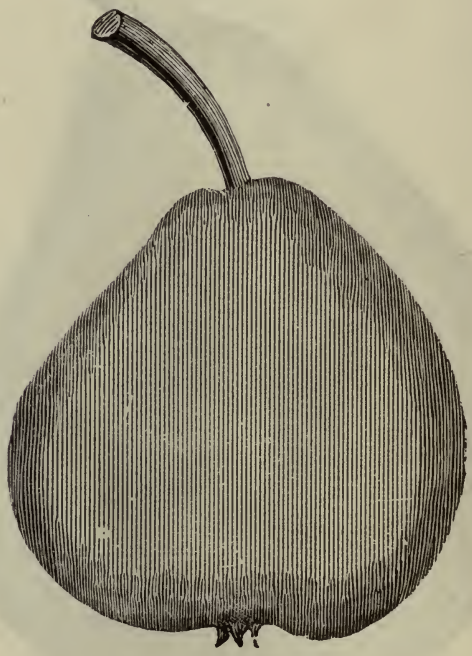


Windsor.

White Doyenne (*Beurre Blanc, Citron de Septembre, Snow Pear, Warwick Bergamot, White Butter*).—A very old French variety that has been in cultivation for more than two centuries. Fruit medium size or over, obovate, and ripens after mid-season. Skin smooth and shining, pale yellow, with sometimes a faint tinge of red next the

sun, and strewed with small dots. Flesh white, buttery, melting, sugary, with a rich piquant vinous flavour. Tree hardy, upright, and a free bearer.

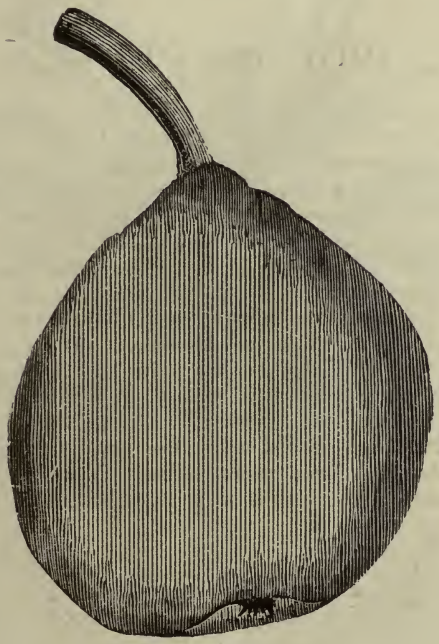
Williams' Bon Chretien (*Bartlett* of the Americans, *Delavault, Duchess, Poire Guillaume*).—An old and popular English variety, and one of our finest summer Pears. Fruit large, oblong to obtuse-pyriform, ripens early in the summer. Skin smooth, greenish-yellow, sometimes having a faint blush on the sunny side. Flesh white, very juicy, melting, with a rich aromatic flavour. Tree robust, hardy, and very prolific. This is decidedly the most popular summer Pear, and is the variety chiefly used for canning.



Winter Nelis.

Windsor (*Bellissime, Belle Tongue, Cape Pear, Figue, Grosse Jargonelle, Summer Bell*).—An old variety of doubtful origin that was formerly very popular, but is now to a large extent replaced by newer kinds. Fruit large to very large, pyriform or bell-shaped, ripens early in the summer. Skin greenish-yellow, with an orange tint on the sunny side. Flesh white, tender, melting, with a brisk sweet flavour. Tree very robust, attains a large size, and bears abundantly.

Winter Bon Chretien (*Bon Chretien d'Hiver, Bon Chretien de Tours, D'Angaisse, De Saint Martin*).—The oldest Pear known, historical records showing that it has been in cultivation in Europe for over four hundred years. It is the source from which the other Bon Chretien varieties have been obtained, and supposed to be of French origin. Fruit large, obtuse-pyriform, ripens late, and keeps for several months. Skin dull yellow, flushed with brown on the sunny side, and strewed with small russet dots. Flesh white, juicy, crisp, and sweet. Tree robust and prolific. This Pear is better adapted for cooking and drying than for dessert.



Zephirin Gregoire.

Winter Cole.—An excellent dessert Pear, a seedling from *Winter Nelis*, raised in Victoria by the late Mr. J. C. Cole. Fruit medium size, roundish-obovate, ripens late, and keeps well. Skin yellowish-green, thickly covered with pale russet. Flesh white, very juicy, melting, with a sweet rich flavour. Tree vigorous and bears freely. Suitable for exporting.

Winter Nelis (*Bergamotte Thouin, Beurre de Malines, Colmar d'Hiver, Nelis d'Hiver*).—A Flemish variety of high quality that is very popular. Fruit medium size or a little under, roundish-obovate,

ripens late, and will keep several months. Skin dull yellowish-green, thickly covered with russet dots and patches. Flesh yellowish-white, very juicy, buttery, melting, with a rich saccharine aromatic flavour. Tree strong, hardy, but a somewhat uncertain bearer. A good dessert Pear, and suitable for exporting.

Zephirin Gregoire.—An excellent Belgian dessert Pear. Fruit medium size, roundish-obovate to pyriform, ripens late, and keeps for several weeks. Skin dull greenish-yellow, clouded and dotted with cinnamon russet. Flesh yellowish-white, very juicy, melting, sugary, with a rich and powerful aroma. Tree robust, pyramidal, and an excellent bearer. Suitable for exporting.

PIGEON PLUM.

This name has been given to the fruit of two evergreen shrubs or small trees indigenous to West Africa, and known to botanists as *Chrysobalanus elipticus* and *C. luteus*, belonging to the order Chrysobalanaceæ. The name is derived from *chrysos* (gold) and *balanus* (an acorn), in allusion to the colour and shape of the fruit in some of the species. Another species, *Chrysobalanus Icaco*, yields the Cocoa Plum, which is described at page 271, volume 1. The species now under notice yield pleasant succulent fruits somewhat like small Plums. They are both compact handsome shrubs, and may be used for ornamental planting in congenial localities, but being natives of a warm climate they will only thrive in the tropical portions of Australia. They thrive best in a rich deep loamy soil, but may be grown in any fairly good ground. Propagation is most readily effected by seeds, which should be planted two inches deep. Plants may be easily obtained from layers, and cuttings of ripened shoots of the current season will root in sand if protected.

PINE-APPLE.

History and Uses.

This popular fruit is indigenous to tropical South America, but it is now naturalized in most of the warmer regions of the globe, and is very widely cultivated. It is known to botanists as *Ananas sativa* (*Ananassa sativa*, *Bromelia sativa*), and it belongs to the order Bromeliaceæ. In habit the plant is a herbaceous perennial, and bears its fruit upon a short stem springing from the crown. The Pine-Apple is in reality a number of small but distinct fruits closely bound together and forming a head. Each separate pip is a fruit in itself. The Pine-Apple is widely cultivated in tropical and semi-tropical regions, and its fruit is considered to be one of the richest for flavour that the world has produced. It is highly valued as a

dessert fruit by most persons not only in regions where it is grown but in colder ones to which it is exported. This fruit is also cultivated artificially in the United Kingdom and other countries where the climate will not allow it to be grown in the open ground, so highly is the Pine-Apple appreciated. The fruit is extensively used in cookery and for flavouring confections and liqueurs, and makes delicious jam, jelly, and marmalade. Pine-Apples are also used to a large extent for bottling and canning, for which purpose

Pine-Apple.

the fruit is cut into slices or cubes about a-quarter of an inch thick. They are preserved in a syrup more or less dense according to the natural sweetness of the fruit. The process is precisely the same as in bottling and canning other fruits, and for full details see page 74, volume 1. Before the fruit is ripe it is caustically acid, and its use in that state will cause irritating or poisonous effects. In small quantities the acrid juice of the green fruit is used medicinally for worms and other intestinal parasites. In addition to its usefulness as a fruit, the Pine-Apple from its leaves yields a valuable commercial fibre. This fibre, which is known as "Pina," is very fine and strong, and can be utilized in the manufacture of fine cloth, as also coarser fabrics and cordage.

Cultivation.

As the Pine-Apple is a native of a warm region it can only be cultivated successfully as a commercial crop in the tropical and sub-tropical portions of Australasia. It is, however, more hardy

than many other tropical plants, and will grow—and also ripen its fruit—in sheltered localities as far south as Sydney. The plant is quite at home in the coast districts of Queensland and the northern part of New South Wales, and in some localities its cultivation has become an important industry. Considerable quantities of fruit are now sent from these districts to the southern colonies and New Zealand, and the trade is expanding. Pine-Apples are well adapted for the warm regions of North Australia, as also in West Australia and some parts of South Australia. In congenial localities the Pine-Apple generally proves a profitable crop, as a plantation will yield from three to four thousand fruits per acre. This crop requires a rich open soil containing a good proportion of vegetable matter, and it should be of fair depth. If the ground is not sufficiently rich it should be improved by the free use of well decayed manure. The ground should be deeply worked, as a good root bed is essential, and, if necessary, provision must be made for effective drainage. Shelter should also be provided if it does not exist naturally. The plants should be arranged in rows about four feet apart, and leaving from two to three feet between in the lines, according to the growth of the variety. It is advisable to plant with regularity so as to facilitate the use of the horse-hoe in keeping the land clean. Care must also be taken to firm the soil round the roots when the plants are put in, and more especially in light open ground. The best time for planting is early in the autumn, or, if that is not convenient, in the spring. Crops planted in the autumn usually give the quickest return. After planting, weeds should be kept down by frequent hoeings, and when practicable it will be an advantage to mulch between the plants before the hot season sets in. A plantation will come into bearing in from eighteen months to two years, according to the strength of the plants when put in and the growth they make. A plantation will yield payable crops for four or five years, after which the plants get weakly and cease to give good marketable fruit. The fruit attains the highest degree of perfection, as a rule, when allowed to remain on the plants till it changes colour, as then only is the rich flavour developed to the fullest extent. When required for shipment, however, the fruit must necessarily be cut before it is fully coloured.

In the cooler regions of Australia, Tasmania, and New Zealand, lovers of this grand fruit who wish to obtain it in perfection may easily grow the Pine-Apple in glass houses or frames with the aid of artificial heat. All that is necessary is to plant in rich open well drained soil, which by means of hot water pipes can be heated to about seventy-five degrees Fah., and a few degrees higher after the fruit has formed. Care must also be taken after the fruit has formed to maintain a good circulation of air, avoiding, however, strong currents, and let the plants have a free light.

Propagation.

Plants may be obtained from seeds, crowns, suckers, and cuttings

from the stems. The first-named method is slow and tedious, and seldom adopted except for raising new varieties. Crowns, or the tufts that grow on the top of the fruits, make good plants, but they are usually longer in coming into bearing than suckers. The most expeditious and serviceable, as also the most generally adopted, method of propagation is by suckers. These should be carefully removed from the parent plants when required for planting, or they may be planted in close rows, nursery fashion, and shifted to their permanent places afterwards. Plants may be obtained from short stem cuttings planted just below the surface, but this mode of propagation is only serviceable when a rapid increase of stock is required.

Varieties.

There are many varieties of the Pine-Apple in cultivation, but three or four will be sufficient for all practical purposes. The following list embraces some of the best and most popular sorts:—

Black Antigua (*Brown Antigua*).—This variety has purple flowers and narrow leaves with short rigid spines. Fruit medium-sized, cylindrical, inclining to oval, pips large and prominent, colour deep ochre. Flesh pale yellow, slightly fibrous, juicy, and well flavoured, but the fruit should be cut as soon as it begins to colour, as when allowed to get fully ripe upon the plant it deteriorates.

Black Jamaica.—An excellent, useful, and comparatively hardy variety which ripens its fruit at all seasons. Flowers purple, leaves dark green, narrow, with small spines. Fruit medium-sized, oval, and somewhat compressed at both base and crown, pips medium size, colour brownish-orange. Flesh pale yellow, firm, slightly stringy, and very highly flavoured.

Charlotte Rothschild.—An excellent variety with lilac flowers and short, broad, bluish-green leaves with strong spines. Fruit cylindrical, very large, being commonly from six to ten pounds in weight, deep yellow, pips large and flat. Flesh yellow, tender, juicy, and richly flavoured.

Enville.—A variety with lilac flowers and tall conical fruit six or seven pounds in weight, in colour a reddish-orange, pips medium-sized and pointed. Flesh pale, without much fibre, sweet, and rich, but scarcely so highly flavoured as the *Queen* and some other kinds.

Lemon Queen (*Barbadoes Queen*).—This variety has large lilac flowers. Fruit cylindrical, medium to large, pale lemon colour, and pips rather above the medium size. Flesh pale yellow, transparent, juicy, sweet, but not so highly flavoured as some other varieties

Monsterat (*Brazil, New Ripley, St. Vincent's Cockscomb*).—A purple flowered variety with medium-sized cylindrical orange coloured fruit with a copper tinge. Pips medium size. Flesh solid, lemon coloured, semi-transparent, slightly stringy, juicy, sweet, but also has a sub-acid flavour.

Providence (*White Providence*).—An old and popular variety with large fruit varying from cylindrical to oval, which often attains a

weight of twelve to fourteen pounds. Flowers dark purple, fruit reddish-yellow, pips very large. Flesh very pale, solid, juicy, and melting, but somewhat poor in flavour.

Queen (*Common Queen*, *Old Queen*).—This is one of the most useful and popular varieties, as it matures early, is comparatively hardy, and is considered to be one of the best kinds for summer crops. Flowers lilac, leaves long and smooth with very few spines. Fruit cylindrical, weighing from five to ten pounds, deep orange, pips rather small but prominent. Flesh pale yellow, slightly fibrous, very juicy, sweet, and richly flavoured.

Ripley (*Old Ripley*).—An old and popular variety with purple flowers. Fruit moderately large, ranging from cylindrical to ovate, in colour a pale copper, and pips above medium size. Flesh pale yellow, firm, crisp, juicy, very sweet, and highly flavoured.

Ripley Queen.—This is a sub-variety of the *Queen*, and the fruit is similar in appearance and quality, but the leaves are somewhat broader.

Rough-leaved Cayenne (*Prickly Cayenne*).—A variety with lilac flowers and long leaves thickly covered with strong spines. Fruit large, weighing from six to eight pounds, cylindrical, tapering a little towards the crown, dark orange, with light pips. Flesh pale yellow, not very juicy, but well flavoured.

Smooth-leaved Cayenne.—An excellent and popular variety, and considered to be one of the best Pines for winter crops. Fruit pyramidal, large, weighing from seven to ten pounds, deep orange, with pips large and flat. Flesh pale yellow, juicy, sweet, and highly flavoured. Flowers purple, and leaves long and smooth with very few spines.

Trinidad (*Pitch Lake*).—This variety has tall, showy, and very large fruit, which has been grown over twenty pounds in weight. Fruit conical, deep orange, with large roundish pips. Flesh yellow, melting, and sweet, with a rich and pleasant flavour.

PIQUILLIN.

This is the vernacular name in South America for the fruit of *Condalia microphylla* (*Zizyphus microphylla*), a small evergreen shrub belonging to the order Rhamnaceæ. It is indigenous to Chili and other parts of South America in the medium cool regions. The fruit is the size of a Cherry, succulent, and when fully ripe has a sweet pleasant flavour. In its native regions it is well appreciated when eaten fresh, and it is also utilized when dried. The Piquillin may be cultivated successfully in those parts of Australasia where there is no trouble from frosts, as also in medium warm regions, either as a fruit plant or ornamental shrub. It will thrive in any ordinary good soil, but prefers an open sandy loam. Propagation may be effected by seeds, which should be planted about an inch deep. Plants can be easily obtained from layers, and cuttings from ripened wood of the

current season's growth will strike freely in sand or light soil if protected from the weather.

PISTACHIO NUT.

History and Uses.

The Nut bearing this name is the product of a deciduous tree known botanically as *Pistacia vera*, which belongs to the natural order *Anacardiaceæ*, or the Cashew Nut family. It is indigenous to Syria and Persia, but has from an early period been largely grown in France, Italy, Spain, and other countries of Southern Europe. The Nuts, which are freely produced, are enclosed in a reddish pulp, and contain greenish oily Almond-like kernels, which are sweet and agreeably flavoured. These Nuts are extensively used in Europe in cookery and confectionery in the same way as sweet Almonds, and their flavour is greatly appreciated. The trees are robust, and will often attain a height of thirty feet or more when growing under favourable conditions. They are also fairly hardy, and will thrive in regions where the frosts are not very severe.

Cultivation.

In Australasia the tree may be grown to perfection in all but the very cold districts, and its cultivation ought to prove profitable, as the Nut, being a good substitute for the Almond, and possessing a distinct flavour of its own, must necessarily be in great demand by confectioners. It may be grown successfully in any fairly good land that is not too wet, and it will adapt itself readily to various localities. Being a tree with very handsome dense foliage, it is valuable for ornamental purposes, and may be planted with advantage in parks or shrubberies. The Pistachio is also a serviceable tree for street planting, and may be used for this purpose with advantage in many localities.

Propagation.

Propagation is effected by seeds, layers, and cuttings. Plants can readily be obtained from seeds, provided they are fresh, but if old they have less vitality. They should be sown in a light rich soil, covering them to the depth of an inch. When large enough to handle, the young plants should be transplanted in rows, or potted off. The following season they will be ready to plant out. Layers strike freely if put down in the spring, and yield very good plants. Cuttings will also root readily if taken off just before the spring and inserted in sand.

PLUM.

History.

The Plum is known botanically as *Prunus*, and belongs to the natural

order *Rosaceæ*, which embraces so many of our cultivated fruits. *Prunus* comes from *prune*, the Greek name of the fruit. As to the origin of the English name there are no records, but probably it is derived in some way from *Prunus*. The principal varieties now in cultivation are supposed to have originated from *Prunus domestica*, a species indigenous to the United Kingdom and the greater portion of Europe and Northern Asia. In its wild state this species is a low-growing tree thickly covered with sharp strong spines, and producing small astringent fruit, which is very different in many respects to that of the cultivated varieties. *Prunus insititia*, a species indigenous to Great Britain (where it is commonly known as the Bullace), but also found in many other parts of Europe, is supposed to be the source of the Damson. The original species bears small round black fruit, which possesses a sharp astringent flavour. There are, however, sub-species which bear green or pale yellow fruit, which is larger and more palatable than that produced by the original type. Though generally admitted to be a distinct species, yet some botanists affirm that it is merely a variety of *Prunus domestica*. The Cherry Plum is *Prunus myrobalana* (*Prunus cerasifera*), also generally classed as a distinct species, though some botanists maintain that it is a variety of *Prunus domestica*. *Prunus spinosa*, a dwarf bushy species indigenous to the United Kingdom, and common to many parts of Europe, is the Sloe or Blackthorn. It includes several sub-species, all of which are thickly covered with spines, and bear small Plum-like fruit which is intensely astringent.

Among other species yielding edible fruits that may be classed as Plums are the following :—*Prunus Americana*, a species indigenous from Canada to Mexico, growing from ten to fifteen feet high. The fruit is roundish-oval, small, thick-skinned, and includes both red and yellow varieties, which are known in America as the Wild Red, or Yellow, Plum, also as the Canada Plum. Flesh juicy, with a pleasant sub-acid flavour. *Prunus Bokharensis*, a species indigenous to Bokhara and Afghanistan, yields a medium-sized fruit known as the Bokhara Plum, large quantities of which are sun dried and sent to India. *Prunus chicasa* (*Prunus angustifolia*), a species indigenous to the southern portion of the United States from Arkansas to Texas, is known as the Chickasaw Plum. The fruit is round, about three-quarters of an inch in diameter, thin skinned, and ranges in colour from red to reddish-orange. Flesh juicy and pleasantly sub-acid. This species has foliage somewhat like the Peach, and varies in height according to locality from a low shrub of three or four feet to a small tree of twelve to fourteen feet. *Prunus demissa*, a species indigenous to Utah and California, is known as the Utah Plum. It is a shrub, and bears in great abundance small and somewhat harsh acid fruit. *Prunus maritima*, a low straggling shrub indigenous to eastern North America, where it is mostly found near the sea coast, is known as the Beach Plum and also as the Sand Plum. The fruit is roundish, about an inch in diameter, and in colour ranges from red to purple. The fruit is juicy but somewhat austere in flavour, though it makes a good preserve. *Prunus Simoni*, a Chinese species, yields a fruit of good quality known as the Apricot Plum. *Prunus subcordata*, a

species indigenous to California and other parts of North West America, a shrub growing ten or twelve feet high, yields a palatable fruit that is utilized to a great extent in its native regions. There are two varieties, one having round yellow fruit the size of large Cherries, and the other has fruit in form and colour similar to Damsons.

There is no certainty as to when the Plum first became a cultivated fruit, but probably the earliest improved varieties originated in Western Asia, as the fruit appears to have been well known to the ancient Persians, Syrians, and Egyptians. Afterwards it appears to have become very popular with the Greeks and Romans. As regards its use by the last-named nation, Pliny informs us that in his time a great many varieties were known. The Damson, or Damascene Plum as it was originally called, as its name implies, originated in Damascus, and is the earliest kind on record. It is said to have been introduced to Italy about a hundred years before the Christian era. For its medicinal qualities the wild Plum was held in high repute by Greeks and Romans, who were in the habit of using the bark of the tree as an astringent in cases of intermittent fever.

Plums of various kinds appear to have become common in England about the middle of the fifteenth century, most of them having been introduced from France, Italy, and other parts of Southern Europe. One of the earliest introductions was the well-known Orleans Plum, a French variety still held in high repute. The popular Green Gage was also introduced from France, where it was known under the name of Reine Claude, but it is supposed to have originated in Greece. This variety is said to have been taken to England towards the end of the last century, along with a number of other trees, by Sir Thomas Gage. It so happened that this particular Plum tree had lost its name, and when, in time, it fruited, the gardener christened it Green Gage in allusion to its colour and in honour of his employer. Some authorities, however, assert that the Green Gage was known in England at a much earlier period, though under another name.

Uses.

The Plum is an excellent dessert fruit, though it is not so extensively used for this purpose as some other kinds, as it is commonly supposed to cause indigestion and flatulence. The fruit is, however, perfectly wholesome if eaten in moderate quantities and when fully ripe. The skin of the Plum is very indigestible, and should never be eaten, and more especially by persons who have weak stomachs or are otherwise out of health. For culinary purposes Plums are extensively used, and large quantities are preserved in various ways. The Plum is considered to be, when cooked, a very wholesome fruit. Medicinally it is mildly laxative, and has a purifying effect upon the blood. For canning there is now a considerable demand for Plums, and this mode of preserving is increasing in popularity. Fruit preserved by this method will keep for any length of time, and is available for use at periods of the year when the fresh Plums are out of season. The canning process will also allow our

growers to open up an export trade after our home wants are supplied. For preserving in the form of jam Plums are very extensively used, and more so than any other fruit. The drying of Plums is an important industry in some parts of Europe, and more especially in France and Italy, where the fruit forms an important article of commerce under the names of Prunes and Prunellas. Several kinds of Plums are used for these purposes, the most suitable being those that have firm fleshy fruit and hang long upon the trees. There is some difference in the methods of drying in different districts, but only in details, and in the main the practice is uniform. Culinary Plums may also be preserved by simply splitting the fruit, removing the stones, and exposing the halves to the action of the sun, the cut side uppermost. Fruit preserved in this way will retain its original flavour, and when carefully prepared and packed will keep for years. The fruit may also be dried by means of artificial evaporators, and when large quantities have to be treated, this method will generally prove more effective and economical.

The juice of the Plum when fermented makes a very palatable wine, and by distillation yields a good spirit. Large quantities of fruit are utilized in this way in some parts of Europe. Any kind of Plums can be used for these purposes, but those having plenty of juice and containing a large proportion of saccharine will yield the best returns. Damsons are largely used in making wine or spirit, and the juice is sometimes employed for colouring or flavouring cheese, which is known as "Damson cheese." The fruit of the Sloe is in Europe often made into a conserve with sugar, and formerly the juice was extensively used in the adulteration of port wine. The leaves of the Sloe were also used extensively formerly in the adulteration of tea. Medicinally the unripe fruit and leaves of all the species contain prussic acid in large proportions, but the *Prunus spinosa* (Sloe) family to a greater extent than the others. The bark of the Plum tree, which is very astringent, is sometimes used medicinally, but to a greater extent formerly than now. From the bark of the wild *Prunus domestica* a good yellow dye for woollens is obtained, while *Prunus spinosa* yields a red colouring material. The wood of all the species of Plums is fine-grained, hard, and durable, and though not attaining a great size is extensively used by European cabinetmakers, and in the manufacture of musical instruments.

Preparation of the Soil and Planting.

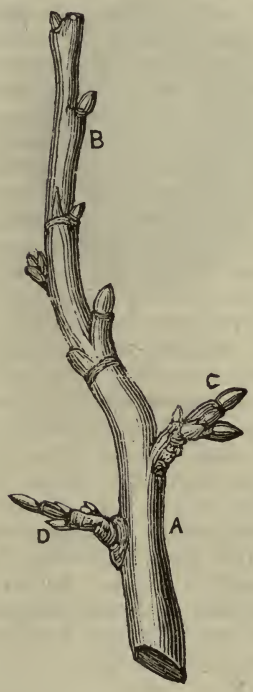
Plums are very hardy trees, and may be grown successfully under various local conditions and in most parts of Australasia, excepting tropical regions. They are likely to thrive best, however, in a moderately cool climate when planted in a deep rich loamy soil. The land should be deeply worked, and more especially if the soil is heavy, as a good root-bed is essential. Drainage must be provided for when necessary, as a wet retentive soil is uncongenial to the trees. Trees should be planted not less than twenty-four feet apart in order to allow ample room for development. As, however, it will be some time before they require the whole of this space, it is a good plan to plant intermediate temporary

trees of either Plums or other fruits, to be removed when necessary. These temporary trees assist in utilizing the land, and act as nurses to the others. Planting may be done at any time between the fall of the leaf till the spring growth commences, but the most favourable period is from the beginning of July to the first week in August, according to the locality. Strong straight-stemmed young trees should be selected, and these ought to have well-formed heads, and roots in proportion.

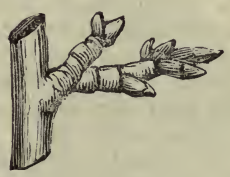
Training and Pruning.

Trees should invariably be trained with low heads, as tall specimens suffer more from strong winds than short ones. Low-headed trees also afford a better shade for the stems, and give greater facilities for gathering the fruit and pruning. Young trees will require more attention in pruning than old ones, as their branches must be thinned out and

Branches of the Plum.



(*A*) Two year old wood. (*B*) One year old wood. (*C* and *D*) Fruit spurs.



Fruit Spur upon older wood.

shortened back according to their special requirements in order to promote a strong growth of wood and get the heads into the desired form as quickly as possible. Mature trees will require but little pruning as a rule, all that is necessary being the removal of misplaced and diseased wood or rank shoots, and thinning out the branches when the heads get too crowded. Too frequently Plum trees are pruned more heavily than is necessary, and more harm than good is done. The necessity for winter pruning may in a large measure be avoided by disbudding or removing surplus shoots early in the summer before growth has made much headway. This practice is specially to be commended in the case of young trees. Very frequently, owing to local circumstances such as a very rich soil, the too free use of manure, or the

nature of the variety, trees will have a tendency to make an over-luxuriant growth of wood, and at the same time they produce but little fruit. In such cases root pruning is likely to prove the most effective remedy. For detailed directions for root pruning, see article upon the Apple in volume 1.

Propagation.

Propagation may be effected by various means, including seeds, cuttings, layers, suckers, budding, and grafting. Seeds are, as a matter of course, the only means by which new varieties can be obtained. Seedlings are also raised in large quantities for stocks, and the Cherry Plum is in great demand for this purpose. Some growers object to seedling stocks as being too vigorous and having a tendency to throw up suckers. Those who hold this opinion prefer stocks that are raised from layers or cuttings, the varieties most generally used in this part of the world being the Julian for free-growing stocks, and the Muscle for those that are less robust. The Cherry Plum is also a favourite stock, as it throws suckers less freely than some kinds. A variety known as the French Cherry Plum is preferred by many to the common kind. As in the case of other fruits, there can be no doubt about seedlings affording the most durable and thrifty stocks. They must, however, be raised from such kinds as are likely to prove suitable for the varieties worked upon them Varieties differ very considerably in their habits, and seedlings from very strong ones are likely to make over-vigorous stocks for less robust sorts. When this is the case suckers are produced freely, and in all probability the fruitfulness of the trees and the quality of the fruit are often materially affected through lack of congeniality between the stock and the scion. There ought to be no great difficulty in raising seedling stocks that will be in sympathy with the varieties worked upon them. Varieties are most generally perpetuated by budding, and this operation may be performed at any time during the growing season, when the bark will rise freely from the wood, but, as a rule, the most favourable time is soon after mid-summer. Grafting is less practised than budding, and may be done just before growth commences in the spring. As to the relative merits of the various stocks opinions vary considerably, but the writer considers that under ordinary circumstances the Plum should have the preference, as likely to give the most durable trees. Then, again, the Cherry Plum seems to offer greater advantages than other kinds for ordinary purposes, and more especially in light sandy soils. In America the Canada Plum (*Prunus Americana*) is used successfully as a dwarfing stock for poor, stiff, and wet soils, and may, if tried, prove serviceable in Australasia. The Peach makes a fairly good stock in dry hot districts, though the trees are not likely to be so long-lived as if worked upon Cherry Plums. The Almond is also a very good stock for dry districts, and more especially in soils containing a large proportion of lime.

Injurious Insects.

The Plum often suffers from the attacks of various insects, and these

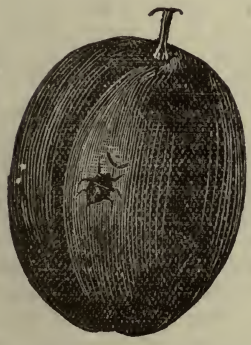
should be kept under as much as possible by the prompt use of remedies as soon as they make their appearance. The more troublesome of these pests are as follows:—

Aphides.—Various species attack the trees and cause more or less damage, the most prominent being known as the Plum Aphis (*Aphis prunifolia*), a small dark-coloured fly. For remedies see article upon the Orange, page 181, and volume 1, pages 90 to 102.

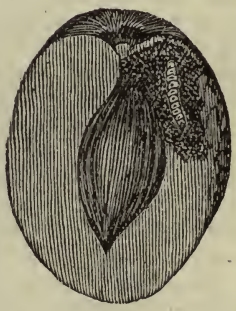
Borers.—Plum trees are liable to the attacks of the Elephant and other beetles of the Weevil family, which, in their larval stage, bore into the branches, stems, or roots. For treatment see page 181, and volume 1, pages 88 and 89.

Curculio (*Cenotrachelus nenuphar*, *Rynchænus nenuphar*).—This insect, which belongs to the Weevil family, is very destructive in America and Europe, but so far it has not proved specially troublesome in Australasia. It particularly affects Plums, but it also attacks, though to a less extent,

CURCULIO.



Fruit showing Insect depositing its Egg. (Natural Size).



Fruit showing Larva working. (Natural Size).

Larva (Slightly Magnified).

Pupa (Magnified).

Perfect Insect (Magnified).

Apricots, Peaches, Cherries, Apples. Pears, and Quinces. The perfect insect is a small dark brown beetle about a-quarter of an inch in length, the sheaths covering the wings being slightly marked with a lighter

colour. The female makes a hole in the fruit, deposits a single egg, and then forms a crescent-shaped slit below it. The work of the insect is easily detected by these crescent slits. Each female lays from fifty to a hundred eggs, and deposits from five to ten per day. The larvæ when hatched resemble small glossy yellowish-white maggots with reddish-brown underneath and pale brown heads. When fully grown the larvæ desert the fruit, which usually falls prematurely, and penetrate the ground to the depth of a few inches, and remain till they reach the perfect state. The perfect beetle feeds both upon the fruit and leaves, as also upon the young bark. The period at which the fruit falls after being punctured depends upon its age at the time it is attacked. Young fruit will generally drop in ten days or a fortnight after it is punctured, but if not attacked till the stone has hardened, it may remain upon the tree till nearly the ordinary period. Sometimes it will ripen with a sound appearance, but is spoiled by the grub inside. The Curculio travels by flying, but only on warm bright days. As a rule the beetles confine themselves to the same trees or others near to them, but sometimes they are carried half a mile or more by strong winds, and thus spread to fresh orchards. When in flight they usually travel within a few feet of the ground, and they have been successfully kept from fruit gardens by means of fine wire nettings fixed to the height of nine or ten feet upon fences.

Remedies:—These are various, but some merely repel and do not destroy the insects. Spraying with Tobacco Water, Lime Water, and Salt and Water while the fruit is small belong to the first-named class of remedies. The most effective way of dealing with the pest is to collect the perfect insects by jarring the trees under which sheets have been spread. The best time for this operation is in the cool of the morning, when the insects are somewhat torpid and fall easily. Jarring should be effected by a smart blow from a hammer or mallet, placing a piece of board between to prevent injury to the bark. The sheets must then be gathered up carefully, and the insects destroyed. Fallen fruit from affected trees should be promptly gathered up and fed to pigs, or destroyed, in order to kill the larvæ. When practicable it is a good plan to let pigs have the run of an affected orchard, as they quickly pick up the fallen fruit. Geese and fowls also effect the same object, but to a more limited extent.

Scale.—Various kinds of Scale insects will attack Plum trees, the worst being the Apricot Scale (*Lecanium pruniosum*), Black or Olive Scale (*Lecanium olea*), and the Pernicious Scale (*Aspidiotus perniciosus*). For descriptions of Scale insects and their treatment see pages 185 and 187, also page 84, volume 1.

Various Other Insects.—*Mealy Bug*, *Red Spider*, and *Thrips* are often troublesome to Plum trees. For descriptions of these pests and their remedies see pages 80, 82, and 84, volume 1.

Injurious Fungi.

Various species of fungi are more or less injurious to the Plum, though

generally speaking this fruit does not suffer to the same extent from these evils as the Peach and some other kinds. The more troublesome kinds are as follows :—

Mildew —Plum trees are liable to various forms of Mildew, some of which affect the roots, and others the young wood, foliage, or fruit. The causes are invariably local, and when these are removed and remedies applied promptly there will be no difficulty in effecting a cure. For further information see page 231 and also article upon Mildew, page 91, volume 1.

Root Fungus.—Trees often suffer from the attacks of fungi at the roots, owing generally to local predisposing causes, which are various. For further information and remedies see article upon the Peach, page 231.

Rust.—This fungus causes serious injury to the foliage of Plum trees in many localities, and is widely spread throughout the Australasian colonies, as also in Europe and America. It is identical with the fungus known as Peach Rust, which is fully described at page 231 in a special article which also gives directions for treatment.

Diseases.

The Plum, like many other trees, is liable to various diseases, which often cause serious injury. Our knowledge respecting these diseases is by no means so perfect as could be desired, and there is a wide field open for careful investigation and experiment. The more prominent and common diseases are as follows :—

Canker.—For a full description of this disease, its causes, and treatment see the special article upon Canker, page 93, volume 1.

Gumming.—Full particulars respecting this troublesome disease will be found in the special article upon Gumming, page 94, volume 1.

Leaf Galls.—Sometimes the foliage of Plum trees suffers to some extent from this disease. full particulars respecting which will be found in a special article upon Leaf Galls, page 95, volume 1.

Silver Disease.—This name has been given in New Zealand to a destructive disease that is causing some trouble to the fruit growers of that colony, but has not, so far as the writer is aware, been discovered in other parts of Australasia. The attention of the writer of this work has been drawn to this disease by Mr. J. C. Blackmore, the New Zealand Government Pomologist, who describes it as the worst evil with which he has to contend. He also says that it is spreading rapidly and has extended to many districts, not confining its attacks to the Plum as at first. but also affecting the Apple, Apricot, Cherry, Peach, and Nectarine. The disease makes its appearance in the spring soon after the leaves are developed, sometimes affecting a solitary branch and at others many. Its appearance is made known by the foliage having a lighter colour than usual, and as the season advances the leaves gradually assume a lustrous silvery appearance, hence the name Silver Disease. Leaves affected by this disease are unable to perform their proper functions, and, consequently, the growth of the trees is checked. From the leaves the disease extends

to the wood of the branches, which become discoloured and dry, and invariably die off soon after growth commences in the following season. The real nature of this disease and its causes are at present unknown, and possibly it may long be classed among the many mysterious evils with which cultivators have to contend. In the opinion of the writer there is some affinity between this disease and the Peach Yellows described at page 233, the symptoms and effects being very similar. If so the better plan is to root out affected trees and destroy them, as the injuries are radical and cannot be cured. If, however, the disease is of fungoid origin, as it may be, spraying with Sulphate of Iron, Bluestone and Ammonia, or similar fungicides will prove beneficial.

Gathering and Packing.

Plums attain the highest degree of perfection when allowed to get thoroughly ripe upon the trees, as then only is their flavour fully developed. Consequently, when required for dessert or drying, they should be allowed, as far as is practicable, to ripen fully before they are gathered. Sometimes, however, when required for a distant market it will be necessary to gather the fruit somewhat early. When required for cooking or jam it is not necessary to wait till the fruit gets fully ripe, and the Plums may be gathered as soon as they are fairly coloured and moderately soft. In sending to market the Plums should be uniform in size, and closely packed in the cases so that they will not shift. Though Plums as a rule are not suitable for storing, yet several of the late kinds may be preserved in good condition for a few weeks. These should be arranged upon shelves in single layers in a dark room or cellar where the temperature is medium low and regular. If wrapped singly in tissue paper they may be kept still longer if required.

Making Prunes.

The fruit must be thoroughly ripe before it is gathered, as then it is richest in saccharine, which is essential to a full and luscious flavour. It is advisable to let it hang upon the trees till it begins to shrivel, and some growers allow the fruit to remain till it drops off. When this plan is adopted it is customary to place straw, grass, &c. under the trees to prevent bruising, which is injurious to the fruit. This plan has its drawbacks, as the process of harvesting is slow, and gathering up the fallen fruit is tedious and laborious. It is a better plan to place sheets under the trees and jar the branches as soon as the fruit is sufficiently ripe. This process may be repeated daily or every second day till the crop is secured. If gathered by hand it will be advisable to go over the trees several times in order to secure the crop in the best possible condition. In France the common mode of drying is, after the fruit is gathered, to spread it out in trays of wood or wickerwork and expose for about two days to the sun till it becomes soft. The trays are then placed in a baker's oven heated to from a hundred and five to a hundred and twenty degrees Fah. and allowed to remain for two hours. The fruit is

then allowed to cool, is turned on the trays, and subjected to another heating of a hundred and forty to a hundred and forty-five degrees. The process of cooling and turning is again repeated, and then a third and final heating is given, this time the temperature being raised to about a hundred and seventy degrees. This method is practised generally by the smaller growers in France, but of late years the larger and more enterprising manufacturers make use of evaporators, which do the work more effectively, rapidly, and at far less cost for labour. In some parts of Europe and generally in California, sun drying is the common method of making Prunes. The fruit, when gathered, is usually graded, or sorted into various sizes, as the work of drying is facilitated when each tray contains Plums uniform in size and quality. Special grading machines are in use in America, but the work can be fairly well performed by passing the fruit over a slightly inclined plane with openings or slots of varying width at intervals, through which the Plums drop according to their size. The fruit may also be quickly graded by passing it through trays of wire netting with meshes of various widths. In Californian practice, before the fruit is placed upon the drying trays it is dipped for half a minute in a boiling hot solution of one pound of concentrated lye and ten gallons of water. The object of this dipping is to remove the bloom and at the same time slightly crack the skins and facilitate the work of drying. Great care must be taken not to immerse the fruit longer than the time mentioned, as otherwise the skins will crack too much, and there will be a loss of sugar. When dipped the fruit should be placed in baskets, boxes, or buckets with open wire bottoms or sides. After the fruit has been dipped it should be thoroughly rinsed in cold water to remove traces of the lye, and then spread out upon the drying trays. The time required for drying will necessarily depend upon the size of the Plums and the weather, and may vary from a week to a month. When the fruit has been sufficiently dried, it should be placed in bins or boxes to slightly ferment, or "sweat," for about a fortnight. During this process the fruit should be turned and mixed frequently by shifting from one box to another, in order to prevent over-strong fermentation and cause evenness in quality. When sufficiently sweated the fruit is dipped a second time in boiling water—plain or with the addition of glucose glycerine, salt, or colouring matter. The object of the dipping is to kill any insect or fungoid germs, and the various additions are supposed to deepen the colour and give a gloss to the fruit. After the second dipping the fruit is again spread upon the trays and exposed to the sun for two or three hours, when it will be ready for packing. In packing care should be taken that when the cases are opened the fruit will appear to the best advantage. The boxes should be carefully lined with white paper, and the top layer of the fruit ought to be nicely faced, or flattened. This facing can be readily effected by flattening some of the fruit between rollers and placing it regularly at the bottom of the boxes. These are then filled tightly and fastened so that when opened out the part first filled will be the top of the box. The boxes ought to be uniform in shape and size, and should be made to hold ten, twenty-five, and fifty pounds respectively. As regards size, the first grade will be Prunes that

go from thirty-five to forty to the pound, second grade, forty to fifty, third grade, fifty to sixty, fourth grade, sixty to seventy, fifth grade, seventy to eighty.

Selection of Varieties.

There is a vast number of Plums in cultivation, and European catalogues contain the names of several hundred varieties Within the present century a great deal has been done in the way of raising new varieties, many of which are greatly superior to a number of the older kinds. English and French raisers have for many years vied with each other in the production of new and choice kinds, and other European countries have contributed to the list. We have also to thank American raisers for some of our choicest and most popular Plums. Australasian catalogues contain lists of all the best-known varieties, which are so numerous as often to cause trouble in making a selection. Planters in making a selection should duly consider the purposes they have in view, and choose accordingly. For dessert Plums the requirements are juiciness, with a rich or luscious flavour. It is also advisable to have a due proportion of early, medium, and late varieties, so as to keep up a supply for as long a period as possible. For culinary purposes those varieties are best that have a brisk sub-acid flavour. If wanted for canning or drying, the kinds selected should be those whose fruit is fleshy and has a tough fibre. For making Prunes particular kinds should also be chosen. But for whatever purpose the fruit may be required, growers will do well not to have too many varieties, as a few well-selected kinds will give more satisfaction than a large number.

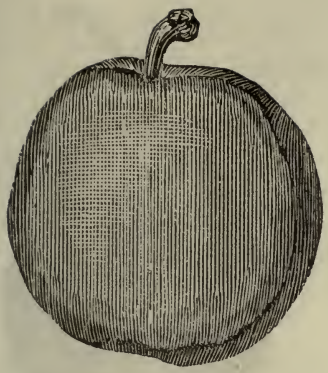
Varieties.

The following list embraces most of the more prominent and desirable varieties, and will afford an ample selection for all practical purposes:—

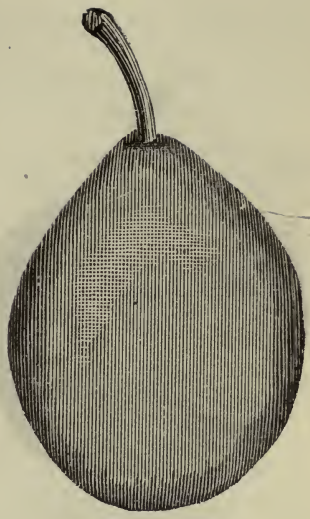
Angelina Burdett.—An excellent English dessert variety which ripens medium early. Fruit round, above medium size. Skin thick, dark purple, covered thickly with brown dots and a heavy bloom. Flesh yellowish, juicy, highly flavoured, and separates freely from the stone. Fruit will hang on the trees till it shrivels up, when its flavour is very rich. Tree hardy, robust, and prolific. Suitable for drying.

Autumn Compôte.—This is an excellent culinary Plum, raised in England by the late Mr. Rivers, which ripens about mid-season. Fruit oval and very large. Skin yellow and deep bright red. Flesh yellow, a little coarse, juicy, pleasantly sub-acid, and adheres to the stone. Tree vigorous and fairly productive. This is an excellent variety for preserving and drying.

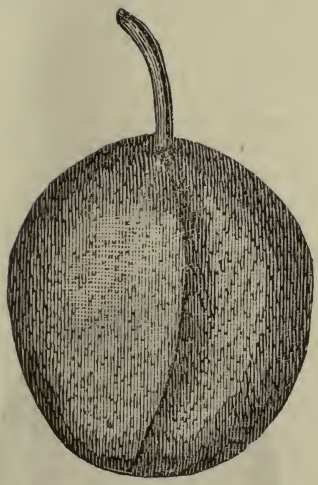
Belgian Purple.—A Belgian variety, with roundish-oval fruit, rather above medium size, which ripens a little before mid-season. Skin deep purple, with a thick bloom. Flesh greenish-yellow, rather coarse, very juicy, sugary, and adheres slightly to the stone. Tree strong and prolific. This is one of the best varieties for cooking and preserving.



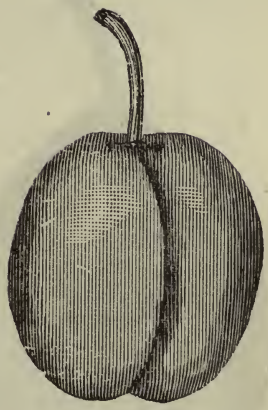
Angelina Burdett.



Autumn Compôte.

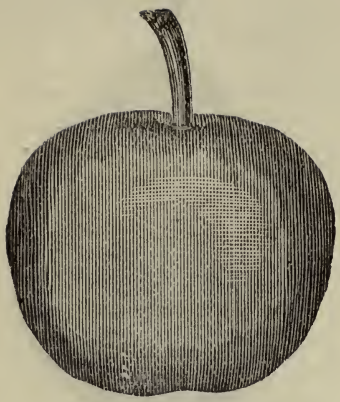


Belle de Septembre.

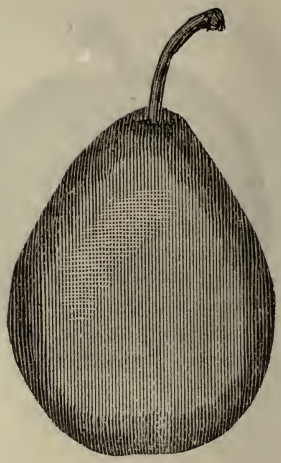


Belgian Purple.

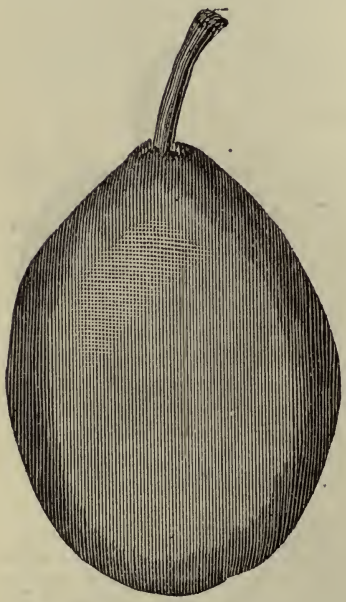
Belle de Septembre (*Autumn Beauty, Van Mons Red*).—Another useful Belgian variety, with large roundish-oval fruit, which ripens about mid-season. Skin thin, light reddish-purple, with small yellow dots. Flesh yellow, firm, juicy, sweet, vinous, and adheres slightly to the stone.



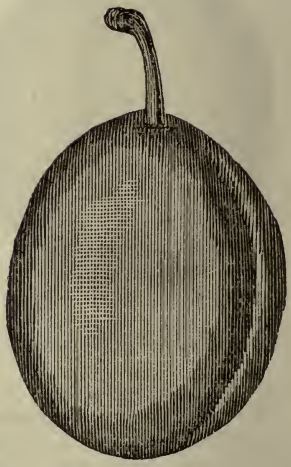
Brahy's Green Gage.



Blue Impératrice.



Coe's Golden Drop.



Blue Perdigon.

Tree vigorous and a very free bearer. This is a first-class culinary and preserving variety.

Blue Superb.—An excellent late variety raised in Victoria by the late Mr. T. C. Cole. Fruit large, bluish-violet, with a thin bloom. Flesh greenish-yellow, juicy, with a rich flavour.

Botan.—A Japanese variety of upright habit, strong growth, and very prolific. Fruit medium-sized, roundish, a dull yellowish-red. Flesh sweet, juicy, and richly flavoured.

Brahy's Green Gage (*Reine Claude de Brahy*).—A useful medium early Plum of the Green Gage class with very large fruit. Skin thin, greenish-yellow. Flesh greenish-yellow, sugary, rich, and adhering slightly to the stone. An excellent dessert variety. Tree vigorous and productive.

Bryanston's Green Gage.—A variety similar in all respects to the ordinary Green Gage with the exception that it ripens ten to twelve days later.

Blue Impératrice (*Impératrice Eugenia*).—An excellent late Plum of French origin with medium-sized obtuse-oval fruit. Skin deep purple, with a thick bloom. Flesh greenish-yellow, rather firm, not very juicy, rich, sugary, and adhering to the stone. Tree strong and prolific. This is an excellent Plum for the dessert or preserving, and is suitable for drying. It will hang on the trees till it shrivels, can be kept some time after it is gathered, and carries well.

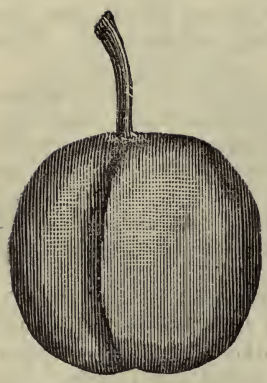
Blue Perdrigon.—An old and reputable variety of Italian origin, with medium-sized oval fruit, which ripens early. Skin reddish-purple, with small yellow dots. Flesh greenish-yellow, firm, sugary, richly flavoured, and adhering to the stone. Tree somewhat tender, but bears freely. This is a good Plum for the dessert or preserving, and is suitable for drying.

Burbank.—A strong and very prolific Japanese variety of upright habit. Fruit almost globular, from one and a-half to two inches in diameter, cherry red, mottled and dotted. Flesh sweet, juicy, with a pleasant but peculiar flavour. Stone very small.

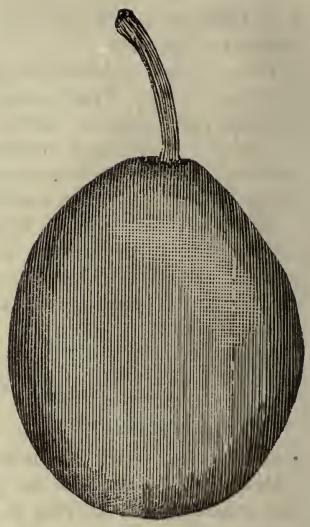
Chabot.—A vigorous and prolific Japanese variety. Fruit large, roundish, greenish-purple. Flesh firm, juicy, and well flavoured.

Cherry (*Early Scarlet, Miser Plum, Myrobalan, Virginian Cherry*).—This is a distinct species of Plum, known to botanists as *Prunus myrobalana*, which bears medium-sized round fruit that ripens before any other kind comes in. Skin deep bright red. Flesh greenish, very juicy, with but little flavour, and adhering to the stone. Chiefly used for cooking and preserving. Tree very robust, grows rapidly, and quickly attains a large size. Useful when planted as a breakwind for orchards, and often used as a stock for other Plums. There is a sub-variety with pale yellow fruit.

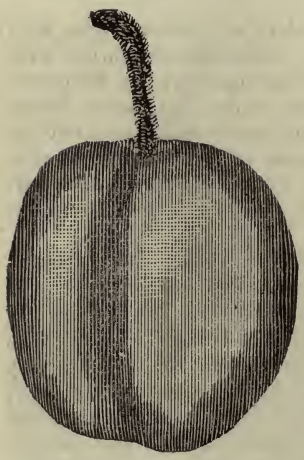
Coe's Golden Drop (*Golden Drop, Golden Gage*).—An old and favourite English variety with very large oval fruit, which ripens late. Skin pale yellow, with numerous dark red spots. Flesh deep yellow, rather firm, sugary, rich, and adhering to the stone. Tree vigorous and productive. This is an excellent Plum for the dessert, cooking, canning, and drying. Makes an excellent Prune.



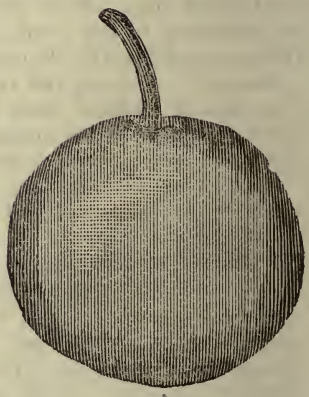
Coe's Late Red.



D'Agen.



De Montford.



Denniston's Superb.

Coe's Late Red (*St. Martin, St. Martin Rouge*).—A popular and well-known English variety with medium-sized roundish fruit, which ripens very late. Skin light purplish-red. Flesh yellowish, firm, flavour brisk, and separates freely from the stone. Tree robust and a very free bearer. This variety is valuable for its lateness. It will hang well after the fruit is ripe, and may be utilised for drying or cooking.

Czar.—A very popular English variety, a seedling from Prince Englebert, which it resembles somewhat, but is rounder. Fruit large, roundish-oval, dull blackish-red. Flesh yellowish, tender, juicy, and well flavoured. Ripens, early, and in England is considered to be one of the best culinary and market varieties.

D'Agen (*Burgundy Prune, Prune d'Agen, Prune d Ast, Prune d'Ente, St. Maurin*).—A French variety, with medium-sized oval fruit, which ripens rather late. Skin very deep purple, covered with a thick bloom. Flesh greenish-yellow, firm, sweet, rich, and adheres slightly to the stone. Tree of medium growth and very prolific. An excellent preserving and drying Plum, and largely used in France for making Prunes.

Denniston's Superb.—This is an excellent dessert Plum of American origin, belonging to the Green Gage family, with roundish slightly flattened fruit above the medium size, which ripens a little after mid-season. Skin pale yellowish-green, with blotches and dots of pale purple, and overspread with a thin bloom. Flesh firm, juicy, sugary, with a brisk flavour, and adheres to the stone, which is small. Tree very vigorous and productive. An excellent variety for the dessert, and also suitable for canning.

De Montford.—A useful French variety with medium-sized roundish-oval fruit, which ripens before mid-season. Skin dull purple, with russet dots and a thin bloom. Flesh greenish-yellow, juicy, sweet, rich, and separates freely from the stone. Tree moderately vigorous, rather inclined to spread, and very prolific. A drying Plum.

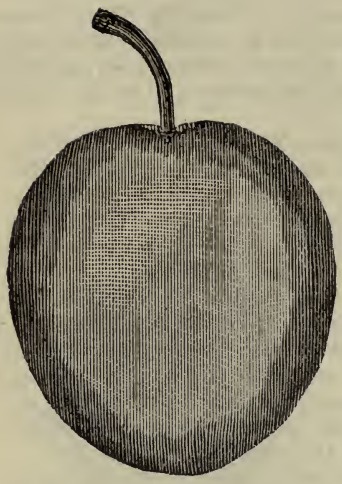
Diamond.—This is a well known and generally cultivated English Plum with large oval fruit, which ripens at mid-season. Skin very dark purple, thickly covered with bloom. Flesh deep yellow, moderately juicy, with a brisk sub-acid flavour, somewhat coarse, and separates from the stone, but not very freely. Tree hardy, robust, and a very heavy cropper. One of the best Plums for cooking and making jam.

Diaprée Rouge (*Diaper, Imperial Diadem, Red Diaper*),—A very good French variety with large oval fruit, which ripens a little after mid-season. Skin pale red, thickly covered with small brown dots and a thin bloom Flesh greenish-yellow, firm, moderately juicy, sugary, rich, and separates from the stone, but not very freely. Tree fairly robust and a very good bearer. This is a very good dessert Plum, and useful for canning.

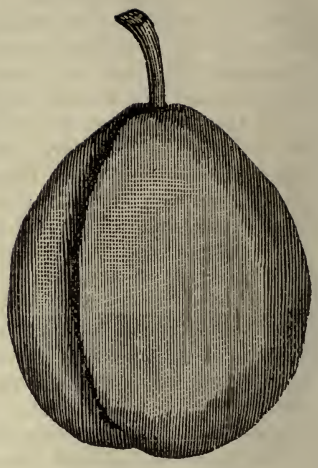
Drap d'Or (*Cloth of Gold, Mirabelle Gross, Yellow Damask, Yellow Perdrigon.*—This variety, which is supposed to be of French origin, has fruit similar in size and shape to the Green Gage, but differing in colour, and ripening about a week earlier. Skin thin, deep bright yellow, with numerous crimson specks. Flesh yellow, melting, with a rich sugary flavour, and separates freely from the stone. Tree moderately robust and a fairly good bearer.

Early Favourite (*Rivers Early Favourite, Rivers' No.* 1).—This is a very useful English Plum, raised by the late Mr. Rivers, with roundish-oval fruit below medium size, which ripens very early in the season. Skin very dark purple, dotted with russet, and covered with a thick bloom. Flesh greenish-yellow, juicy, sweet, vinous, and separates freely from the stone. Tree hardy, strong, and a good cropper.

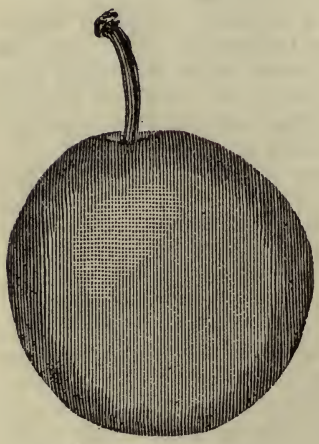
Early Green Gage (*Reine Claude Hâtive*).—A useful very early Plum



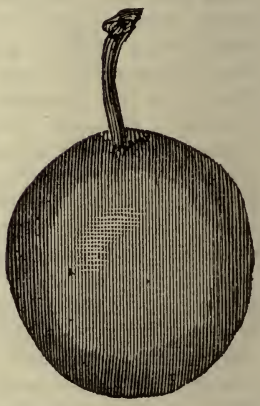
Diamond.



Diaprée Rouge.



Drap d'Or.



Early Favourite.

of the Green Gage class, supposed to be of French origin, with rather small round fruit. Skin yellowish-green, with a reddish cheek, and sprinkled with a few dots. Flesh yellow, very tender, juicy, sugary, richly flavoured, and separates freely from the stone. Tree fairly vigorous and prolific.

Early Mirabelle (*Mirabelle Précoce*).—This is a very early French variety with small round fruit. Skin golden yellow, with a few crimson dots. Flesh yellow, juicy, sweet, with a rich luscious flavour, and separates freely from the stone, which is very small. Tree vigorous and bears abundantly.

Early Orleans (*Grimwood's Orleans, Hampton Court, New Orleans, Wilmot's Orleans*).—This is a sub-variety of the common Orleans, which it resembles to some extent, but is somewhat richer in flavour, and ripens about a fortnight earlier. Tree moderately vigorous and bears fairly well. This is a useful culinary variety.

Early Rivers (*Early Prolific*).—A valuable English Plum with roundish-oval medium-sized fruit, which ripens very early. Skin deep purple, covered with a thin bloom. Flesh greenish-yellow, juicy, sweet, pleasantly sub-acid, and separates freely from the stone. Tree vigorous, very hardy, and a heavy bearer. This is one of the most valuable early Plums, and is useful for the dessert, cooking, and preserving.

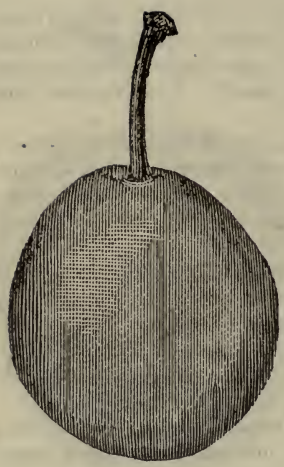
Fotheringham (*Fotheringay, Grove House Purple, Sheen*).—An old and popular English variety with medium-sized obovate fruit, which ripens early. Skin deep reddish-purple, with a thin bloom. Flesh pale greenish-yellow, firm, sugary, with a pleasant sub-acid flavour, and separates freely from the stone. Tree robust and prolific. This variety is useful for the dessert, culinary purposes, canning, and drying.

French Prune (*Saint Catherine*).—This is a very old and popular variety in France, where it is grown extensively in some districts for making Prunes. It is also greatly esteemed for the dessert and preserving. Fruit of medium size, obovate, narrowing considerably towards the stalk, and ripens about mid-season. Skin pale yellow, with a few red dots and a thin bloom. Flesh yellow, rather firm, juicy, rich, sugary, with a piquant flavour, and adheres slightly to the stone. Tree fairly vigorous and a good bearer.

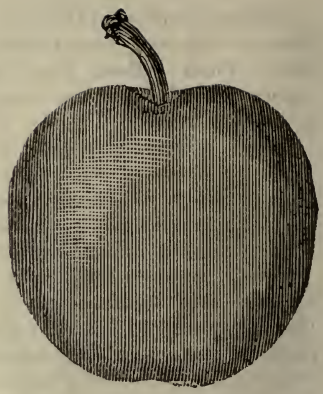
General Hand.—This is an excellent American preserving Plum with very large roundish-oval fruit, which ripens about mid-season. Skin deep golden yellow, slightly marbled with a lighter tint. Flesh pale yellow, firm, not very juicy, sweet, rather coarse, and separates freely from the stone. Tree very vigorous and prolific. This Plum is well suited for canning and drying.

General Saigo.—A Japanese variety with large fruit somewhat similar to an Apricot in appearance. Flesh rich and luscious, with a distinct flavour. Tree strong, hardy, and prolific.

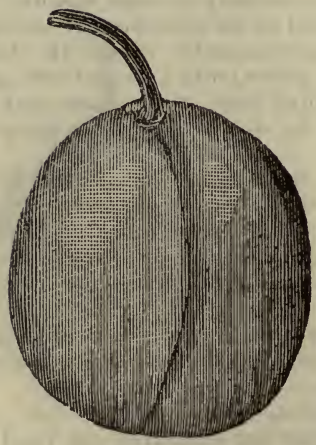
German Prune (*Damask, Early Russian, Quetsche, Sweet Prune*).—A variety of doubtful origin, but very popular and extensively cultivated in Germany and other parts of Central Europe. The fruit is long oval swollen on one side, and narrowing towards the stalk. It ripens a little after mid-season, and will hang till it begins to shrivel. Skin dark purple, slightly dotted with russet, and covered with a thick bloom. Flesh greenish-yellow, firm, moderately juicy, sweet, and piquant, separating freely from the stone, which is long and flat. Tree vigorous and an abundant bearer. This variety makes an excellent Prune, and is a good Plum for cooking and preserving.



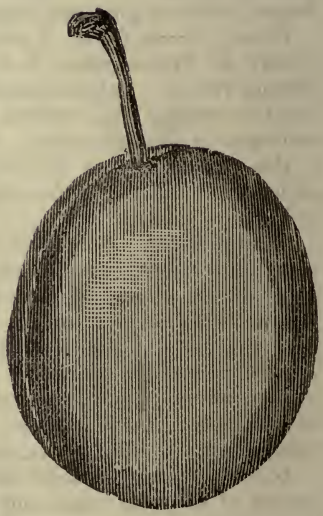
Early Rivers.



Fotheringham.

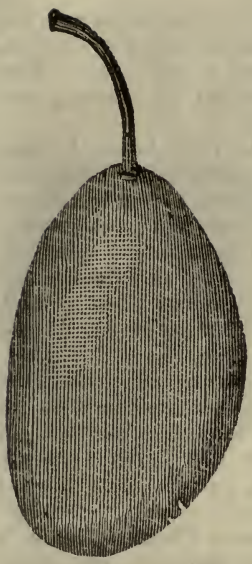


French Prune.

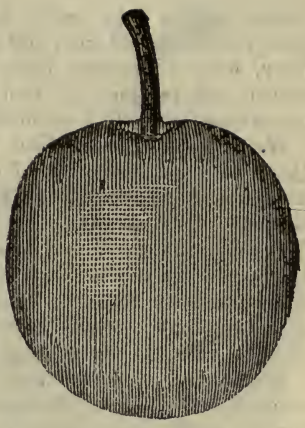


General Hand.

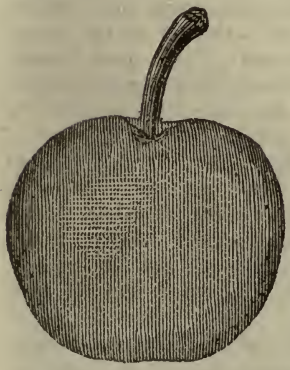
Golden Esperen.—An excellent American dessert variety with large roundish-oval fruit, which ripens at mid-season. Skin thin, golden-yellow, tinged and mottled with pale green, and slightly dotted with crimson. Flesh bright yellow, very juicy, with a rich sugary flavour, and



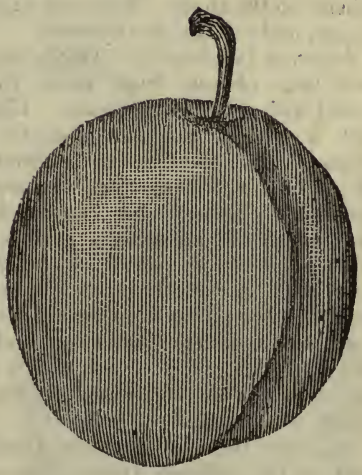
German Prune.



Golden Esperen.



Green Gage.



Goliath

separates freely from the stone. Tree of moderate growth, inclined to spread, and a very good bearer. This is a fine dessert Plum.

Goliath (*Caledonian, St. Cloud, Steers' Emperor, Wilmot's Late Orleans*). —This is an old and favourite English variety with roundish-oblong fruit,

which ripens a little before mid-season. Skin deep reddish-purple, but paler on the shaded side, and covered with a thin bloom. Flesh yellow, juicy, with a pleasant brisk flavour, and adheres to the stone. Tree robust and prolific. A fine showy Plum, excellent for cooking and preserving, but only a second-class dessert variety.

Green Gage (*Abricot Vert, Bradford Gage, Ida Gage, Isleworth Gage, Queen Claudia, Reine Claude*).—This is one of the best-known, richest-flavoured, and most popular Plums, and is supposed to have originated in Greece. Fruit medium size, round, and ripens about mid-season. Skin deep yellowish-green, and when fully ripe dotted and marbled with red. Flesh greenish-yellow, very juicy, tender, with a sugary rich flavour, and separates freely from the stone. Tree moderately robust, short jointed, spreading, and a good bearer. This is one of the finest dessert Plums, and also valuable for canning and preserving.

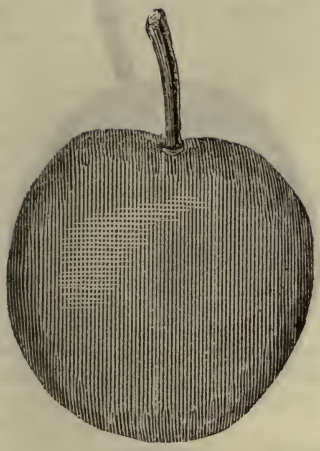
Guthrie's Late Green Gage.—An excellent Scotch variety, equal to the common Green Gage, but somewhat larger, and ripening from a fortnight to three weeks later. Skin yellow, clouded with pale green, and covered with a thin bloom. Flesh greenish-yellow, juicy, rich, highly flavoured, and adheres to the stone. Tree hardy, robust, and prolific. A good canning and preserving Plum.

Huling's Superb (*Gloire de New York, Keyser's Plum*).—This is a first-class American variety with very large roundish-oval fruit, which ripens about mid-season. Skin greenish-yellow, thinly covered with bloom. Flesh greenish-yellow, sugary, rich, with a brisk flavour, and adheres to the stone. Tree very vigorous, upright in growth, with large foliage, and a fairly good bearer.

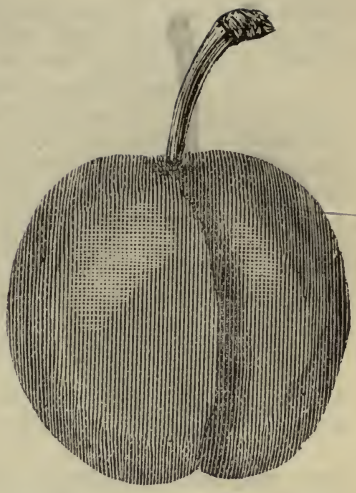
Ickworth Impératrice.—This is one of the finest English dessert Plums, with large obovate fruit, which ripens very late. Skin deep purple, netted with pale yellow streaks. Flesh greenish-yellow, firm, juicy, sweet, with a peculiar rich and pleasant flavour, and adhering to the stone, which is rather small. Tree moderately robust and a fairly good bearer. This Plum will hang upon the tree till it shrivels, and if gathered and wrapped in tissue paper can be kept fresh for several weeks. It is a variety specially adapted for drying, and will make a good Prune.

Impériale de Milan (*Prune de Milan*).—This variety is supposed to have originated in Italy, and is an excellent late dessert and preserving Plum. Fruit rather large, roundish-oval, and ripens somewhat late. Skin dark purple, dotted with yellow, and covered with a thick bloom. Flesh yellowish, firm, juicy, sweet, with a rich musky flavour, and adhering to the stone. Tree vigorous, spreading in habit, and a free bearer. This variety is suitable for drying.

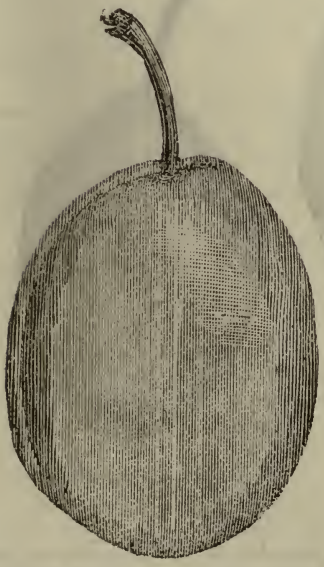
Imperial Gage.—This is an American variety of repute, raised from a seed of the common Green Gage, which in many respects it resembles. Fruit rather above the medium size, roundish-oval, and ripens a little after mid-season. Skin pale green, tinged with yellow, marbled with dull green, and covered with a thick bloom. Flesh greenish, very juicy, rich, with an agreeable flavour, and separates freely from the stone. Tree very free in growth, and bears abundant crops. In America this variety has the reputation of being one of the most productive and profitable of Plums. Suitable for canning.



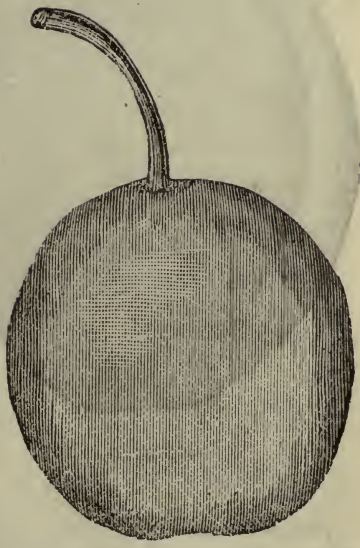
Guthrie's Late Green Gage.



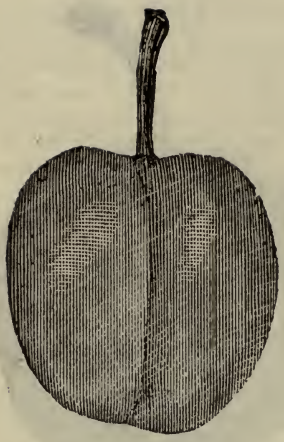
Huling's Superb.



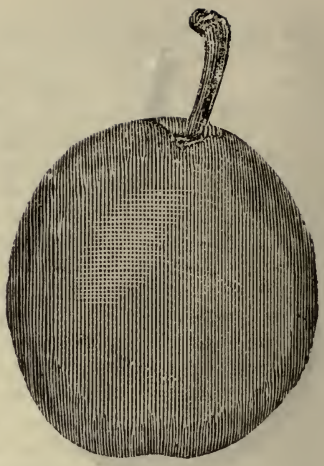
Ickworth Imperatrice



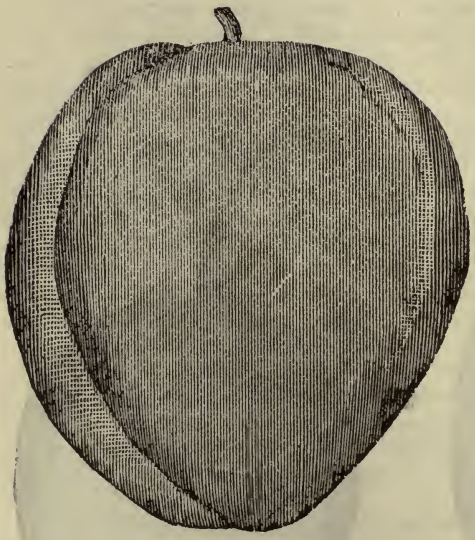
Impériale de Milan.



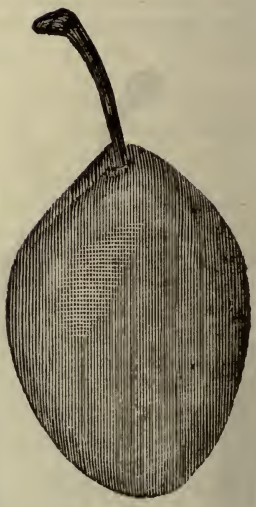
Imperial Gage



Jefferson.



Kelsey.



Italian Prune.

Italian Prune (*Fellemberg, Italian Quetsche, Semiana*).—This is a variety of supposed Italian origin with medium-sized oval fruit, which ripens late in the season. Skin dark purple-blue, covered with a thick

bloom, and dotted with yellow. Flesh deep yellow, firm, juicy, sweet, well flavoured, and separating freely from the stone. Tree vigorous, spreading, and a free bearer. This is an excellent Plum for the dessert or preserving, as also for drying, and makes a good Prune.

Jefferson.—An excellent American variety with large oval fruit, slightly narrowed towards the stalk, and ripening about mid-season. Skin golden-yellow, flushed with red on the sunny side, sprinkled with red dots, and covered with a thin bloom. Flesh deep orange, firm, juicy, highly flavoured, and separates freely from the stone. Tree moderately vigorous and a regular and free bearer. This is an excellent dessert Plum and a good one for canning.

Jodoigne Green Gage.—A French variety of the Green Gage class with large roundish fruit, which ripens late in the season. Skin thin, greenish-yellow, with a blush of red and yellowish dots next the sun, and covered with a thick bloom. Flesh pale yellow, firm, juicy, sugary, richly flavoured, and separates from the stone. Tree vigorous and productive. This is a first-class dessert variety, and is also suitable for cooking and canning.

July Green Gage.—A very early variety belonging to the Green Gage class with fruit similar in appearance and flavour to the parent of that section. An excellent and useful Plum on account of its extreme earliness.

Kelsey.—An excellent Japanese variety. Fruit roundish heart shape, in colour a blending of yellow and purple, and from one and a-half to two inches in diameter, with a distinct suture. Flesh firm, adhering to the stone, which is small, sweet, with a rich pleasant flavour. Tree strong, very prolific, of upright habit, with narrow leaves. This is an excellent preserving Plum.

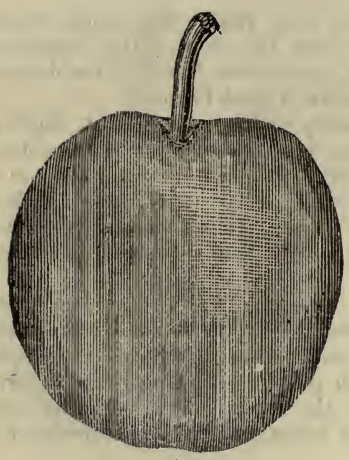
Kirke's.—An English variety of repute with roundish-oblong fruit above the medium size, which ripens about mid-season. Skin dark purple, with a few deep yellow dots, and covered with a dense bloom. Flesh greenish-yellow, firm, juicy, sugary, with a rich flavour, and separating freely from the stone. Tree robust and bears freely. This is an excellent dessert Plum.

Late Black Imperial.—A free-bearing English culinary variety. Fruit medium-sized, reddish-black. Flesh firm, juicy, with a piquant sub-acid flavour.

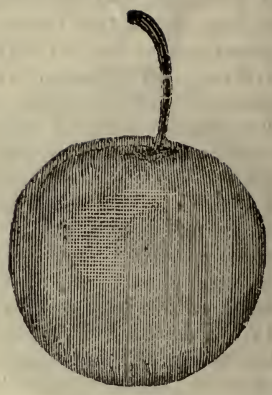
Late Black Orleans.—A very prolific English variety. Fruit medium-sized, black, with a rich bloom. Flesh sweet, juicy, and well flavoured.

Late Rivers.—A useful English variety with roundish fruit rather below the medium size, which ripens very late. Skin very dark purple, almost black. Flesh apricot yellow, rich, sugary, very highly flavoured, and adhering to the stone. Tree vigorous and prolific. This is one of the richest flavoured late Plums.

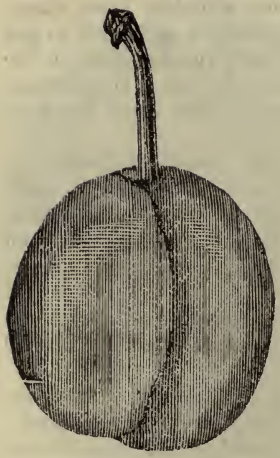
Liegel's Apricot.—A French variety with medium-sized roundish fruit, which ripens after mid-season. Skin yellowish-green, like that of the Green Gage, and covered with a thin bloom. Flesh greenish-yellow, juicy, tender, with a rich sugary flavour, and separating freely from the stone. Tree fairly vigorous, and a moderately good bearer. This is



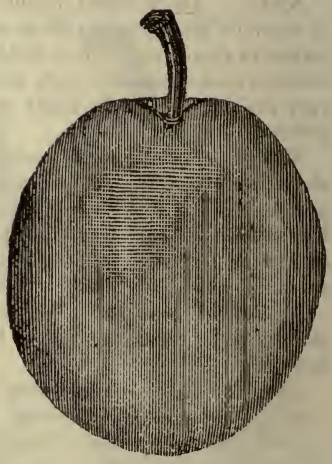
Kirke s.



Late Black Orleans.



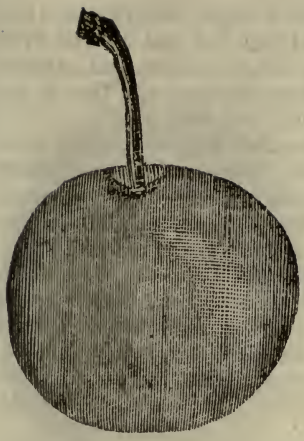
Late Rivers.



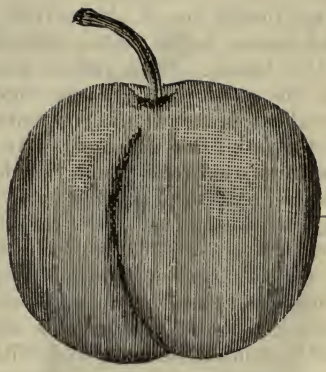
Liegel's Apricot.

an excellent dessert Plum, and has a peculiar flavour differing from all others.

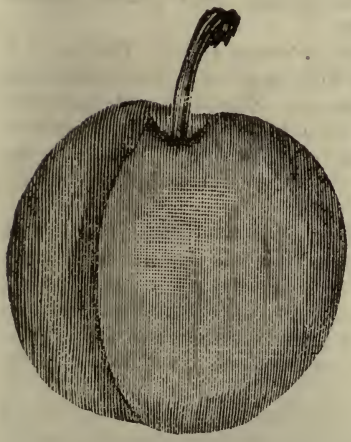
Mitchelson's.—An English variety with oval fruit somewhat above the medium size, which ripens about mid-season. Skin black, sprinkled with a few light brown dots, and covered with a thin bloom. Flesh yellow,



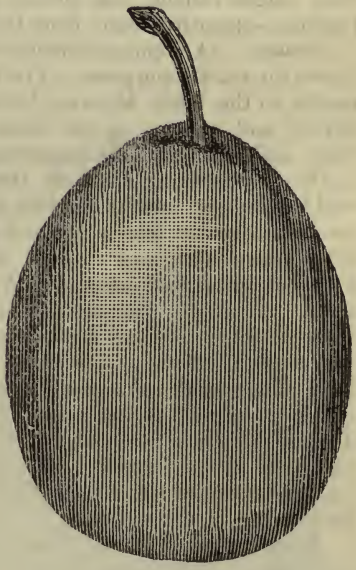
McLaughlin.



Orleans.



Oullin's Golden.



Pond's Seeding.

tender, very juicy, sweet, well flavoured, separating freely from the stone. Tree hardy and a very heavy bearer, the fruit being produced in clusters. An excellent preserving Plum, somewhat similar to the Diamond, but sweeter and rather smaller.

McLaughlin.—A useful American variety of the Green Gage class with

large nearly round oblate fruit, which ripens medium early. Skin thin and tender, bright yellow, dotted and mottled with red, and covered with a thin bloom. Flesh yellow, firm, juicy, very sweet, luscious, and adheres to the stone. Tree hardy, vigorous, and very productive. This is an excellent dessert Plum, and suitable for canning and drying.

Orleans (*Red Damask*).—An old and popular English variety with medium-sized round fruit, which ripens a little before mid-season. Skin tender, reddish-purple. Flesh yellowish, tender, sweet, briskly flavoured, and separating freely from the stone. Tree hardy, vigorous, and uniformly productive. This is an excellent culinary and preserving Plum.

Oullin's Golden (*Oullin's Gage, Reine Claude Précoce*).—This is a showy and excellent dessert Plum of German origin. Fruit rather large, roundish-oblong, and ripens medium early. Skin rich yellow, dotted with crimson, and covered with a light bloom. Flesh yellow, tender, juicy, sugary, with a rich flavour, and adheres slightly to the stone. Tree robust, of pyramidal habit, and very productive. This is one of the finest dessert varieties.

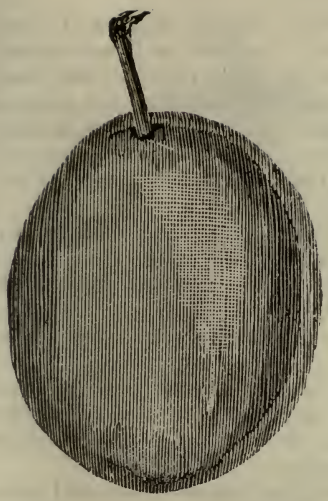
Peach (*Reine Claude Berger*).—An excellent early dessert variety. Fruit very large, roundish-oblate, and somewhat flattened at the ends. Skin bright salmon red, dotted with amber. Flesh tender, juicy, and luscious, separating freely from the stone.

Pershore.—A popular culinary variety in England, where it is largely grown for market purposes. Fruit golden yellow, and in shape somewhat similar to the *White Magnum Bonum*. Flesh juicy, with a rich sub-acid flavour, and adheres to the stone. Tree prolific, fruit ripens medium early, and is an excellent preserving Plum.

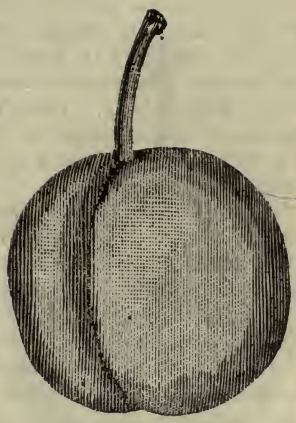
Pond's Seedling (*Fonthill, Hungarian Prune, Pond's Purple*).—A well-known and popular English variety with large oval fruit narrowing towards the stalk, which ripens at mid-season. Skin dark red, sprinkled with brown dots, and covered with a thin bloom. Flesh dull yellow, firm, but juicy, with a sweet and pleasant flavour, and adhering to the stone. Tree very vigorous and productive. This is a valuable culinary Plum, and may be used for canning or drying.

Prince Englebert.—This is an excellent Plum of Belgian origin with large oblong-oval fruit, which ripens a little after mid-season. Skin very deep purple, with minute russet dots, and covered with a heavy bloom. Flesh yellowish-green, rather firm, juicy, sweet, with a brisk rich flavour, and adheres to the stone. Tree vigorous and a very heavy bearer. This variety is excellent for the dessert or culinary purposes, and may be used for canning or drying.

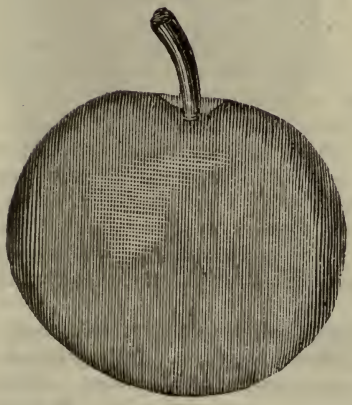
Purple Gage (*Reine Claude Violette, Violet Gage*).—This is an excellent variety whose origin is unknown, but it has been a popular Plum both in England and France for a long period. Fruit roundish like the Green Gage, of medium size, and ripens late. Skin rather thick, violet-purple, dotted with pale yellow, and covered with a light bloom. Flesh greenish-yellow, firm, sugary, with a rich high flavour, and separating freely from the stone. Tree moderately vigorous and a fairly good bearer. An excellent dessert Plum which will hang on the tree till it shrivels, and may be utilized by drying.



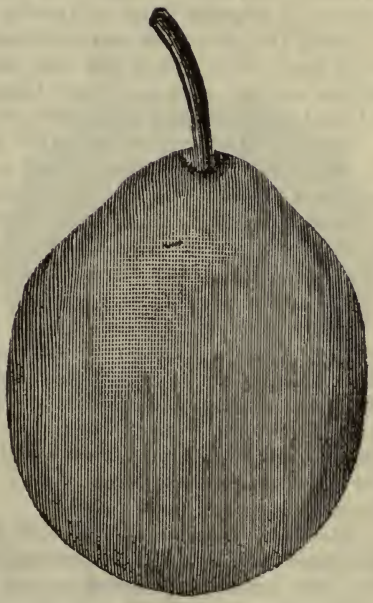
Prince Englebert.



Purple Gage



Reine Claude de Bavay.



Red Magnum Bonum.

Red Magnum Bonum (*Florence, Imperial Purple Egg, Red Egg, Purple Magnum Bonum, Imperial Violet*).—An old and well-known English variety with large egg-shaped fruit, which ripens a little after mid-season. Skin pale to deep red, sprinkled with grey dots, and covered with a slight bloom. Flesh yellowish-green, firm, not very juicy, briskly flavoured, and separates freely from the stone. Tree fairly vigorous and a good bearer. This is a good culinary Plum, and may be utilized for canning or drying.

Reine Claude de Bavay (*Bavay's Green Gage*).—A useful dessert variety of French origin with large roundish fruit of the Green Gage class, which ripens late in the season. Skin greenish-yellow, with splashes of dull gaeen, covered with a thin bloom. Flesh yellow, tender, very juicy, sweet, highly flavoured, and separates freely from the stone. Tree vigorous and very productive.

Reine Victoria.—An excellent late French variety that must not be confounded with the English *Victoria*, as they are quite distinct. Fruit dark reddish-purple, above medium size, short oval. Flesh juicy, richly flavoured, and separates freely from the stone.

Robe de Sargent.—This name is, by Hogg and other writers, said to be a synonym for *D'Agen*, but in America an excellent Prune Plum is grown under the same name which is quite distinct in form and other respects. The American Plum has a deep purple skin approaching to black, is oval in shape, and medium-sized. Flesh greenish-yellow, sweet, and richly flavoured, and adheres slightly to the stone. Tree upright and a prolific bearer. A popular Plum in America for drying and preserving.

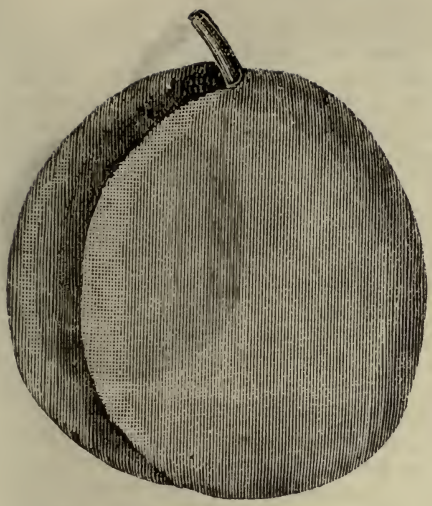
Royal Dauphine.—A useful culinary Plum which ripens medium early. Fruit large, oval. Skin pale red, dotted and mottled with darker and lighter shades, with a violet bloom. Flesh greenish-yellow, juicy, sub-acid, and separates freely from the stone.

Satsuma (*Japan Blood Plum*).—A Japanese variety with large almost globular fruit from two to two and a-half inches in diameter. Skin dark brick red. Flesh dark red, juicy, with a brisk pleasant flavour. Stone small and pointed. Tree hardy, vigorous, and very prolific.

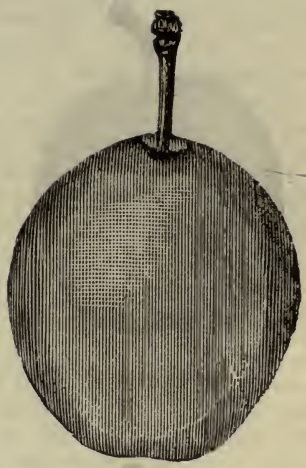
Silver Prune.—A variety under this name is very popular in California as a drying Plum, but there is but little, if any, difference between it and Coe's Golden Drop, from which it is said to be a seedling.

Simoni's Plum (*Chinese Apricot Plum*).—This is a distinct Chinese species (*Prunus Simoni*) whose fruit differs in many respects from the other kinds. Fruit large, round, flattened, with a deep suture and very short stalk. Skin a dark cinnabar or brick red. Flesh firm, rich, sweet, with a peculiar flavour which has been likened to a blending of the Banana and Pine-Apple, stone small. Tree vigorous, hardy, well suited for hot dry districts; foliage a very light green. Fruit ripens early and bears packing and carriage well.

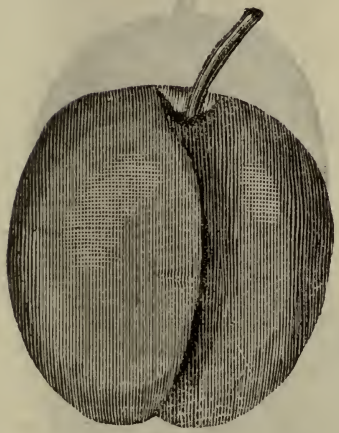
Standard of England.—A useful English culinary variety with ovate medium-sized fruit, which ripens a little after mid-season. Skin purplish-red, with numerous yellow dots, and covered with a thick bloom. Flesh yellowish-green, rather firm, juicy, moderately sweet, with a brisk flavour, and separates freely from the stone. Tree vigorous and prolific.



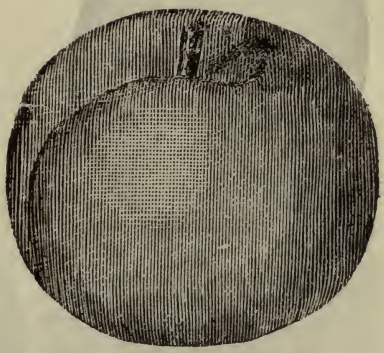
Satsuma.



Standard of England.

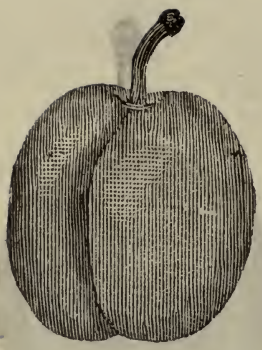


Robe de Sargent.

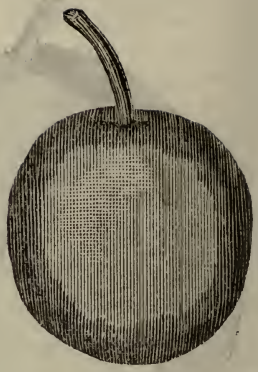


Simoni's Plum.

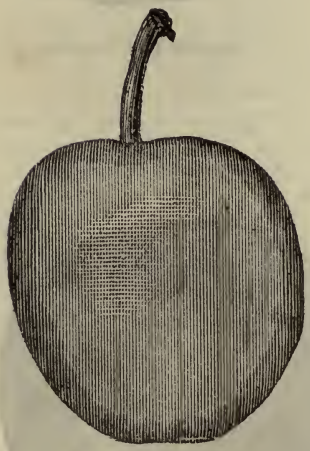
St. Etienne.—This is an excellent and very early dessert variety with medium-sized roundish-oval fruit. Skin thin, greenish-yellow, shaded, marbled, and dotted with crimson. Flesh yellow, tender, juicy, sugary, richly flavoured, and separating freely from the stone. Tree moderate in growth and a fairly good bearer.



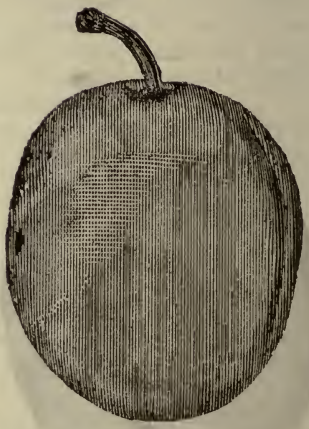
St. Etienne.



Winsour.



St. Martin's Quetche.



Victoria.

St. Martin's Quetsche.—This is a very late Prune variety from Germany with medium-sized ovate fruit. Skin pale yellow, with a white bloom. Flesh yellowish, firm, sweet, with a rich flavour, and separates freely from the stone. Tree hardy, a very free bearer, and the fruit will hang till it shrivels. This is an excellent Plum for drying, and makes a good Prune.

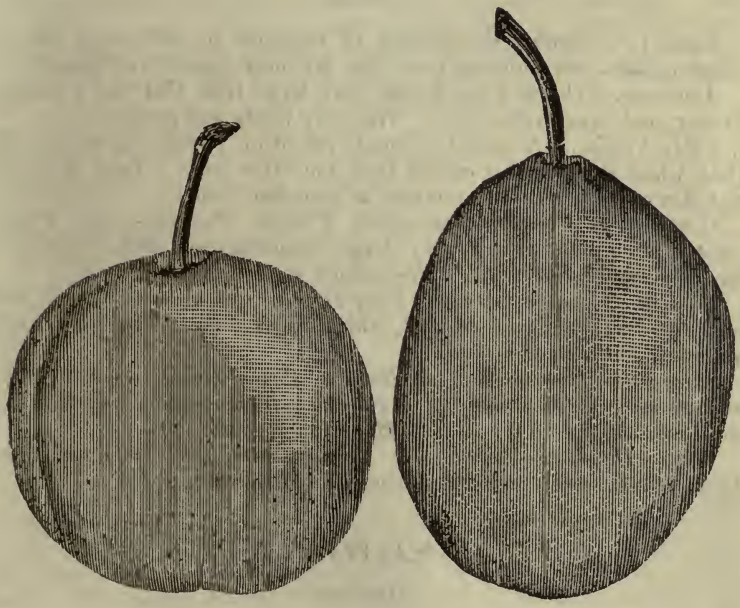
Sultan.—An excellent English culinary variety, a seedling from *Belle de Septembre.* Fruit large, roundish-oval. Skin reddish-purple. Flesh firm, juicy, with a brisk flavour.

Transparent Gage (*Diaphane, Reine Claude Diaphane*).—A French variety of the Green Gage class with roundish-oblate fruit above the medium size. which ripens about mid-season. Skin thin, and so transparent as to show the texture of the flesh beneath, greenish-yellow, speckled and marbled with red. Flesh greenish yellow, rather firm, very juicy, with a rich sweetness, and separating readily from the stone. Tree vigorous and a good cropper. This is a first-class dessert variety.

Victoria (*Alderton, Denyer's Victoria, Sharp's Emperor*).—An English variety with large roundish-oval fruit, which ripens rather late. Skin light red, thickly speckled with grey dots. Flesh yellow, juicy, sweet, pleasantly flavoured, and separating freely from the stone. Tree hardy, robust, and productive. A good culinary variety.

Washington (*Bolmar, Franklin, Parker's Mammoth, Phillip I.*).—This is a handsome American Plum with very large roundish-ovate fruit, which ripens medium early. Skin deep yellow, with a pale crimson blush and dots. Flesh yellow, firm, very sweet, luscious, and separates readily from the stone. Tree a strong grower, with large foliage, and bears very freely. This variety makes a good Plum for the dessert, and can be utilized for culinary purposes or canning and drying.

White Magnum Bonum (*Egg Plum, Imperial Blanche, White Egg, White Mogul, White Imperial, White Holland, Yellow Magnum Bonum*). —An old, well-known, and popular English variety with large egg-shaped



Washington. White Magnum Bonum.

fruit, which ripens medium early. Skin bright-yellow, with numerous white dots, and covered with a thin white bloom. Flesh yellow, coarse grained, firm, with a brisk sub-acid flavour, and adheres to the stone. Tree vigorous and prolific. This is an excellent culinary Plum, and suitable for drying or canning.

White Perdrigon (*Brignole, Maître Claude, Perdrigon Blanc*).—A French variety with medium-sized oval fruit narrowing towards the stalk, which ripens a little before mid-season. Skin pale yellow, strewed with white dots, and sometimes small red spots. Flesh firm, juicy, rich, slightly aromatic, and separates freely from the stone. Tree moderate in growth and fairly productive. This is a very good drying and preserving variety, and makes an excellent Prune.

Winesour (*Rotherham*).—An English Plum, valuable for culinary purposes or preserving, with medium-sized oval fruit, which ripens at mid-season. Skin dark purple, covered with darker specks. Flesh greenish-yellow, pleasantly sub-acid, and adheres to the stone. Tree vigorous and a free bearer.

Yellow Impératrice (*Altesse Blanche*).—This is an excellent dessert variety of French origin with large roundish-oval fruit, which ripens early. Skin deep golden yellow, slightly marked with red towards the stalk. Flesh yellow, juicy, sugary, richly flavoured, and adheres to the stone. Tree moderately vigorous and a fairly good cropper. Suitable for drying and makes a good Prune.

DAMSONS.

There is a number of varieties of Damsons in cultivation, but the following selection embraces those that are most distinct and useful:—

American.—This is a fine variety with large fruit that has a pleasant flavour, and ripens rather late. Tree very hardy and prolific.

Cole's Prolific.—A desirable variety raised in Victoria by the late Mr. Cole, which ripens rather earlier than the other sorts. Fruit large and well flavoured. Tree vigorous and an abundant bearer.

Crittendon's (*Cluster, Crittendon's Prolific, Prolific*).—An English variety of repute. Fruit very large, roundish-oval, deep black, well flavoured, and ripens early. Tree robust and very prolific.

English (*Common, Black, Purple*).—A well-known variety with medium-sized well-flavoured fruit, which ripens early. Tree very hardy, vigorous, and a heavy bearer.

Shropshire (*Damascene, Long Damson, Prune Damson*).—A first-class and popular English variety. Fruit large, deep purple, well flavoured, the flesh adhering to the stone. Hardy and prolific.

White Damson.—Fruit below medium size, oval, yellowish-green. Flesh yellow, sweet, and well flavoured. Moderately prolific.

POMEGRANATE

History.

The Pomegranate is known botanically as *Punica granatum*, and it

belongs to the natural order *Myrtaceæ*, or the Myrtle family. The name, according to some writers, signifies "from Carthage," where the tree is said to have been grown extensively; other authorities derive it from *Puniceus* (scarlet) in allusion to the colour of the flowers. In its natural state it is rather widely dispersed, and is found in most parts of Western Asia and Northern Africa. It appears to have been held in high esteem by the nations of antiquity, and is frequently mentioned in their histories. The Pomegranate, according to Bible history, was, together with the Vine, Fig, and Olive, among the earliest fruits that were cultivated by mankind. We also learn from the same source that it was one of the fruits that the children of Israel murmured for when passing through the wilderness. In the heathen mythology the Pomegranate also appears to have been a highly valued fruit, as Juno is sometimes represented with it. The Jews in Western Asia and the south of Europe use the fruit largely in their religious ceremonies.

Uses.

The fruit of the Pomegranate is largely used in the warmer countries of the old world, as its juice is considered to be very refreshing. It is grateful to the palate, possesses a peculiarly pleasant acid flavour, and assuages thirst well. Possessing such useful qualities it is consequently highly prized and generally cultivated in Southern Europe, Northern Africa, and throughout Asia. The Pomegranate is also useful in other ways, and may be utilized for tanning, dyeing, and medicinally. The bark is rich in tannin, yielding sometimes as much as thirty per cent., and is largely used in preparing morocco leather in some parts of the world. The flowers were formerly used to some extent for dyeing cloth red. A dye can also be obtained from the skins of the fruit. The skins are very astringent, and an infusion is sometimes used in cases of dysentery. The root bark is also sometimes used for the same complaint. Independent of its value as a fruit-bearing tree, the Pomegranate is worthy of attention as an ornamental plant. It is a very handsome small tree or shrub with deep shining green foliage, and the bright red flowers are produced in succession for several months. This tree is specially adapted for cottage gardens and shrubberies. There are several varieties, having single or double flowers of various shades of red, yellow, and white, all of which are suitable for ornamental planting; but if fruit is the object the common *Punica granatum* is the kind that should be chosen.

Cultivation.

The Pomegranate will thrive in all but the coldest parts of Australasia, and will stand a few degrees of frost with impunity. It will also succeed in any ordinary good soil, but thrives best in a deep rich sandy loam. The trees are strong feeders, and in poor land manure should be used freely. The ground should be well prepared by working it deeply, and when necessary drainage must be provided. When grown as a regular

plantation the trees should be planted about eighteen feet apart. The young plants will require some attention in pruning to keep them shapely and to secure a strong growth of wood. Mature trees will not require so much pruning, all that is necessary being the thinning out of the branches when too numerous, the removal of rank or misplaced shoots, and stopping those that are making too much growth. It is advisable to keep the ground as free from weeds as possible by frequent light stirrings, taking care not to disturb the roots to any extent. Before the warm weather sets in the surface soil should be mulched four or five inches deep as far as the roots extend, but care must be taken to keep the material clear of stems of the trees. Shelter is of great assistance to the Pomegranate, and should be provided when necessary. When grown under favourable conditions the Pomegranate will attain a great age, and there are in France several specimens which are known to be over two centuries old.

Propagation.

Propagation may be effected by seeds, cuttings, layers, budding, and grafting. The first is a slow method as compared with the others, and is but seldom practised. Cuttings of the previous year's growth strike freely if taken off just before growth starts in the spring. Insert them about three inches deep in sand or light soil. Plants are readily obtained from layers, which may be put down early in the spring or in the latter part of the summer. Grafting and budding are methods by which particularly choice varieties may be increased quickly, but for ordinary purposes they are seldom practised.

QUINCE.

History.

The Quince belongs to the Pomeæ section of the natural order *Rosaceæ*, and is known botanically as *Pyrus Cydonia*, and also as *Cydonia vulgaris*. The last-mentioned specific name has originated from the supposition that the fruit was first cultivated at Cydon, a city in the Island of Crete. The common English name Quince is supposed to be a corruption of the French name *coignass*. The Quince is indigenous to various countries in Central, Eastern, and Southern Europe, and is also found in some parts of Western Asia. From time immemorial the Quince appears to have been cultivated, and by several of the nations of antiquity it was held in high esteem. By the Greeks and Romans the fruit was recognised as the emblem of love, happiness, and fruitfulness. The Quince was also dedicated to Venus, and the temples of Cyrus and Paphos were profusely decorated with this fruit. Some authorities consider the Quince to have been the Golden Apple that, according to the fable, grew in the Garden of the Hesperides. Pliny mentions several kinds as being grown in Italy in his time, and speaks highly of the medicinal virtues of the fruit. He

says, "Quinces, if eaten when quite ripe, are good for those who spit blood or are troubled with hæmorrhage, and that the raw juice is a sovereign remedy for swollen spleen, dropsy, or a difficulty in drawing the breath." Further this writer says, "That the flowers, either fresh or dried, are good for inflammation of the eyes, and that pieces of the root are worn as a charm against scrofula. By Columella the Quince is highly spoken of, and he says that it was regarded as one of the most pleasant and wholesome fruits. The Quince is said to have been introduced to England towards the end of the sixteenth century, and soon became popular on account of its supposed medicinal properties The celebrated philosopher, Lord Bacon, appears to have held the fruit in great esteem, as in his writings he says that it is good for strengthening the stomach. Gerard, writing a few years after its introduction to England, informs us that in his time the Quince was generally planted in hedges, the fruit being used for making marmalade. This marmalade was a very popular preparation for a long period in England, chiefly on account of its supposed medicinal virtues. After a time the Quince seems to have lost its popularity in the United Kingdom, and latterly it is but little cultivated.

Uses.

In many parts of the south of Europe the Quince is a very popular fruit, and it is largely used in various ways. This fruit is also very popular in Australasia, and is cultivated to some extent in all the colonies. Considerable quantities are used in making jam, jelly, and marmalade, and by many these conserves made from Quinces are considered to be superior to those obtained from any other fruit. In making jam the fruit is pared, quartered, and cored, and boiled steadily for eight or ten hours, adding twelve ounces of sugar to each pound of fruit. For jelly the fruit is preserved in the same way and then boiled for several hours, after which the juice should be strained through a jelly bag or piece of folded muslin. A pound of white sugar should then be added to every pint of juice, and boil till the mass becomes jelly. In making marmalade only perfectly ripe fruit should be used, and this must be prepared as for jam and jelly. Care, however, must be taken to save all the pips, as they abound in mucilage, and greatly improve the marmalade. Place the fruit and pips in large jars, which should be stood in water, and this must be boiled till the Quinces are quite soft. The pulp must then be strained through a fine sieve, and three-quarters of a pound of white sugar should be added to every pound of fruit. The sugar should be boiled to a syrup before it is used. After mixing the sugar the pulp should be boiled for an hour, and then it will be ready for placing in the jars. The word marmalade is derived from the Portuguese name of the Quince, *marmelo.* The fruit is commonly used fresh for culinary purposes, and many people are very partial to Quinces when utilized for tarts, puddings, and when stewed. The Quince can also be turned to good account for making cider, or wine as it is sometimes called. This is made in precisely the same way as Apple cider, and for full directions see article upon the Apple, volume 1. Another method is to add a gallon of

water and three pounds of white sugar to every gallon of Quince juice. When properly matured, Quince cider is considered to be a wholesome and palatable beverage, but it requires to stand about twelve months before it is in the best condition. By distilling the fermented juice a strong spirit can be obtained. Medicinally the seeds of the Quince are considered to be useful for some complaints, and when boiled in water they yield a mucilage which is sometimes used as a demulcent. The fruit in various forms is considered to be cooling, slightly astringent, and stomachic.

Cultivation.

The Quince may be cultivated in most parts of Australasia successfully, and seems equally at home in the warm as in the colder districts. It will also adapt itself to various soils and situations, but thrives best in rich land and in localities where it can obtain a good supply of water at its roots. When practicable it should also be sheltered from stormy winds, which in exposed places are apt to injure the fruit by knocking them against each other. Prepare the ground as for other fruit trees, working it deeply unless it happens to be very light and porous. Provide also for drainage if necessary, as will be the case in heavy soils, as though the Quince likes fairly moist ground it will not thrive when its roots are soddened for any length of time. As a rule, the trees do not attain so great a size as the Apple, Pear, and many other trees, and eighteen feet will be a sufficient distance apart. The trees should invariably be trained with low heads. In pruning young trees the shoots should be thinned out freely so as to get a vigorous growth and the plants into the desired forms as quickly as possible. Mature trees require, as a rule, but little in the way of pruning. All that is necessary, except for special reasons, is to thin out the branches when over-crowded, and regulate rank or straggling shoots. The fruit is mostly borne upon wood of the previous season's growth, and also upon older spurs. The trees have generally a tendency to produce a number of rank shoots from the main stems, as also suckers from the roots, and these should be removed while young. Very often, owing to local circumstances, such as the too free use of manure, or a naturally over-rich soil, the trees make, year after year, a heavy growth of wood and produce but little fruit. When this happens root pruning will generally prove an effective remedy. The most favourable time for pruning either branch or root is in July or August. It is advisable to keep the ground as free from weeds as possible, and before the hot weather sets in the ground should be mulched as far as the roots of the trees extend.

Propagation.

Propagation is readily effected by seeds, cuttings, layers, budding, and grafting. Seedlings are raised chiefly for stocks upon which approved kinds are grafted or budded, and Pears are often worked upon them. As stocks for Quince many prefer them to cuttings or layers as giving stronger, more durable, and cleaner stemmed plants. When used as a

stock for the Pear the Quince has a dwarfing tendency, and is commonly used by nurserymen in raising low-growing trees. In some cases Pears are also materially improved in quality when worked upon the Quince stock. Seed should be sown in the autumn, covering it to the depth of an inch. The following year plant out the young seedlings in rows thirty inches apart, leaving half that space between the plants in the lines. They will in the next season be ready for working, or planting out. Cuttings root freely, and plants are often obtained by this means. They should be planted in the latter part of the winter or early spring, leaving them about a foot long, and inserting them about five inches into the ground. Layering is a method by which large plants may be obtained quickly, and it can be done at various times of the year, but early in the spring is the most favourable period. Neither layers nor cuttings are likely to yield such vigorous plants as seedlings, though they furnish a considerable proportion of the plants that are sold. Grafting and budding should be more generally practised, and may be done at the same periods of growth as for other deciduous fruits.

Insects, Fungi, and Diseases

The Quince is liable to be attacked by the various pests that affect the Apple and Pear, but rarely suffers to the same extent. Should any of these evils make their appearance, full particulars respecting them and modes of treatment will be found in the articles upon the Apple and Pear.

Varieties.

The varieties of the Quince are not numerous, as is the case of most other fruits, and the following list embraces the principal sorts :—

Anger's.—A hardy robust variety which is grown largely as a stock for the Pear. Fruit medium-sized roundish, similar in shape to the *Apple-shaped*, but smaller and greatly inferior in quality. It also ripens at a later period. Tree vigorous, has large leaves, and grows late in the season.

Apple-shaped (*Orange*).—This variety produces large roundish fruit somewhat similar in shape to an Apple. Skin a fine golden colour. Flesh strong in flavour and cooks well. Ripens a little earlier than the other varieties. Tree robust, hardy, bears freely, and does better in cold districts than the other kinds.

Pear-shaped (*Oblong*).—This variety has pyriform fruit rather longer than the preceding one, and is somewhat paler in colour. The fruit is firmer in texture than the *Apple-shaped*, is not so juicy, nor so valuable for culinary purposes or preserving. It ripens somewhat later, and will keep better than the first-named variety. Tree vigorous and a fairly good bearer.

Portugal.—This is the best variety for a mild climate, and does remarkably well in most parts of Australasia. The fruit is of the largest size, in shape obtuse-oval, and the skin is a bright pale yellow. Flesh milder in flavour than the other kinds, and when cooked turns a fine

deep red colour. This kind is largely used for culinary purposes and preserving. Tree hardy and prolific. Ripens about the same time as the last-named variety.

Rea's Mammoth.—An excellent American variety with fruit similar in appearance to the *Apple-shaped*, but very much larger, and first-class in quality. Tree vigorous and prolific.

RAMBUTAN.

This is one of the names used in India for the fruit of *Nephelium lappaceum* (*Euphoria Nephelium*, *Scytalia Rambutan*), an evergreen small tree belonging to the order Sapindaceæ, and closely allied to the Li-tchi and Longan. It also passes under the vernacular name of Rampostan. This tree is indigenous to South India, the Malay Archipelago, and other parts of Southern Asia. It is generally cultivated in India, where its fruit is greatly appreciated and by many preferred to the Li-tchi. The fruit is oval, about two inches long, slightly flattened, and covered with soft fleshy spines. The pulp has a pleasant sub-acid flavour. The fruit is used in the same way as the Li-tchi, and for full particulars as to cultivation see article upon that fruit, page 117.

An allied species, *Nephelium pinnatum*, yields the fruit known in Fiji under the native name of "Dawa." It is indigenous to Fiji, the New Hebrides, and other South Sea Islands, and is a handsome evergreen tree attaining a height of fifty or sixty feet. The fruit is about the size of a Walnut, and contains a glutinous honey-like pulp, which is greatly relished by the South Sea Islanders in localities where it grows. This species may be cultivated under the same conditions as required for the others, and similar directions will apply.

RAMLEH.

This is the native name for the fruit of *Pierardia dulcis* (*sapida*), a small evergreen tree indigenous to Burmah, Sumatra, and the Malay Peninsula, belonging to the order Sapindaceæ. The tree has entire oblong leaves, yellow flowers, and bears smooth yellow fruit about the size of a large Gooseberry, which has a sweet luscious pulp, and is greatly esteemed by the Burmese. In some of its native regions the fruit is known as the Choopah. This tree can only be successfuly cultivated in the tropical portions of Australia, but in congenial regions it is worthy of attention both as a fruit-yielding and as an ornamental plant. Propagation can be readily effected by seed, which should be planted an inch deep. Plants may be obtained from layers, and cuttings of ripened wood of the current season's growth will strike freely in sand if protected from the weather.

RASPBERRY.

History.

The Raspberry is known botanically as *Rubus Idæus*, and it belongs to the natural order *Rosaceæ*, or the Rose family. The generic name *Rubus* comes from the Celtic *rub* (red), in allusion to the colour of the fruit in many of the species. Its specific name originated with the ancient Greeks, who called the fruit Idæus on account of its growing in abundance upon Mount Ida. The common English name, Raspberry, is said to have been given on account of the rasping roughness of the stems. This fruit is indigenous to the greater part of Europe, and is to be found growing wild in many parts of the United Kingdom. It is also widely spread through Northern Asia. Like all other cultivated fruits the Raspberry has been greatly improved by the hand of man, and the highly-flavoured garden varieties of the present day are widely different from the fruit in a wild state.

The Raspberry appears to have been well known to the nations of antiquity, and it is frequently mentioned by their writers. Palladius, a Roman, writing in the fourth century, mentions it among the generally cultivated fruits of his time. Pliny also mentions it as a valuable fruit. For centuries the Raspberry has been one of the most generally cultivated fruits in the northern countries of Europe, and in the United Kingdom it has always been a favourite.

Several other species of *Rubus* yield edible fruits that are classed as Raspberries, and the majority are worthy of attention from cultivators. The most prominent of these is the Black Cap Raspberry (*Rubus occidentalis*), also known as the Thimbleberry, a North American species of strong growth. This species embraces a number of varieties bearing large well-flavoured fruits, which in colour are mostly either deep purple or black. Some varieties, however, have fruits that in colour are of various shades of red, while others range from pale yellow to orange. Varieties of the Black Cap Raspberry are extensively cultivated in America, but they have not become popular in Europe, and are almost unknown in Australasia. The American Red Raspberry (*Rubus strigosus*) is another species which includes several varieties that are generally cultivated in the United States. The stems are strong and upright, with stiff straight thorns, and the fruit, which is well flavoured and freely produced, is of medium size, varying in colour from bright crimson to deep red, according to the variety. These two kinds and *Rubus Idæus* (Common Raspberry) are the only species that are largely cultivated for their fruits.

Other species worthy of notice are the White-stemmed Raspberry (*Rubus leucodermis*), a native of California and other parts of North West America. It is a strong-growing species with stout curved thorns and large pleasantly flavoured fruit, which varies in colour from brownish-yellow to black. It is closely allied to *Rubus occidentalis*, and some authorities consider it to be merely a variety. The Showy Raspberry

(*Rubus spectabilis*), so called from its large conspicuous red flowers, is a robust upright hardy species indigenous to California and North West America to Alaska. The fruit is large, ovoid, varying from red to yellow, and has a brisk pleasant flavour. The Salmon Berry of California is the fruit of *Rubus Nutkanus* (*velutinus*), a shrubby species indigenous to Western America and northward to Alaska. The fruit is salmon red, with a dry and somewhat musky flavour, and consists of but a few large grains. The Purple Flowered Raspberry (*Rubus odoratus*) is a shrubby species remarkable for its handsome purple flowers. It is very closely allied to *Rubus Nutkanus*, and is indigenous to the greater part of North America, growing chiefly in high rocky places. This species is also sometimes called Thimbleberry and also Mulberry. Other American species are *Rubus deliciosus*, an erect shrubby plant with large pleasantly flavoured fruit. It is indigenous to the south-west portion of the United States. *Rubus trivialis* is another shrubby species from the southern States with large black well flavoured fruit. *Rubus ursinus* (*macropetalus*) is a unisexual shrub indigenous to California and Oregon, which bears black, large, oval, and very sweet fruit.

The Indian Raspberry is *Rubus flavus* (*ellipticus*), a strong-growing evergreen species indigenous to the mountain regions of India, where it is found at elevations of from four to seven thousand feet. The stems are fully an inch in diameter at the base, and are armed with stout formidable thorns. The plants are prolific, the fruit being borne upon the terminal shoots of the current season's growth, and forms loose panicles of from six to eighteen berries. In colour the fruit is pale yellow, and it possesses the true Raspberry flavour, with a pleasant acidity. This species might prove serviceable in regions that are too warm for the common Raspberry. *Rubus lasiocarpus* and *Rubus opulifolius*, two closely allied species indigenous to the mountain regions of India, Ceylon, and Java, yield large and palatable fruits. *Rubus reticulatus*, another Indian mountain species, has large red pleasant fruit, which is produced in succession for a long period. The three last-named species might prove serviceable in those parts of Australia that are too warm for the ordinary Raspberry. Several species of *Rubus* are indigenous to Eastern Australia, though they extend to other countries. One of the best known is *Rubus rosifolius*, which passes under the name of the Native Raspberry. This species is also found in many parts of Africa and Asia. The fruit is produced in succession, and is somewhat poor in flavour, but improves in tropical regions. *Rubus mollacanus* (*rugosus*) is another species found in Eastern Australia as far south as Gippsland, but it also extends to New Guinea, Fiji, the Philippine Islands, China, and India. It is robust, tall, somewhat rambling in habit, and has small red fruit having a slight acid flavour. *Rubus parvifolius*, is a species also found in Eastern and Southern Australia, though it extends to Japan and other parts of Asia. The fruit is of medium size and fairly palatable, its flavour being better in mountain regions than in the lowlands. *Rubus Gunnianus*, a small herbaceous species, is the Tasmanian Native Raspberry, and is the principal indigenous fruit found in Tasmania. It grows in alpine regions only, and produces red juicy fruits, but it is more closely allied to the

Cloudberry (*Rubus Chamæmorus*) than the Raspberry. A closely allied species is *Rubus geoi les*, indigenous to Chili, Patagonia, and other parts of South America, as also the Falkland Islands. It is herbaceous, and bears greenish-yellow pleasantly flavoured fruit, which resembles the Cloudberry. *Rubus imperialis*, another South American species from Argentina and Brazil, yields large and palatable fruit, as also does *Rubus Hawaiensis*, a species from the Sandwich Islands.

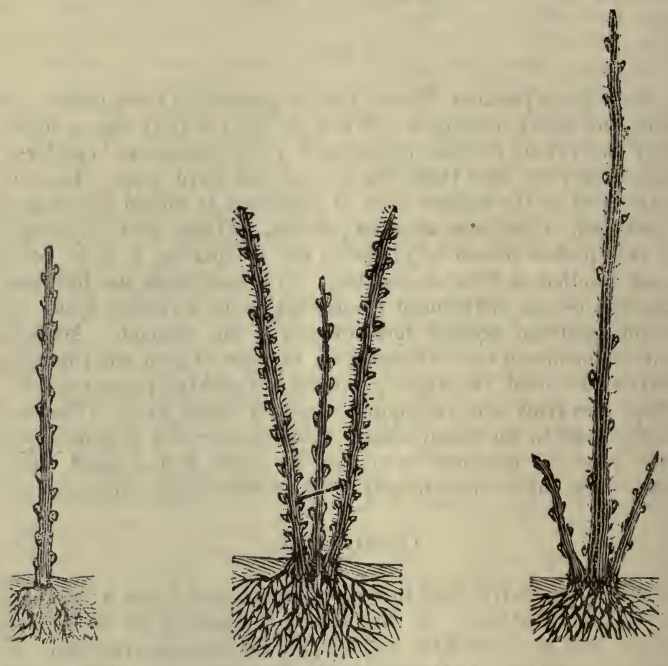
Uses.

The fruit has a peculiar flavour that is grateful to most palates, but it is volatile and easily destroyed. When the fruit is fully ripe a shower of rain may destroy its peculiar aroma, and if the berries are kept for a few days before they are used their rich flavour will have gone. In order to obtain the fruit in the highest state of perfection it should be eaten when fresh gathered, or as soon after as possible. When sent to market the fruit as it is picked should be placed in the receptacles it is to be eaten from, and handled as little as possible, In a fresh state the Raspberry is considered to be one of the most wholesome fruits, as, unlike many others, it does not undergo acetous fermentation in the stomach. Medicinally the fruit is considered to act beneficially in cases of gout and rheumatism. Raspberries are used in large quantities for making preserves, and jam made from this fruit is more popular than any other kind. The fruit is also largely used in the manufacture of sweetmeats and a popular syrup. From the juice an excellent wine can be made, and a good spirit by distilling. The juice is also largely used for flavouring spirits and ices.

Cultivation.

The Raspberry thrives best in a cool climate, and is not a suitable fruit for the warmer districts. It thrives well in many of the cooler parts of Australasia, and is particularly well adapted for mountain regions. When the climatic conditions are favourable the Raspberry is a very profitable fruit to cultivate. It will succeed in any ordinary good ground, but thrives best in a rich strong loamy soil. The ground should be deeply worked, and drainage must be provided for if necessary. Planting may be done at any time between April and August, but unless circumstances make it necessary it is not advisable to delay till late in the season. The ordinary mode of planting is to place the canes about six inches apart in bunches of three in rows four or five feet each way, and tying each group to a single stake. Some growers prefer to plant single canes eighteen inches apart, with a space of about five feet between the rows. It is advisable to shorten back the canes in planting in order to encourage the plants to make strong growth the first season. By the adoption of this plan strong well-furnished plants will be obtained sooner than if the newly planted canes were left long. A good idea of the effects of the treatment recommended may be obtained from the illustrations. A Raspberry plantation will reach perfection in about three years after

it is formed, and if properly treated will last for a long period. As a rule, however, it will not be advisable to let it stand for more than eight or nine years, as better results will be obtained from younger plants. The ground should be kept as free from weeds as possible by frequent light scarifyings or hoeings, taking care to injure the



Medium strong plant. | Probable growth of the same plant if cut back to the black mark. | Probable growth of a strong plant if not cut back the first season.

roots as little as possible. Deep digging or ploughing should never be practised, as these operations destroy a large proportion of the roots and weaken the plants. Before the hot weather sets in let the whole surface of the ground be covered with a mulching of stable manure, straw, grass, or any other material that will answer the purpose. By this means the ground will be kept cool—a favourable condition for the Raspberry in the early summer months—and the surface moisture will be conserved to a very great extent. If stable manure is used it will not only prove serviceable as a mulching, but supply as it decays nutriment for the plants. Raspberries are strong-feeding plants, and old plantations will generally be materially

assisted by the use of manure. Manure should be supplied in the winter and lightly forked in, disturbing the roots as little as possible.

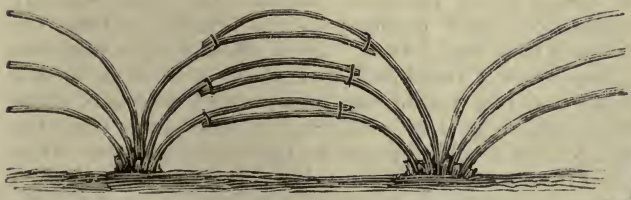
Pruning and Training.

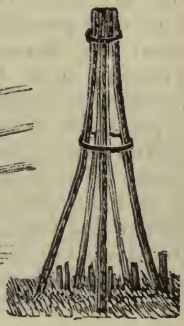
The Raspberry has strong spreading perennial roots, which throw up a number of stems or canes every summer. These bear fruit the second year and then decay, being replaced by younger canes; consequently, the bearing or two-year-old canes must be cut away after they have done fruiting. The young canes will generally be too numerous, and they must, if necessary, be thinned out to the required number while they are small. The number of canes to be

Training.

To Single Stakes.

With Hoops.





Without Stakes.

left must depend to a great extent upon the strength of the plants, and will vary from three to six. In the latter part of the winter or early in the spring before growth commences, the young canes should be shortened back according to their strength, leaving them from thirty inches to four feet long. At the same time they should be

TRELLISING.

Trellising with Posts and Rails.

Trellising with Stakes.

securely tied to their supports. The Raspberry may be trained in various ways, according to the means and fancy of the cultivator and the nature of the climate, as also to suit special local conditions. The most generally adopted mode is to have a single stake for each plant and fastening the canes to it before growth commences. Training with hoops is an excellent method, but it is scarcely practicable except for small gardens, as its practice entails the expenditure of much time and labour. It is effected by using two stakes and a hoop from a small barrel or piece of wire to form a circle. The canes are tied inside the hoop, which prevents them from being blown about by the wind, and at the same time the foliage and fruit is more freely exposed to light and air than when the stems are tied in bunches to single stakes. Raspberries are often grown without any supports, and when this system is adopted a preference should be given to varieties with short sturdy canes.

Another way of doing without stakes is to tie the canes to those of the adjoining plant, as shown by the illustration. Trellising is often practised, but it is better adapted for cold regions than others. The advantages of this system are that when the canes are spread out the fruit is more fully exposed to the light and air, and that, consequently, it ripens sooner, more regularly, and has a more perfect flavour than when the plants are bunched up to single stakes. On the other hand, however, in regions where the sun has great power the spreading out of the canes and foliage adds to the risk of scorching, which often causes injury to the crops. The ordinary way of trellising is to place stakes along the rows at intervals of ten or twelve feet to support battens or wires, to which the canes must be tied, spreading them out so as to cover the spaces as regularly as possible. Another mode of spreading out the growth is to place stakes about two feet from the plants on either side in the rows and tie a portion of the canes to each, as shown by the illustration. Raspberries may also sometimes be trained upon walls or fences with advantage, and more especially in shaded situations, where the crops will be serviceable through being later than when grown under ordinary conditions.

Propagation.

Raspberries may be propagated by seeds, cuttings, layers, and suckers. Seed is seldom used, and only for raising new varieties. It should be saved from the finest berries, fully ripened, and ought to be sown in the autumn or early spring. It should be sown in rich soil, covering it to the depth of an eighth of an inch. It is better to sow in pots, boxes, or frames, as more attention can be given than in the open ground. When the young plants are about two inches high they should be transplanted into small beds about six inches apart. They will usually fruit the second year, but sometimes not till the third. Plants are readily propagated by cuttings or layers, but these methods are but little practised. The most common method of propagation is by suckers, which are freely produced and have merely to be removed from the parent plants. In the case of new or choice varieties, which are wanted to increase quickly, the object can be readily attained by planting pieces of the roots in rich soil.

Injurious Insects.

Aphides.—Various insect pests attack the Raspberry, though it, perhaps, suffers from them to a less extent than many other fruits. Aphides of various kinds often attack the foliage soon after growth commences or later on in the early summer, causing more or less injury. When these insects make their appearance it will be advisable to promptly spray or syringe the plants with some liquid remedy. Full particulars respecting these insects and the remedies for them will be found at page 77, volume 1. A kindred insect, commonly known as the Flea-louse (*Psylla tripunctata*), also causes

some trouble in Raspberry plantations. It is a small insect very similar in appearance to an Aphis, but moves with a jumping motion like the Flea, hence the common name. This insect is very destructive, causing the foliage to shrivel and curl, as also the points of the young shoots. Remedies:—It requires similar treatment to that recommended for the Aphis family.

Beetle.—An insect known as the Raspberry Beetle (*Byturus tomentosus*) is a very troublesome pest in Europe, but the writer is not quite certain whether it has as yet made its way to Australasia. Probably it has, and if not we have an insect very similar to it. The Raspberry Beetles are small dark brown insects about the sixth of an inch in length and having six feet. They make their appearance as soon as growth commences, and feed upon the young shoots. As the

RASPBERRY BEETLE.

Larva and Perfect Insect.
(Natural Size).

Showing the Larva at work and how the Fruit is effected.

Larva and Perfect Insect.
(Magnified).

flower buds make their appearance the female deposits its eggs singly in them, and the young larvæ, or grubs, hatch out just as the fruit has formed. These grubs are brownish-yellow, with dark markings and heads, are about half an inch in length, and have six legs. As soon as they are hatched the larvæ commence to feed upon the fruit, and either destroy it altogether or some of the carpels as shown in the illustration. Eventually the grubs, after completing their work, fall to the ground, change into their chrysolis form, and

remain during the winter. Remedies:—1. Digging and hoeing the surface soil so as to destroy as many of the chrysolids as possible. 2. Collecting and destroying the insects in the perfect, or Beetle, stage. 3. Dusting lime over the plants when the insects are in the larval stage.

Weevil.—The insect known as the Raspberry Weevil (*Otiorynchus picipes*) belongs to the same family as the somewhat familiar Elephant Beetle. It is very destructive not only to Raspberries, but to many other cultivated plants. It is a small light brown insect about a quarter of an inch in length, and upon its back are spots and lines of a dark colour. The insect has six legs, black feet, and a spoon-shaped

WEEVIL.

Larva (Natural Size).

Perfect Insect (Natural Size).

Larva (Magnified).

rostrum or snout. It makes its appearance in the spring or early summer, remaining concealed in the earth all day and feeding only by night. These insects feed upon the leaves and buds, which they puncture with their strong snouts, and seriously weaken the plants. As the summer advances the insects descend to the ground, where they lay their eggs, and in a short time the larvæ, which are small white legless grubs with brown heads, are produced. These grubs feed upon the roots of the plants till they assume their pupa form, and appear as perfect Weevils in the spring. Remedies:—The same methods may be adopted as recommended for the Raspberry Beetle. Other species of the Weevil family are also troublesome in Raspberry plantations, both in their larval and perfect state, and require somewhat similar treatment.

Various Other Insects.—Caterpillars of various kinds are often troublesome in the spring or early summer. Red Spider often attacks Raspberry plants late in the season, and more especially if it has been a dry one. Thrips are also sometimes troublesome. Particulars respecting these classes of insects and the modes of dealing with them will be found at page 77, volume 1.

INJURIOUS FUNGI.

Mildew.—This name is applied to various kinds of fungi that have a white or powdery appearance, and often somewhat vaguely. The name has been applied to a very destructive root fungus that has within the last few years caused great trouble to the Raspberry growers in the Lilydale district, Victoria, where the cultivation of

the fruit is a prominent industry. It is also proving a serious evil in other localities in Australasia. The disease makes its appearance upon the roots in the form of a mass of white thread-like fibres, which feed upon the juices of the plants, causing decay and, eventually, death. Plants, when attacked, soon begin to lose vigour, and their foliage becomes yellow and sickly. There is no known remedy, though probably watering the surface soil occasionally with a solution of Sulphate of Iron would check the spread of the fungus, if it did not destroy it. When a plantation is attacked the wisest and safest plan is to dig up and destroy the affected plants by burning them. Care should be taken that the fungus does not spread, as it does readily, both above and below the surface soil, if affected plants are allowed to remain. This fungus, though very destructive to the Raspberry, is not peculiar to that plant, but also attacks many of our indigenous trees and shrubs.

Rust.—The leaves of the Raspberry are often affected by a reddish species of rust (*Uredo rubrum*), and sometimes to such an extent as to have a sickly appearance. The cause or causes are uncertain, but probably mainly result from uncongenial soil conditions such as extremes of wet and dryness, lack of nourishment, or the use of rank manure. Remedies:—1. Sulphate of Iron. 2. Bordeaux Mixture. 3. Bluestone and Ammonia. Particulars as to the use of these remedies will be found at pages 99 and 102, volume 1.

Varieties.

There are a number of varieties of Raspberries in cultivation, some having red, and others yellow, fruit. The following list embraces those that are most popular and useful, and growers must remember that a few sorts are better for practical purposes than a large number:—

Barnet (*Cornwell's Prolific, Large Red, Lord Exmouth's*).—An old English variety with large roundish-conical dark red fruit. The berries are somewhat larger than those of the *Red Antwerp*, but not quite so highly flavoured. Plant strong, an abundant bearer, and ripens early.

Belle de Fontenay (*Amazon, Belle d'Orleans*).—A French variety with large long conical fruit of a deep red colour, and possessing a good flavour. Plant somewhat dwarf in habit, has very large foliage, and bears late in the season. The plant has also a tendency to throw up suckers profusely, and unless these are kept down it is a shy bearer.

Belle de Pallau.— An excellent French variety with large obtuse-conical fruit of a bright crimson colour, with large grains. Juicy and rich. Plant robust, with strong upright canes, and very prolific.

Brinckle's Orange (*Orange*).—An American variety with large conical bright orange fruit, which is juicy, sweet, and highly flavoured. Generally considered to be the richest flavoured yellow Raspberry. Plant strong and very productive. Ripens early. The plant throws up suckers abundantly, and these must be kept down, or otherwise the fruit will not be plentiful.

Carter's Prolific.—An English variety with large deep red roundish-conical fruit, which is rather firm and has an excellent flavour. Plant strong, prolific, and ripens its fruit early.

Cornwell's Yellow.—This is one of the best of the yellow-fruited kinds, and is of English origin. Fruit large, well flavoured, and is produced in early summer. Plant robust and a regular cropper.

Cushing.—An American variety of good repute with large bright red conical fruit with a brisk acid flavour. Plant moderately vigorous and a good cropper. An early summer bearer.

Fastolf (*Filby*).—A favourite English variety with large obtuse-conical high flavoured purplish-red fruit, which ripens in early summer. Plant robust and generally a free bearer, but feels the effects of drought more than some other kinds.

Franconia (*Naomi*).—An early French variety with large obtuse-conical purplish-red fruit, which has a brisk sub-acid flavour, and is excellent for preserving. The fruit is also firmer than most kinds, and, therefore, bears carriage better. Plant strong, has large foliage, and a very free bearer.

Barnet.

Belle de Fontenay.

Belle de Pallau.

Brinkle's Orange.

Carter's Prolific.

Knevett's Giant.—An English variety with very large deep red roundish-conical berries, which have a rich flavour and ripen medium early. Plant very robust and productive.

Northumberland Filbasket.—An English variety of high repute with large deep red roundish-conical fruit, which has a pleasant slightly acid flavour, and ripens in early summer. Plant robust, hardy, and a very good bearer.

Cushing.

Franconia.

Fastolf.

Knevett's Giant.

Northumberland Filbasket.

October Red.—A French variety with large bright red roundish-conical highly-flavoured berries, which ripen their main crop late in the summer and autumn, and are produced in succession. Plants strong and bear freely, but a full crop can only be obtained from the young canes of the same year's growth. Older canes will yield berries, but they will be smaller and less abundant than those from a younger growth.

October Yellow.—This is also a French variety, with large yellow berries, but in all other respects it is similar to the *October Red*.

Prince of Wales.—An English summer-bearing variety with large roundish-conical fruit, deep bright red in colour, with a pleasant brisk flavour. Plant strong, productive, and only throws comparatively few suckers.

Red Antwerp (*Burley, Late Bearing*).—This is an old and popular variety, and, notwithstanding its name, is of English origin. Fruit large, nearly globular, dark red, juicy, with a rich brisk flavour. Plant strong, a free bearer, and can generally be depended upon for a crop.

Rivers' Monthly (*Large Monthly*).—A valuable English late-ripening variety, which produces its fruit in succession for a considerable period. In favourable seasons fruit may be obtained without a break for six or seven weeks. The foliage is, however, somewhat tender, liable to get scorched, and the plants are seriously affected by drought. Fruit roundish-conical, bright red, and well flavoured. Plant strong and very prolific.

October Red.

Prince of Wales.

Red Antwerp.

Rivers' Monthly.

Semper Fidelis.

Victoria.

Semper Fidelis.—This is an excellent and useful English variety with large conical dull red sub-acid fruit, which ripens medium early. Though the berries are not so highly flavoured as those of some other kinds they are excellent for preserving, and as the variety is a sure cropper it is one of the most profitable for market purposes. Plant vigorous and hardy.

Vice-President French (*French*).—An American variety with large roundish-conical fruit of a deep red colour, juicy, with a rich flavour, and ripening rather late in the summer. Plant strong and very productive.

Victoria (*Roger's Victoria*).—An English variety with large dark red roundish-conical berries possessing a high flavour, ripening towards the end of summer and in autumn, and coming in a little before the *October Red*. Plant only moderately robust, but bears fairly well.

Yellow Antwerp (*Double-bearing Yellow, White Antwerp*).—An old English variety somewhat similar in habit and bearing qualities to the *Red Antwerp*, but the fruit, which is pale yellow, has a sweeter flavour. Plant vigorous and a free bearer. There is a sub-variety called the *Sweet Yellow Antwerp* with deeper-coloured and somewhat higher flavoured fruit, but the plants are less robust and do not bear freely.

Black Cap Raspberries.

This is a distinct class from the ordinary Raspberries, embracing a number of varieties of *Rubus occidentalis*, an American species commonly known as the Thimbleberry. Though the term "Black Cap" is applied to this section the fruit varies in colour, according to the variety, from deep black to purple, orange, bright yellow, and buff. In America varieties of this class receive a good deal of attention, and are extensively cultivated, but they have not found much favour in Europe, and are scarcely known in Australasia. Probably this section would be found useful in cool mountain districts, as they are hardy, prolific, and the fruit is of good quality. The following list embraces a selection of desirable varieties :—

American Black (*Black Cap Raspberry, Black Raspberry*).—This is the original species, indigenous to most parts of the United States. Fruit medium size, roundish-oval, black, with a bloom. Flavour sweet and pleasant, but the seeds are numerous and disproportionate to the amount of flesh and juice. Plant hardy and variable in habit, and roots from the ends of the young canes.

Autumn Black.—This is a variety raised in England by the late Mr. Rivers from a cross between the Black Cap Raspberry and the English Blackberry (*Rubus fruticosus*). The plant has to some extent the rambling habit of the Blackberry, but the fruit is a true Raspberry. Fruit medium size, reddish-black, with a brisk and pleasant flavour. Plant very robust, prolific, and a late bearer.

Catawissa.—A prolific variety of branching habit which often produces a second, or autumn, crop. Fruit medium-sized, round, dark reddish-purple, juicy, and well flavoured, and chiefly produced at the ends of the shoots.

Mammoth Cluster (*Large Miami, McCormick*).—This is a favourite variety in America, where it is extensively cultivated. Fruit very large, round, purple-black, well flavoured, and ripens rather late. Plants hardy, vigorous, and productive.

Miami.—A hardy, vigorous, prolific, and serviceable variety. Fruit large, roundish-oval, brownish-black, juicy, sweet, and well flavoured.

Ohio Everbearing (*Monthly Black Cap*).—A very popular and excellent variety largely cultivated in America. Fruit large, black, sweet, juicy, and pleasantly flavoured. Plant upright in habit, has numerous strong hooked spines, makes robust growth, and bears more or less in succession till late in the autumn.

Mammoth Cluster.

Miami.

Ohio Everbearing.

Philadelphia.

Philadelphia.—A hardy and productive variety with erect branching canes. Fruit medium to large, dark red, with a brisk sub-acid flavour.

Seneca.—An excellent and productive variety which ripens at mid-season between the early and late kinds. Fruit large, oval, black, with a slight bloom, juicy, and well flavoured.

SAPODILLA PLUM.

The fruit known under this name is the product of *Achras Sapota* (*Sapota Achras*), a large evergreen tree with white flowers indigenous to the West Indies and tropical South America. It belongs to the order Sapotaceæ, which embraces many genera that yield useful edible fruits. *Achras* is the Greek name for the Pear, and was applied to the genera in allusion to the shape and colour of the fruit. The fruit is as large as a medium-sized Quince, with reddish-yellow flesh which has a rich perfume and a delicious flavour. In addition to its value as a fruit tree the Sapodilla Plum yields gutta-percha in considerable quantities, and medicinally the bark is a useful tonic, while the seeds are aperient and tonic. An Australian species, *Achras australis* (*Sideroxylon australe*), an evergreen tree indigenous to Queensland and the coast river districts of Northern New South Wales, bears a Sapodilla Plum that is tolerably good fruit, but which is greatly inferior to the exotic kind, though the tree is more hardy. This species is also known under the name of Australian Apple. (For full description see page 202, volume 1). The Sapodilla Plum requires a rich loamy soil, and the West Indian species, as a matter of course, can only be grown successfully in tropical or semi-tropical regions. The Australian species, being somewhat more hardy, may be grown in medium warm districts. Being handsome evergreen trees, both species are worthy of attention for ornamental purposes as well as for their fruit in congenial localities. Propagation is mostly effected by seeds, which should be planted an inch and a-half deep. Plants may be obtained from layers, and ripened cuttings of the current season's growth strike readily in sand under shelter.

SAPOTA.

This is a handsome evergreen tree, known to botanists as *Casimiroa edulis*, belonging to the natural order Aurantaceæ, and closely allied to the Citrus family. It is a native of Mexico, where it grows up to an elevation of about seven thousand feet. By the Mexicans it is called Zapote. The tree attains a height of about thirty feet, and makes a compact and dense growth. The fruit is about the size of a Cherry, pale yellow, and must be dead ripe before it is fit to eat. When fully matured the flesh is melting like that of the Peach, has a rich sub-acid flavour, and is said to induce sleep. The seed is said to possess deleterious qualities. The Sapota may be grown successfully from medium warm to temperate regions, where the frosts are

but light, and is well worthy of attention as an ornamental tree. Propagation is most readily affected by seeds, which should be planted an inch deep. Cuttings made from ripened wood of the current season's growth will strike in sand if placed in a close frame where they will be protected from atmospheric influences.

SAPUCAIA NUT.

The Nuts known under this name are the product of *Lecythis ollaria*, an evergreen tree indigenous to tropical South America, belonging to the Lecythideæ section of the order Myrtaceæ. The specific name signifies an oil jar, in allusion to the form of the capsules. The tree attains a height of about sixty feet, has yellowish-white flowers, and its fruit consists of hard woody urn-shaped capsules about six inches in diameter, and somewhat similar in form to those of the Eucalyptus family. These capsules are furnished with a lid at the apex about two inches in diameter, and when thoroughly ripe these coverings fall off with sharp cracking reports, and the seeds fall to the ground. The capsules, however, remain upon the trees after they are empty for a considerable time, and are then called Monkey Pots. Each capsule contains a number of soft-shelled seeds, or Nuts, from one to two inches in length, which have a sweet pleasant flavour, and are eaten either raw or roasted. The seeds are greatly relished by monkeys, which are numerous in the native regions of this tree, and these sagacious little animals are said to watch for the reports made by the lids when separating from the capsules. *Lecythis Zabucajo*, another large evergreen tree, a native of the same regions, also yields similar nuts. Being natives of tropical regions, the Sapucaia Nut trees can only be grown in the warmer parts of Australasia. In congenial localities they are well worth cultivating for their Nuts, and also as handsome ornamental trees. Propagation is most readily effected by seeds, which should be planted about two inches deep. Layers root freely, but, as a matter of course, they can only be obtained from small plants, and cuttings of ripened wood of the current season's growth will strike in sand if protected from the weather.

SEA-SIDE GRAPE.

This is the common but somewhat inappropriate name of *Coccoloba uvifera* (*parviflora*), a medium large evergreen tree indigenous to Central America northward to Florida and the West Indies. It belongs to the natural order Polygonaceæ, or Buckwheat family, which comprises but very few woody plants. The greenish-white flowers are produced in spikes, and these are followed by bunches of small dark blue berries, which are edible and possess a sweet or sub-acid flavour according to the varieties, of which there are several.

As the tree grows naturally in sandy sea-coast soils, it may, in warm regions, be planted with advantage in similar localities. From the wood an astringent substance called Jamaica Kino is extracted, and it also yields a red dye. Several other species of *Coccoloba* yield edible fruits and possess similar properties, but with one exception (*Coccoloba Leoganensis*) they are indigenous to inland districts of tropical South America. Propagation may be effected by seeds, which should be planted an inch and a-half deep, and ripened cuttings, of the current season's growth, in sand without shortening the leaves.

SERVICE.

The Service is a well-known tree in the United Kingdom and other northern countries of Europe, where it is valued chiefly for its wood and for ornament, though the fruit is utilized to a limited extent. There are two kinds, one being known as the True Service (*Pyrus domestica* or *Pyrus Sorbus*), and the other the Wild Service (*Pyrus torminalis* or *Cratægus torminalis*). They belong to the Pomea section of the order Rosaceæ, and are closely related to the Apple and Pear. The True Service is indigenous to the United Kingdom and many other parts of Northern Europe. It is a large deciduous tree of spreading habit with winged leaves, and bears in profusion fruit about the size of large Gooseberries which varies in shape from oblong to round. In flavour the fruit is austere and insipid, but is used as food in Kamschatka and other regions in Northern Europe after being mellowed by the action of frost. It hangs upon the trees the greater portion of the winter, and long after the leaves have fallen. The fruit is sometimes used for making cider, either by itself or when mixed with Apples. The wood is compact, strong, and durable, and in Europe is used to some extent for tool handles and the wooden parts of implements.

The Wild Service is a larger tree which is indigenous to the United Kingdom and other parts of Northern Europe. It bears in profusion large bunches of brown fruit about the size of small Gooseberries, which are edible, but somewhat harsh and insipid. The wood is white, compact, hard, and tough, and in Europe is used for various purposes when strength and durability are required.

Closely allied to the Service is the Mountain Ash or Rowan (*Pyrus aucuparia*), a handsome small tree which attains a height of about thirty feet. The fruit is produced in profusion, and is of an orange red colour, but is only valuable for its showy appearance in the late autumn or winter. There is also a variety with yellow fruit. The timber is hard, tough, and durable, and the suckers, which spring freely from the roots, as also with the Service, are in Europe utilized for making hoops for casks and other purposes.

Propagation in each can be readily effected by seeds, which should be planted an inch deep. Plants may also be easily obtained from layers or cuttings. Formerly both species of Service were often used

by European gardeners as stocks for the Apple and Pear, but of late years they are seldom employed for the purpose. Both kinds of Service and the Mountain Ash are better adapted for the cooler parts of Australasia than other regions, and they are well suited for elevated and mountain districts. They may, however, be grown in medium cool districts with success, and are worthy of attention as ornamental trees, and also for their timber.

SERVICE BERRY.

The plant known by this name is a small deciduous many-branched tree belonging to the Pomea section of the order Rosaceæ. It is indigenous to North America, and is known botanically as *Amelanchier sanguinea* (*Mespilus Canadensis*, *Pyrus sanguinea*). The flowers precede the foliage in the spring, and the trees are brilliant masses of pure white blossoms; consequently, the plant is also known as the Snowy Mespilus. The small purple-black fruit is about the size of Cherries, and has a sweet and pleasant flavour. As an ornamental plant, the Service Berry is worthy of attention in the colder regions of Australasia, though its fruit is of less value than many other kinds. Propagation is readily effected by seeds, cuttings, and layers. Seeds should be planted an inch deep, cuttings put in in the spring, and plants may be layered before they start into growth.

SHERBET SHRUB.

The plant known under this name is *Grewia asiatica*, an evergreen shrub indigenous to India, Persia, and other parts of Asia, belonging to the natural order Tiliaceæ. It has purple flowers, elm-like foliage, and makes a good ornamental shrub. The small fruit has an acrid acid, but also a pleasant, flavour, and is utilized to some extent in the manufacture of sherbet, hence the common name. This shrub may be grown successfully in regions ranging from tropical to medium warm, and will thrive in any fairly good soil. Propagation is effected by seeds, which should be covered an inch deep, or plants may be obtained readily from layers. Cuttings of ripened wood of the current season's growth also strike freely in sand if protected from the weather.

SOUARI NUT.

The Souari Nut is the product of *Caryocar nuciferum*, an evergreen tree with broad trifoliate leaves growing to the height of from eighty to a hundred feet, and belonging to the order Rhizobolaceæ. It is a native of Guiana and other parts of tropical South America. The

fruit is nearly round, with a hard reddish-brown outer covering enclosing a white pulp in which four or a less number of seeds or Nuts are embedded. These seeds are kidney-shaped, somewhat flattened, and have hard shells covered with small tubercles. The kernels have a sweet pleasant flavour somewhat similar to the Hazel Nut, but are more oily. Owing to the large proportion of oil in them they are also commonly known as Butter Nuts. Similar Nuts are obtained from *Caryocar butryosum*, also a native of Guiana, which differs from the first-named species in having its leaves five-parted instead of three, and the seeds are somewhat more oily. This species is also known as *Pekea butryosa* and *Pekea tuberculata*, and the seeds pass under the name of Pekea Nuts. As both species are natives of warm regions they can only be successfully cultivated in the tropical and sub-tropical parts of Australasia. In suitable localities they are worthy of cultivation for their Nuts, which are freely produced and will always find a ready sale. The Nuts are also valuable for their oil, which is of a superior kind. As ornamental trees both species are also worthy of attention. Propagation is generally effected by seeds, which should be covered two inches deep. If young plants are available propagation may be easily effected from layers, and cuttings of the current season's growth may be struck in sand if protected from sun and wind.

STAR APPLE.

This is a handsome evergreen tree with spreading branches known to botanists as *Chrysophyllum Cainito*, belonging to the order Sapotaceæ. The generic name is derived from *chrysos* (gold) and *phyllon* (a leaf), in allusion to the undersides of the leaves being densely covered with deep yellow shining hairs or down. The tree attains a height of thirty or forty feet, has white flowers, and fruit as large as a medium-sized Apple. The fruit consists of ten cells, each containing a single seed, and when cut through the centre before the seeds harden the halves have a rayed or star-like appearance, and hence the common name. The fruit is also known as the Cainito. When fully ripe the gelatinous pulp has a pleasant flavour, but previously to maturing it is remarkably astringent. There are several varieties, which differ slightly in shape and quality. The Star Apple is a native of the West Indies, and can only be grown successfully in the tropical and semi-tropical regions of Australia. Several other species of *Chrysophyllum* yield edible fruits of less economic value than the Star Apple. They are mostly natives of the West Indies, tropical America, or West Africa, and require the same treatment as the Star Apple. *Lucuma Cainito*, a closely-allied species from Peru, yields a fairly good fruit known as the Peruvian Cainito. This species is more hardy than the Star Apple, and may be grown successfully in medium warm regions. *Chrysophyllum pruniferum* (*Niemeyera prunifera*) is the Australian Cainito, and is also known as an Australian or

Native Plum. For a full description of this tree see page 209, volume 1.

The Star Apple and the other species mentioned are handsome trees and worthy of attention for ornamental planting, irrespective of the value of their fruit, in localities where the climate is congenial. They will grow in any ordinary good soil, but thrive best in a deep rich well-drained loam and in sheltered situations. Propagation may be effected by seeds, which should be planted an inch and a-half deep. Cuttings of the ripened wood of the present season will root freely in sand if placed in a close frame, and when practicable plants can be readily obtained from layers.

STRAWBERRY.

History.

The Strawberry belongs to the natural order of *Rosaceæ*, and is known botanically as *Fragaria*. This name comes from the Latin *fragrans* (fragrant), in allusion to the strong and pleasant odour of the fruit. The common or English name is supposed to have originated from the practice of laying straw under the fruit to keep it clean. Some authorities, however, contend that the name was originally Strayberry, in allusion to the runners trailing along the ground and forming young plants away from the parent one. There are a number of species, and the family is widely diffused, representatives being found in the temperate zones of Europe, Asia, and both North and South America. The numerous varieties now cultivated have originated from several species which, as a rule, alter materially in character when brought under cultivation.

Strawberries appear to have been unknown or neglected by the nations of antiquity, as they are not mentioned by the early Greek and Roman writers upon agriculture. In England they appear to have been systematically cultivated for hundreds of years, as Strayberries are mentioned in old records from the time of Henry VI. In the latter part of the fifteenth century the garden of the Bishop of Ely, situated in Holborn, London, was noted for the fine Strawberries grown in it, and Shakspeare makes prominent allusion to this circumstance in one of his plays. The kind then grown is supposed to have been the common Wood Strawberry (*Fragaria vesca*), which was doubtless the first species brought under cultivation. This species grows wild in the woods in the United Kingdom and many other parts of Europe, and is also found in North America. In its native state it produces an abundance of small red fruit, which is rather poor in flavour, but under cultivation its quality is greatly improved. The Alpine Strawberry comes from the same species (*Fragaria vesca*). This kind is more vigorous in growth than the Wood Strawberry, and bears larger and better flavoured fruit. This Strawberry is very prolific, and under liberal treatment will yield more or less fruit

for several months in succession. There are two sections, the red and the white, the latter having fruit that is paler in colour and scarcely so acid in flavour as the former, but in other respects they are alike. Each section also embraces several varieties. *Fragaria collina*, a species found in various parts of Northern Europe, bears fruit somewhat similar to *Fragaria vesca*, and is commonly known as the Hill Strawberry. Some authorities, however, consider that this species is merely a form of *Fragaria vesca*.

The first of the large-fruited kinds grown in England was known as the Hautbois, and is supposed to have originated from the Mountain Strawberry of Bohemia (*Fragaria elatior*). The name Hautbois (pronounced hoboy) is French, and means literally high wood, and probably originated through the species growing naturally in mountain forests. Some authorities, however, contend that the name is derived from the circumstance of the fruit stems rising well above the leaves. In the older English works upon gardening the name is generally written *hautboy*. The fruit of the Hautbois is very highly flavoured, with an aroma differing from that of other kinds, and for a long period it was the most popular Strrwberry that was cultivated. In the course of time the name came to be applied commonly to any kind of fine Strawberries, and "ripe hoboy" is still a prominent London cry during the summer. *Fragaria virginiana*, the Virginian or Scarlet Strawberry, a species with highly coloured fruit, was introduced to England from America early in the seventeenth century. Parkinson, an English horticultural writer of repute, who wrote about this time, mentions the following kinds as being cultivated :—Red and White Wood, Green, Virginian, and Bohemian, the last-mentioned doubtless being identical with the Hautbois. *Fragaria chilensis*, the Chilian Strawberry, was taken to England early in the eighteenth century, but it never became very popular. It has large white fruit with very little colour, and though sweet and pleasant lacks high flavour and juiciness. This kind is not grown much in Victoria, but it is very popular in some parts of New South Wales, and more especially around Sydney, where it is generally cultivated under the name of Hautbois, to which it is not entitled. In fact, many prefer this Strawberry to the other kinds, and growers like it because the fruit is firm and can be carried to market with less difficulty than the ordinary sorts. *Fragaria grandiflora* (*Ananas, calycina*), the Pine-Apple Strawberry, was introduced to Europe about the middle of the eighteenth century from South America. From this species many of the finest varieties belonging to the Pine section have originated. Prominent among these are the British Queen, Carolina Superba, and Frogmore Late Pine.

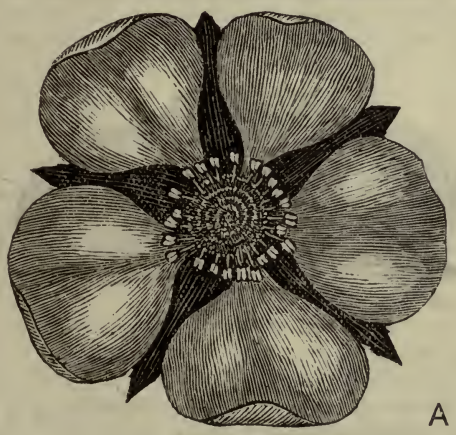
Uses.

The Strawberry is a very popular fruit, and also a very wholesome one. It may be safely eaten by the most delicate persons without fear of any ill effects, as it does not undergo acetous fermentation in the stomach, which is the case with most other fruits. The peculiar rich flavour of the Strawberry is unsurpassed by that of any other fruit, and there are few

who do not highly appreciate it. Medicinally, Strawberries are supposed to be beneficial in cases of gout, rheumatism, stone, gravel, and consumption. The juice is also considered to be serviceable in dissolving tartareous incrustations that collect upon the teeth. In addition to the grateful flavour of the fruit to the palate, the pleasant sub-acid juice is very refreshing, and more especially in hot weather. In France and other parts of Europe a favourite cooling drink is made from the juice when mixed with water, with lemon and sugar added. Strawberries make an excellent preserve, and in the form of either jam or jelly are very popular. The juice by fermentation makes a strong, rich, and palatable wine, and from this an excellent spirit can be obtained by distillation.

Imperfect Flowers.

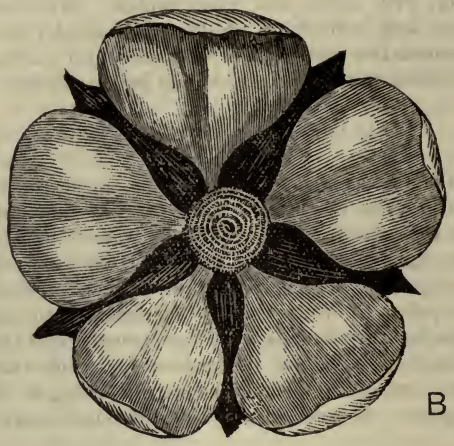
The flowers of the Strawberry are usually bi-sexual, or furnished with stamers and pistils, the essential organs for the production of fruit. Sometimes, however, varieties are produced whose flowers are without stamens, or male organs, and contain pistils, or female parts only. As a matter of course, plants in this condition cannot produce fruit unless fertilised by the pollen of others that are furnished with stamens. With some varieties the lack of stamens is a characteristic, and these are known as pistillate sorts, but it is not uncommon for kinds that usually have perfect flowers to occasionally become unfruitful owing to the suppression of the male organs. A good idea of the difference between perfect and



Perfect Flower Enlarged

pistillate flowers may be obtained from the illustrations. Figure A represents a bi-sexual, or perfect, flower showing the pistils in the centre, with the stamens arranged in a circle around them. The stamens are

different in appearance to the pistils, being longer, and at the end of each is a small knob called the anther. The anthers contain the pollen, a fine powdery substance that is essential to fructification. Figure B shows a pistillate flower. Figure C represents a section of a perfect flower, and affords another view of the arrangement of stamens and pistils. From a



Pistillate or Imperfect Flower Enlarged.

Section of Perfect Flower.

botanical point of view the true fruit of the Strawberry is what we call seeds, which are embedded upon a fleshy receptacle. But though the effect of the pollen simply perfects the seeds, yet if these are not properly formed the receptacles do not enlarge, but wither off. Sometimes plants have stamens and no pistils, but this is not common, and is a sign of degeneracy, and such varieties should be promptly replaced by more reliable ones. Pistillate varieties will yield good crops, provided they are fertilised by the pollen of other kinds growing close to them through

the working of bees and other insects. It may be stated, however, that the pistillate varieties are chiefly of American origin, and that the European kinds generally cultivated are, as a rule, perfect. Therefore, cultivators in Australasia need have but little trouble as to the sexuality of their Strawberries.

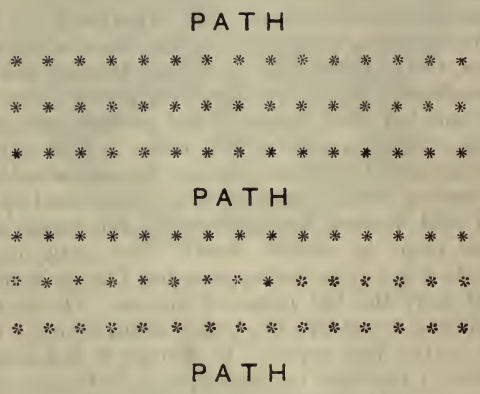
Cultivation.

Climate and Soil.—Strawberries may be grown successfully in many parts of Australasia, but they are better adapted for the cooler regions than the warmer districts. Fruit produced in cool districts is generally superior in flavour to that raised in warmer localities. It is generally admitted that Strawberries raised in the north of England have, as a rule, a better flavour than those produced in the southern counties. Then, again, fruit raised in Scotland is popularly supposed to be richer in flavour than the produce of England. The Strawberry is a fruit specially well adapted for cool elevated regions and the slopes of mountain ranges. It will, however, thrive fairly well in all but tropical and semi-tropical regions in Australasia. Strawberries may be grown successfully in any ordinary good soil, but they thrive to the greatest perfection in a rich deep sandy loam. Some varieties will do better in light soils than others, but their peculiarities in this respect can only be ascertained by experience. The time of fruiting will be influenced to some extent by the aspect of the ground in cool districts, and growers by this means may accelerate or retard their crops by several weeks. For early crops the most favourable situation is a slope having an aspect that is northerly, so that the plants will have the full power of the sun. On the other hand, if late fruit is required, a southern slope upon which there is comparatively little sunshine is the best aspect. In Europe it is a common practice when early fruit is required to make special beds slope so as to get as much sunshine as possible.

Preparing the Ground.—In preparing land for Strawberries deep cultivation is essential, and more especially in stiff soils. When they are able to do so the roots will penetrate to a considerable depth in search of food and moisture. It is not an uncommon thing in loose soil to find roots from two to three feet below the surface. Deep rooting is a great advantage, as when the roots are well below the surface the plants are less liable to suffer from the effects of drought, and at the same time have a larger area to extract their food from. In preparing land for Strawberries drainage must always be provided for when necessary, as the plants are liable to suffer from the saturation of their roots, and more especially when they are deep in the ground.

Planting.—The most favourable time for planting is in the autumn, as soon as possible after the dry season has broken up. At this period of the year the ground contains a great deal of heat, growth is active, and the young plants are able to make good headway before the winter sets in. During the winter they continue to make good progress, and are able to carry full crops the next fruiting season. Though planting may be done during the winter or spring, the returns the first season will not

be so good as if the plants were put in in the autumn. For garden or hand cultivation the most convenient way of growing Strawberries is to plant them in beds, each containing three rows. These rows should be fifteen inches apart, and twelve inches ought to be left between the plants in the lines. Two feet and a-half of space is left between the outside rows of each bed, and along the centre a twelve inch path should be marked off. By adopting this system of planting, every part of the ground is accessible for gathering the fruit and other purposes without the necessity of trampling over the rows, an advantage worthy of consideration. For field cultivation with horse-power implements, it will be necessary to plant wider, and the rows should not be less than two feet apart. Before the young plants are fixed in their places the roots if long should be shortened back to about half their length. This operation



removes the portions that get broken when shifted, and the roots that are left are more easily arranged in the ground when planted. The shortening process also causes the growth of root fibres from near the ends, as also of additional ones from near the crowns. From the illustrations a good idea may be obtained as how the roots should be trimmed, and the probable effect upon the future growth. When plants have only short roots, as is often the case with plants shifted early in the autumn, trimming back is unnecessary. In planting it is also necessary to trim off the greater portion of the old leaves, leaving but two or three of the central ones. This is if the plants have been taken up in the ordinary way with their roots freed from the soil. On the other hand, however, if the plants are shifted with a ball of earth to each without material disturbance to the roots, there is no occasion to shorten back the foliage. Care should be taken in planting not to expose the roots to a drying atmosphere, and, when practicable, moist, dull, or calm weather should be chosen for the work. It will be advisable in planting to spread the roots out horizontally, as far as may be practicable, just below the surface soil.

Pruning the Roots.
Line showing where to cut.

Roots arranged in the best way.

Roots as generally arranged.

Though this method entails more labour, yet it places the plants under the best conditions for making vigorous growth. Very often, however, both for economy and quickness, planting is done with a dibber. The plants should not be placed too deep in the ground, and it will be sufficient if the crowns are just below the surface.

Keeping Down Weeds.—In order to grow Strawberries successfully it is essential that the plantation should be kept free from

Root growth after Pruning.

weeds, which, previous to the fruiting season at any rate, must never be allowed to make much headway. They should be kept down by frequent light stirrings of the surface soil, taking care to disturb the Strawberry roots as little as possible. As soon as the fruit begins to swell the ground between the plants should be covered with short grass, fine straw, or other suitable material, in order to keep the berries clean. This covering will also act as a mulching, checking rapid evaporation, and preventing the surface soil from caking from the effects of the sun and drying winds. Should the weather be dry when the fruit is forming it will be advisable to water the plants when practicable. Water under such conditions is very serviceable, and its command will give cultivators a great advantage. Watering, however, should always be done thoroughly, and growers must remember that one good soaking is better than a dozen light sprinklings. Strawberry plants at the fruiting period will take up a considerable quantity of water with advantage, but it should not be supplied too freely so as to sodden the ground.

Removal of Runners.—All runners should be removed previous to the fruiting season as soon as they make their appearance, and for this purpose the beds must be looked over frequently. If the runners are allowed to remain it is at the expense of the fruiting power of the plants. Even after the fruiting season it is advisable to remove the runners unless young plants are required, though it is not so essential as before the crop is produced. When treated in this way some kinds will often produce a good second, or autumn, crop. The writer has frequently had this experience, and more especially with that excellent and well-known variety, *Trollope's Victoria.*

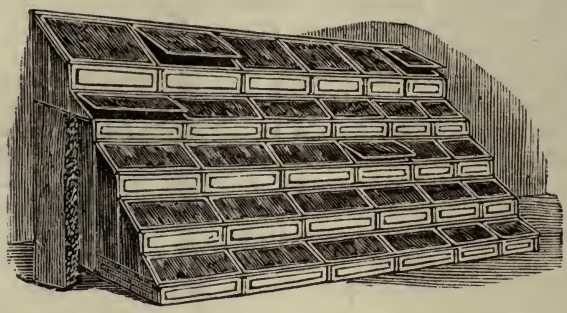
Manuring.—Strawberries are very strong-feeding plants, and require plenty of nourishment to bring the crops to perfection. In preparing the ground well-rotted manure should be used freely, and bone-dust may be employed with advantage in strong soils. The following winter the beds should receive another good dressing, working it in lightly and disturbing the roots as little as possible. Strawberries remove from the soil soda and potash in very large proportions; consequently, fertilizers rich in these materials are very serviceable manures. Wood ashes may be used freely with advantage both in heavy and light soils. Seaweed is also an excellent manure owing to the large amount of potash in it, and should be used freely in localities where it can be readily obtained. Superphosphate, guano, poudrette, and other concentrated manures may be used with advantage to a moderate extent, but in excess they are liable to injure the plants. Rich black soils containing large proportions of vegetable matter from swamps are of great manurial value for land intended for Strawberries, and more especially light loamy or sandy ground. This material should be spread over the surface and allowed to lie for a few weeks before the ground is broken up. Liquid manure may be used with great advantage to Strawberry plants after the flowers make their appearance, but at an earlier stage of growth it stimulates the leaves more than the fruit. This valuable manure should be invariably used when practicable, taking care not to wet the foliage or fruit in applying it.

Renewal of Plantations.—Though Strawberry plantations will last several years and give good returns, yet the better plan is to renew them after two seasons' growth. Young plants will, as a rule. bear more freely and produce better fruit than older ones. Planters should renew half the area under Strawberries every season, and by this means they will always have beds in the most thrifty condition. In the warmer districts where long summer droughts are common, Strawberries often give the most satisfactory returns if the plantations are renewed every year. Plantations in these dry localities suffer severely from the effects of sun and drought unless they receive an amount of attention and care which in many cases it is impossible to give them. On the other hand, by treating the plants as annuals and breaking up the plantation after the fruiting season, the cultivator will have no trouble during the summer. It is also advisable to change the land frequently, as Strawberries are a very exhausting crop. Strawberries are frequently used as edging plants for walks in kitchen or cottage gardens, but they are not well adapted for this purpose, as their growth is not sufficiently compact, and their runners are apt to be troublesome. The Alpine section is the best for this purpose, as the plants do not, as a rule, produce runners.

Cultivation Under Glass.

In Europe it is a common practice to grow Strawberries under glass, either in pots or when planted in beds in frames or houses. Though in this part of the world artificial cultivation is not of so much importance as in the northern countries of Europe, yet it may prove serviceable under certain conditions, and more especially in the cooler regions of Australasia. Strawberries may be grown under the shelter of glass without artificial heat simply to obtain fruit a week or two in advance of the usual time. Plants in pots may be grown under the same conditions for table decoration, and, being very effective when used in this way, they are well deserving of special attention for the purpose If Strawberries are required out of season the plants should be grown in hot beds or heated houses or frames kept at a temperature of from sixty-five to seventy degrees by day and fifty-five to sixty-five at night. The plants must be watered sufficiently to keep the soil moderately moist, but not soddened, and should be frequently syringed or sprinkled over the foliage till they come into flower, when the tops ought to be kept rather dry till after the fruit has set. Air should be admitted freely in the day time, taking care that the plants are not exposed to strong currents. In growing plants under glass, either forced or otherwise in pots or in beds, a rich open soil is essential, and well-rotted manure may be used freely. It is also necessary that the pots or beds, as the case may be, should have effective drainage. Another essential is that the plants should be close to the glass, or otherwise they will become drawn and weakly. Various styles of houses are in use for growing Strawberries, according to the fancies or requirements of cultivators. One of the most serviceable structures is shown by the illustration,

and is used to some extent in the United Kingdom. This is a simple "Lean-to" house with the roof formed of several short frames, like a flight of steps, instead of having the usual slope. These frames open in sections, as shown by the engraving, and the cultivator has ready access to the plants. Stages are fixed below the roof either for pots or boxes of soil at such a depth that the plants will just keep clear of the glass. This is both a serviceable and very cheap style of house.

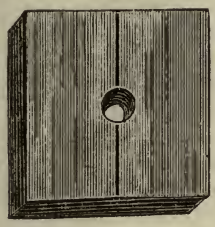


An Economical and Serviceable Forcing House.

Protecting the Fruit.

As soon as the fruit begins to form it will be advisable to cover the surface soil between the plants with a thin layer of short grass, fine straw, or other suitable material to keep the berries clean, as when not protected in this way they are apt to be more or less gritty. This covering also acts as a mulching, checks evaporation from the surface soil, and prevents it from caking hard through the action of the sun and wind. It is a common practice in Europe to use a kind of tile for keeping the fruit of Strawberries clean and the surface soil moist, as also for hastening maturity. These tiles are made in two parts, as shown by the illustration, and when joined together are about twelve inches square. They are from an inch to an inch and a-half thick, and the opening for the plant is four or five inches in diameter. When the ground is covered by these tiles the soil will retain moisture for a long time, as evaporation necessarily goes on slowly. Fruit resting upon the tiles also ripens more rapidly than under ordinary conditions. On the other hand, however, in regions where the sun has great power, fruit resting upon tiles is liable to injury from scorching. Another objection to tiles is they afford harbour for slugs, woodlice, and other insects. As a matter of course, when tiles are used they should be removed as soon as the plants have done fruiting so as to allow the air free access to the soil.

Another mode of protecting the fruit from dirt is by the use of what are known as Strawberry vases. These vases are about twelve inches in diameter, made of the same material as flower pots, and are in shape like round dishes, as shown by the illustration. The fruit



Strawberry Tile.

Strawberry Vase.

either rests upon the sides, or hangs over the edges, of these receptacles, and, therefore, clear of the ground. It is also claimed in favour of the Strawberry vase that its use ensures the plant the full benefit of the rainfall from passing showers, and facilitates ordinary waterings. Owing to their cost and the extra labour in using them, neither tiles nor vases are likely to be largely used by those who grow Strawberries for market. They are, however, worthy of attention from amateurs and others who cultivate for their own pleasure.

Picking.

Strawberries should be gathered when perfectly dry, but not while the fruit is heated by the sun. In the morning and evening are the best times, generally speaking. The flavour of the fruit is strongest in dry weather, and the slightest shower will effect it to some extent. The fine aroma peculiar to the Strawberry is not quite so evanescent as that of the Raspberry, but it is by no means durable, and the berries are in the highest state of perfection when freshly gathered. The fruit being also very tender is easily injured by frequent handlings or the pressure caused when the berries are heaped in masses. In order to obtain Strawberries in the highest state of perfection, the fruit, as it is gathered, should be placed in the receptacles from which it has to be eaten. This is the practice with growers in the United Kingdom and other parts of Europe, and has been the rule for generations. There ought to be no great difficulty in adopting a similar system in this part of the world. When such a practice cannot be adopted conveniently the fruit should be handled with the greatest care, and as few times as possible. The custom prevalent in this part of the world of weighing or measuring the fruit by retail dealers should not be tolerated on any account. It is

impossible to follow such a practice without damaging the berries more or less and spoiling their flavour.

Propagation.

Propagation may be effected by seed, runners, and division of the plants. Seed is seldom used, and only for raising new varieties, except in the case of the Alpine section, which seldom produces runners, and is sometimes increased by this method. The seed should be saved from the finest berries, and must be fully ripe when gathered. The berries should be squeezed by hand in water, and the seeds, which are on the surface of the pulp, will, when detached from the skin, sink to the bottom. After several washings, to remove as much of the pulp as possible, the seeds should be strained through a cloth and dried. It should be sown in the autumn or spring in light rich open soil, covering it about an-eighth of an inch deep. It is better to sow in boxes, frames, or pots so that more care can be given than in the open ground. When the young plants have made four leaves they should be transplanted about three inches apart into small beds. The following season they will be ready for the ordinary plantations. Though seedlings are but seldom raised, it is probable that growers might find it to their advantage to obtain plants in this way occasionally. In some localities there are complaints of Strawberries failing, though formerly they flourished, and it is possible that seedlings, having greater vitality, might with advantage take the places of the older varieties, which appear to have become weakened in constitution. Young plants are so freely produced by runners in the case of most of the varieties that no other method of propagation is needed. The best plants are those that are first formed on the runners, In the absence of runners, as in the case of the Alpine section, young plants are readily obtained by dividing the old crowns.

Injurious Insects.

Aphides.—These insects are often troublesome to Strawberry plants, attacking the leaves, as also the roots when the surface soil is sufficiently open to allow them to get into the ground. As they appear in large numbers and feed upon the juices of the plants, they are, consequently, a serious evil. Therefore, cultivators should promptly deal with this pest as soon as it makes its appearance. For further information as to Aphides and their remedies see page 77, volume 1.

Beetles.—Several kinds of true Beetles, both in their larval and perfect state, prey upon Strawberry plants. These insects range in size, according to the species, from a quarter to three-quarters of an inch, in colour from grey to dark brown, and are provided with six legs. The larvæ are yellowish-white, with brown heads, and vary from half-an-inch to an inch and a-half long, according to the species.

These grubs attack and feed upon the roots, and often cause great havoc to the plants. The perfect Beetle feeds both upon the foliage and roots, and is nocturnal in its habits, burying itself in the soil in the day time. Remedies:—1. Loosen the soil frequently so as to give facilities for birds to find the grubs, to which the insectivorous kinds are very partial. Magpies and crows are very fond of these grubs, as are also fowls. 2. The Beetles, being nocturnal, may be trapped in large numbers when active by means of floating lights placed in dishes filled with water. 3. When the insects are very numerous it will be advisable to destroy affected plantations, and fresh ones should not be made in or near the same spots for a year or two.

Strawberry Beetle.

Caterpillars.—Various species of Caterpillars are troublesome, and often cause serious damage to the foliage and fruit. These insects are most numerous in the early part of the summer, though they often make their appearance in spring and autumn. Some kinds are known as "Leaf-rollers," because in feeding they fold up the leaves, the edges of which they fasten together with their fine silken threads. This peculiarity adds to the difficulty of dealing with the insects, as remedies in the form of powders or liquids do not readily reach them. Remedies:—Lime, soot, or finely-powdered earth dusted over the plants frequently.

Crown Borer.—This insect (*Tyloderma fragaria*) is a small Beetle belonging to the Curculio family. It is brown, about an-eighth of an inch in length, and half that in breadth, the back being covered with numerous dark stripes and spots. The grubs of this insect bore into the crowns of the plants, as their name indicates, and destroy both leaves and flower stalks. There is no absolute remedy for these pests, though they may be kept in check to some extent by dusting the crowns of the plants with lime or soot occasionally. When a plantation is affected by this pest the wisest plan is to destroy it as soon as the crop is removed, as then the bulk of the grubs is still in the crowns of the plants.

Strawberry Crown Borer.

Strawberry Beetle.—This is a very destructive insect in Strawberry plantations, and is found in many parts of Australasia. The Beetle is small, of a drab colour, with black and white markings, belonging to the Weevil family, and is known scientifically as *Rhinaria perdrix.* The larvæ are yellowish-white in colour, and slightly larger than the one shown by the illustration in the crown of a plant. Both in the larva and perfect state this insect is very injurious to Strawberry plants, and it also preys upon Raspberries, though to a less extent. In its larva state the insect bores into the crowns of the plants and causes their destruction. The perfect insects feed upon the stalks of both leaves and flowers, in which they make channels, as shown by the illustration. The Beetles make their appearance in the early

part of the summer, and immediately begin to propagate; consequently, a few weeks afterwards the larvæ come upon the scene and commence the work of their lives. The Beetles having wings can readily travel considerable distances, and, consequently, when they make their appearance, often spread rapidly over a wide area. Remedies:—1.

AUSTRALIAN STRAWBERRY BEETLE.

Perfect Insect (Natural Size).

Perfect Insect (Magnified).

Larva (Magnified).

Pupa (Magnified).

Showing Larva at work in the Crown of the Plant.

Showing how the Perfect Insect eats furrows in the Leaf Stalk.

When the larvæ are numerous and many plants affected, it will be advisable to root up the latter and destroy them. 2. Dust the beds with quicklime occasionally as a preventative, and also after the insects make their appearance. 3. Water with Bluestone and Ammonia or Bordeaux Mixture, but not while the fruit is forming,

as both these remedies are poisonous. 4. Water with a solution of Tobacco, Elder Leaves, or Walnut Leaves. Full particulars as to the preparation of these remedies will be found at pages 99 to 102, volume 1.

Weevil.—The Strawberry Weevil (*Otiorynchus sulcatus*) is a small wingless insect belonging to the Curculio family. In colour it is nearly black, its length is about a-third of an inch, and it is provided with six legs. The larvæ are creamy-white, hairy, without legs, and about a-third of an inch in length. They feed upon the roots and leaves, both in their larval and perfect state, and often cause a considerable amount of injury. This insect does not confine itself to

STRAWBERRY WEEVIL.

Larva (Natural Size).

Larva (Magnified).

Perfect Insect
(Twice its Natural Size).

the Strawberry, but also affects the Raspberry and other plants, though not to the same extent. Another species, commonly known as the Red Legged Weevil (*Otiorynchus tenebricosus*), is another species of similar habits, and equally destructive to Strawberry plantations. It is the same size, shining black in colour, with red legs. The larvæ is similar to that of the first-named species. Various other species of Weevil are also more or less troublesome to Strawberry cultivators. Remedies:—The same as recommended for the Raspberry Beetle at page 367.

Various Other Insects.—*Red Spider*, *Slugs*, *Snails*, and *Thrips* are all more or less troublesome to Strawberry plants, and should be kept under by all practicable means. For full particulars respecting the pests and their remedies see special chapter upon Insects, page 77, volume 1.

INJURIOUS FUNGI.

Leaf Blight.—Strawberry plants are often affected by a fungus that appears in the form of spots upon the leaves, and which sometimes causes serious damage. The spots are at first small and dark brown or purple in colour, but they increase in size afterwards, and assume a lighter hue. The fungus grows rapidly, and in a few weeks either destroys or seriously injures such leaves as it attacks. When the plants are attacked early in the season the fungus also spreads to the flower stalks, and by exhausting the juices either prevents the berries from forming or causes them to shrivel up and wither off

at an early stage. The fungus propagates rapidly, and the spores are widely distributed by every puff of wind. Remedies:—1. As soon as the fungus is detected remove all the affected leaves carefully and burn them. In this way it is quite possible to get rid of the pest if it is dealt with at an early stage. 2. When not very bad the fungus may be kept

STRAWBERRY LEAF BLIGHT.

Affected Leaves.

Spores of Fungus
(Magnified 500 Times).

in check to a great extent by spraying the plants with either Ammoniacal Solution of Copper Carbonate, Bordeaux Mixture, Eau Celeste, or Sulphate of Iron. Directions for preparing and using these fungicides will be found at page 98, volume 1. When plants are badly affected it will be advisable to remove and destroy them as soon as practicable so as to prevent the fungus from spreading.

Mildew.— Sometimes Strawberry plants are attacked by various forms of Mildew, either upon the roots, leaves, or flower stems. The most general cause is the want of drainage, but the result may be due to the use of strong fresh manure. Remedy:—Water with a solution of Sulphate of Iron.

Rust.—Various forms of Rust affect Strawberry plants, and sometimes cause serious injury both to the foliage and fruit. The principal kind is what is known as Strawberry Brand (*Aregma obtusatum*), which is very widely spread, and is in Europe considered to be a very destructive fungus. This fungus generally does not make its appearance till the

STRAWBERRY BRAND.

Affected Leaf.

Spores of Fungus (Greatly Magnified).

summer has well advanced; consequently, the plants do not suffer till after the fruiting period. It makes its appearance in minute yellow spots, and usually on the upper sides of the leaves. Remedies:—1. Sulphate of Iron. 2. Bordeaux Mixture. 3. Bluestone and Ammonia. 4. Bluestone and Sodium Carbonate. Each remedy should be applied as a spray, and whatever one is chosen ought to be used throughout. Full directions as to the preparation and use of these remedies will be found on pages 99 and 102, volume 1. Other species of Rust fungi sometimes attack Strawberry plants, and all require the same treatment. When, however, plants are badly attacked, it will be advisable to remove the leaves and destroy them by burning.

VARIETIES.

There are a great number of varieties of Strawberries in cultivation, but growers, either for market or private use, will find a limited number will give more satisfactory results than a larger one. The following list embraces the most popular varieties, and among them are to be found all the desirable qualities to be found in Strawberries:—

Admiral Dundas.—An excellent English variety with large roundish-conical fruit, irregular, and often angular. Skin pale scarlet. Flesh juicy, with a brisk rich flavour.

Ajax.—An English variety of vigorous habit with large roundish irregular fruit, often deeply furrowed. Skin dull brick red. Flesh reddish, solid, juicy, and briskly flavoured. Plant hardy and vigorous.

Black Prince (Black Imperial, Aberdeen Seedling).—An old and popular English variety which ripens very early, and is largely used for

Admiral Dundas.

Ajax.

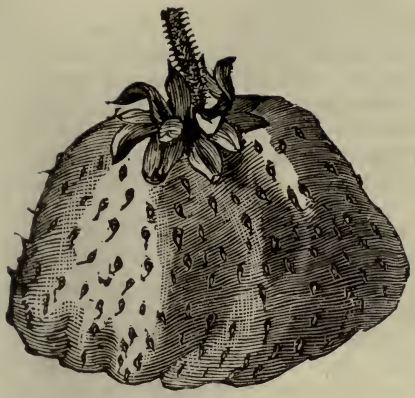
Black Prince

Boule d'Or.

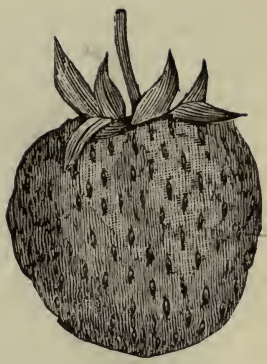
Captain.

British Queen.

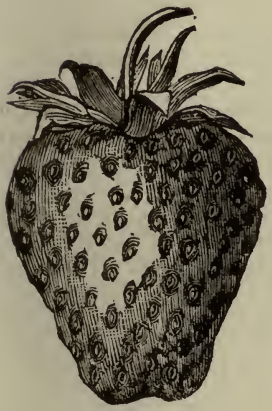
Carolina Superba



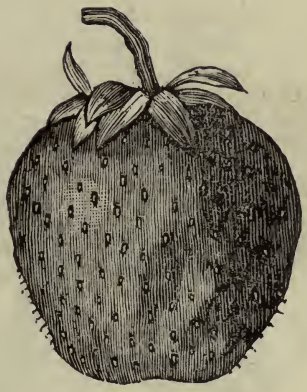
Cockscomb.



Compte de Paris



Deptford Pine.



Dr. Hogg.

preserving in the United Kingdom. Fruit small, obovate, a purple-red in colour, and possessing a brisk sub-acid flavour. Plant vigorous and a very heavy bearer.

Boule d'Or.—A French variety with large roundish much-flattened fruit. Skin bright orange scarlet. Flesh white, juicy, and richly flavoured.

British Queen.—An English variety which has been very popular in Great Britain for a great many years owing to the high quality of its fruit, which has an exquisite flavour. In Australasia, however, it does not thrive as a rule, and rarely bears well, so it is a variety that cannot be recommended. Fruit large, cockscomb-shaped, and often flattened. Flesh white, firm, and juicy.

Captain (*The Captain*).—A comparatively new English variety with large ovate regular fruit, sometimes inclining to cockscomb, which ripens early. Skin pale red. Flesh pale, firm, with a brisk pleasant flavour.

Carolina Superba.—This is a well-known variety of English origin with large fruit inclining to cockscomb shape. Fruit pale red. Flesh white, firm, possesses a very rich flavour, and ripens about mid-season. Plant robust, but a somewhat uncertain bearer in this part of the world, and cannot be depended upon.

Cockscomb.—A handsome and useful variety, raised in England, with very large pale scarlet berries, mostly cockscomb-shaped, and ripening at mid-season. Flesh white, with a very hazy tinge, and richly flavoured. Plant strong, hardy, and an excellent bearer.

Compte de Paris.—A useful variety of uncertain origin with large scarlet obtuse heart-shaped berries, which ripen at mid-season. Flesh pale red, solid, with a brisk sub-acid flavour. Plant robust and bears very freely.

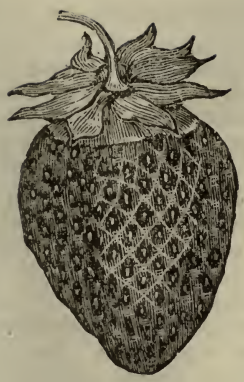
Deptford Pine.—This is an old English Strawberry, and for quality is worthy of a place among the best of the newer varieties. Fruit large, cockscomb-shaped, bright scarlet, and very glossy. Flesh firm, with a rich and slightly sub-acid flavour. Plant vigorous, but sometimes a shy bearer.

Dr. Hogg.—An English variety of repute with very large cockscomb shaped fruit, which ripens a little after mid-season. Skin pale red. Flesh firm, juicy, sweet, with a very rich flavour. Plant robust, hardy, and an abundant bearer.

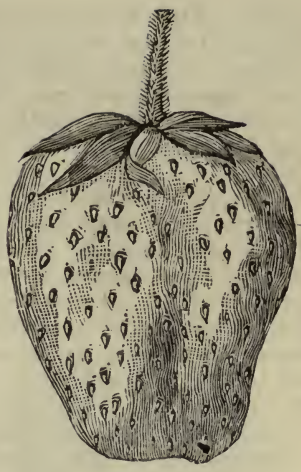
Duc de Malakoff.—This is an excellent French variety with large roundish or cockscomb-shaped berries, which ripen at mid-season. Skin deep red. Flesh pale red, sweet, and highly flavoured. Plant strong and bears freely.

Duc de Malakoff.

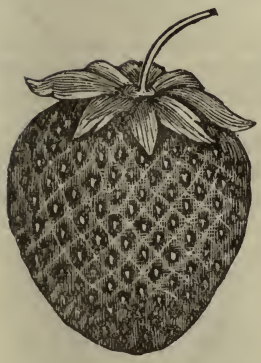
Duke of Edinburgh.



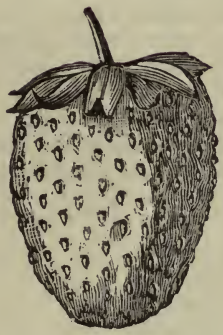
Eclipse.



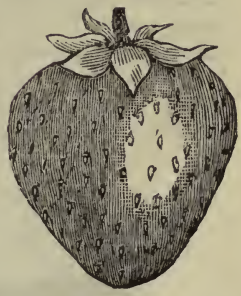
Eleanor.



Edith.



Elton.



Filbert Pine.

Duke of Edinburgh.—A fine English variety, a cross between *Elton Pine* and *Keen's Seedling.* Fruit large, conical, sometimes inclining to cockscomb, and in colour dark crimson. Flesh firm, juicy, with a rich brisk flavour.

Edith.—An excellent and very popular variety raised at Malvern, a suburb of Melbourne. The fruit is large, well coloured, and has a rich and pleasant slightly sub-acid flavour. Plant strong, very hardy, and prolific, and can always be depended upon for a crop. It can be grown successfully in most soils and situations, and comes in very early, the fruit of this variety being generally first in the market.

Eclipse.—A good English variety with conical or cockscomb-shaped fruit somewhat above the medium size. Skin bright glossy red and

shining. Flesh white, firm, rich, with a highly aromatic flavour. Plant robust and a great bearer.

Eleanor (*Crystal Palace*).—This is an English variety with very large regular conical fruit, which ripens about mid-season. Skin deep crimson. Flesh firm, reddish, juicy, slightly sub-acid, and a little of the pine flavour. Plant hardy, very strong in growth, and a fairly good bearer.

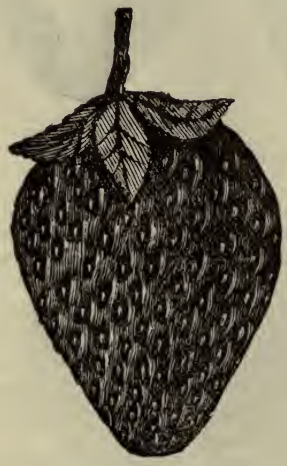
Elton (*Elton Pine*).—An old but good English variety which ripens very late. Fruit large, ovate, sometimes cockscomb-shaped. Skin bright crimson and shining. Flesh reddish, firm, with a pleasant sub-acid flavour. Plant vigorous and an excellent bearer.

Filbert Pine (*Myatt's Seedling*).—An excellent late English variety with berries rather above medium size, conical, and occasionally cockscomb-shaped. Skin dull purplish-red. Flesh white to pale pink, firm, rich, and briskly flavoured, with a fine aroma. Plant vigorous, hardy, and very prolific. This kind has also the reputation of being suitable for very light soils where some of the other varieties will not thrive.

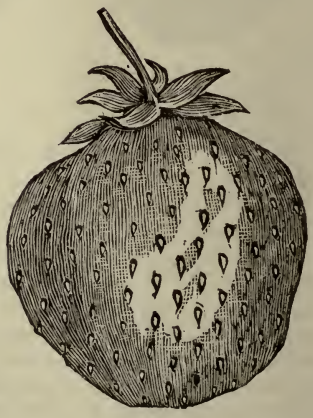
Frogmore Late Pine.—Another excellent late English variety with large conical or cockscomb-shaped fruit. Skin dark red and very glossy. Flesh red, tender, very juicy, and highly flavoured, having a rich pine aroma. Plant strong and prolific.

Goliath (*Kitley's*).—An English variety with very large irregular often cockscomb-shaped berries, which ripen at mid-season. Skin deep red throughout. Flesh white, solid, with a rich brisk high flavour. Plant hardy, very vigorous, and bears profusely.

Hovey's Seedling (*Germantown, Young's Seedling*).—An American variety which has a high reputation in the United States, but has never become popular in Great Britain or Australia. Probably, if tried, it



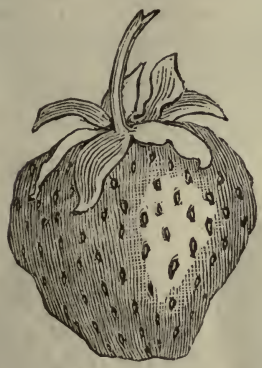
Frogmore Late Pine.



Goliath.

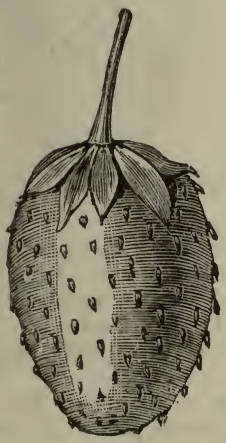
might prove a serviceable sort in some localities. Fruit very large, roundish-oval or conical, and ripens at mid-season. Skin deep scarlet and very glossy. Flesh firm, juicy, sweet, with a rich agreeable flavour. Plant very hardy, vigorous, and productive.

James Veitch.—A fine English variety which ripens medium early. Fruit large, roundish, and in colour bright red. Flesh firm, pale, very juicy, and well flavoured. Plant robust and a good bearer.



Hovey's Seedling.

James Veitch.



John Powell.

Jucunda.

John Powell.—This is a first-class variety of English origin with large long ovate berries, which ripen at mid-season. Skin bright deep red and very glossy. Flesh white, very firm, sugary, juicy, with a rich pine flavour. Plant vigorous and usually a free bearer, but it is sometimes rather shy.

Jucunda.—A very good European variety of uncertain origin. Fruit large, conical, and ranging in colour from bright crimson to dark red. Flesh firm, juicy, and richly flavoured.

Keen's Seedling.—A very old, popular, and excellent English variety which is generally cultivated in the United Kingdom. It does not, however, thrive in this part of the world, and is a very shy bearer. Fruit large, roundish, sometimes cockscomb-shaped, which ripens medium early. Skin dark bright red and glossy. Flesh red, firm, juicy, brisk, and has a pleasant sub-acid flavour. Plant vigorous, and in Great Britain is regarded as one of the most productive and regular bearing Strawberries.

Keen's Seedling.

La Châlonnaise.

La Constante.

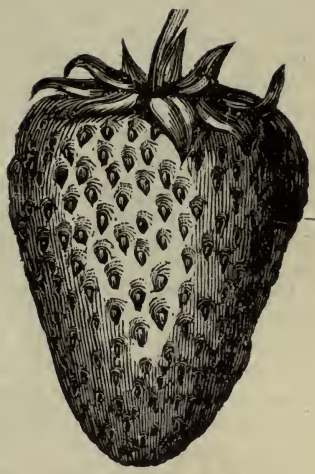
La Châlonnaise.—A French variety with large conical berries which ripen at mid-season. Skin bright pale red. Flesh white, juicy sweet, with a rich flavour. Plant strong, hardy, and prolific.

La Constante.—Another French variety with a high European reputation, which it does not maintain in this part of the world. Fruit large, conical, regular in form, and ripens medium early. Skin deep bright red. Flesh white, with a red tinge, firm, juicy, and richly flavoured. Plant moderately vigorous, and has the character of a free bearer in England, but in this colony it is somewhat shy.

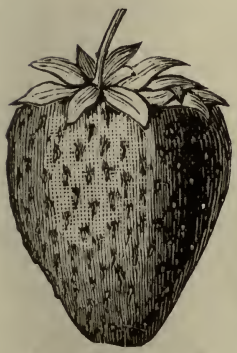
La Reine.—This is another French variety with a high European reputation that does not maintain its character in this part of the world. According to Dr. Hogg, the fruit is large, conical, or wedge-shaped. Skin of a pale flesh colour. Flesh juicy, sweet, and highly flavoured. Plant vigorous and prolific. In Victoria the plant is a shy bearer, and the fruit inferior to many other varieties.

Mammoth.—An English variety with immensely large flattened irregularly-shaped berries, which ripen at mid-season. Skin deep red and very glossy. Flesh red, firm, solid, and has a brisk pleasant flavour. Plant moderately robust and sometimes a shy bearer.

Mammoth.

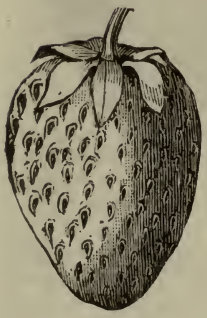


Marguerite.

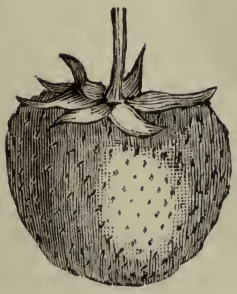


Omar Pacha.

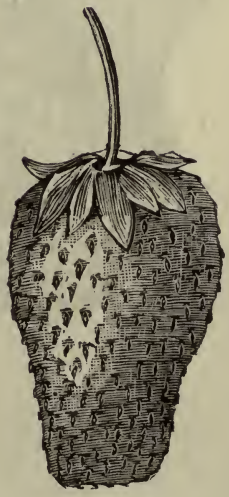
May Queen.



La Reine.



Noble.



Myatt's Prolific.

Marguerite (*La Marguerite*).—A well-known and popular variety of French origin with very large conical or cockscomb-shaped fruit, which ripens very early. Skin bright shining red. Flesh white, tinged with pink, firm, moderately juicy, and sweet, but lacking a high flavour. Plant robust, hardy, and bears freely. This is a favourite kind in Australia on account of its earliness, as also because the fruit being firm carries well to market.

May Queen.—A very early English variety with rather small roundish fruit. Skin yellowish-red. Flesh white, juicy, and very pleasantly flavoured. Plant moderately strong and a very free bearer. The only recommendation this Strawberry has is its extreme earliness.

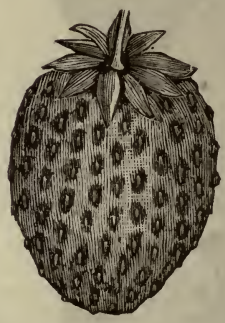
Myatt's Prolific (*Wonderful*).—A first-class English variety with very large conical, ranging to cockscomb, fruit, which is often fingered. Skin pale red. Flesh white, juicy, sweet, with a rich aromatic flavour.

Noble.—A recently introduced English variety that is valuable for its earliness. Fruit large, roundish. Flesh firm, juicy, with a brisk flavour. Plant strong and bears profusely.

Omar Pacha (*Myatt's Eliza, Rival Queen*).—A first-class English variety with medium-sized oval dark red berries, which ripen at mid-season. Flesh reddish-white, firm, solid, very juicy, and highly flavoured. Plant robust and productive.

Oscar.—An early English variety with large angular fruit, which is sometimes flattened or wedge-shaped. Skin dark shining red. Flesh reddish, firm, solid, juicy, and richly flavoured. Plant strong and an abundant bearer.

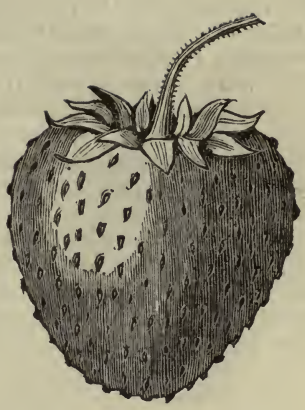
Oscar



Pioneer.

Pioneer.—An English variety with medium-sized fruit varying from conical to obovate. Skin a very dark red. Flesh reddish, firm, juicy, with a brisk flavour. Plant strong, very prolific, and as early as Marguerite.

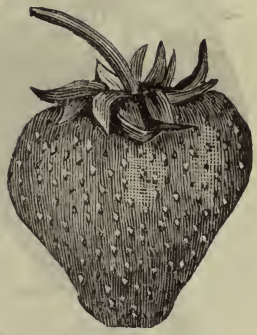
Premier.



President.

Prince Arthur.

Princess Royal.



Princess of Wales.

Premier (*British Queen Seedling*).—This is a rather popular English variety with large roundish-ovate berries, which ripen at mid-season. Skin bright red and very glossy. Flesh white, firm, juicy, and highly flavoured. Plant robust, but in this part of the world has sometimes proved a shy bearer.

President.—A hardy robust variety of uncertain origin that has been found well suited for heavy soils. Fruit large, roundish-conical, and in colour a deep red. Flesh reddish, solid, juicy, with a rich luscious flavour. Plant vigorous, hardy, and generally a free bearer.

Prince Arthur (*Ingram's*).—A very prolific English variety of excellent quality. Fruit medium-sized, conical, and in colour a bright crimson. Flesh white, solid, very juicy, with a brisk rich pine flavour.

Princess Royal (*Cuthill's*).—An excellent English variety with medium-

sized roundish-ovate berries, which ripen at mid-season. Skin from deep to pale red. Flesh white, with a deep red tinge, very rich, and highly flavoured. Plant strong and an abundant bearer.

Princess of Wales (Knight's).—This is an excellent very early English variety which ripens its fruit about the same time as the May Queen, to which it is greatly superior both in size and quality. Fruit large, cockscomb-shaped, and corrugated. Skin deep red throughout. Flesh tinged with red, tender, juicy, and has a rich pine flavour. Plant vigorous and prolific.

Rifleman.—A fine English variety with large ovate or cockscomb-shaped fruit, which ripens at mid-season. Skin bright salmon-red. Flesh white, solid, firm, juicy, and richly flavoured. Plant vigorous and an abundant bearer under favourable conditions. Has proved better adapted for the cooler districts than around Melbourne.

Rifleman.

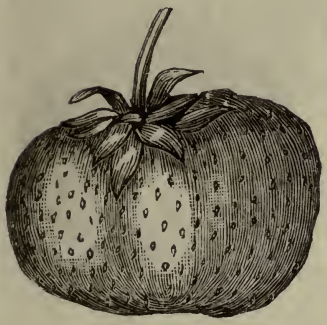
Royal Sovereign.

Sharpless.

Sir Charles Napier.

Sir Harry.

Sir Joseph Paxton



Triomphe de Gand.

Trollope's Victoria.

Royal Sovereign.—A recently introduced English variety belonging to the *British Queen* section. Fruit very large, oblong, conical, colour a bright glossy scarlet, and ripens early. Flesh firm, juicy, with a rich flavour similar to that of the *British Queen.* Plant strong and very prolific.

Sharpless.—An American variety that is popular in the United States. Fruit large to very large, irregular, roundish-conical, and often cockscomb-shaped. Flesh pink, firm, sweet, with a rich aromatic flavour. Plant hardy, vigorous, and very prolific.

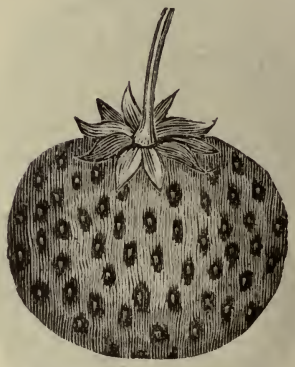
Sir Charles Napier.—An English variety with large ovate flattened or wedge-shaped berries, which ripen early in the season. Skin pale or bright scarlet and very glossy. Flesh, white, firm, solid, sub-acid, pleasant, but not high flavoured. Plant somewhat tender in habit, but a fairly good bearer.

Sir Harry.—A very late and useful English variety, a cross between British Queen and Keen's Seedling, and a standard market Strawberry in Great Britain. It does not, however, do so well in Australia, except in the cooler districts where it flourishes. Berries large, cockscomb-shaped. Skin deep purplish-red. Flesh red, tender, juicy, and highly flavoured. Plant robust and a free bearer when growing in congenial localities.

Sir Joseph Paxton.—This is an excellent early English variety with large roundish berries. Skin bright glossy red. Flesh pale red, firm, rich, and highly flavoured. Plant strong and productive.

Triomphe de Gand.—A Belgian variety of high quality with very large roundish flattened, and often cockscomb, fruit. Colour bright crimson. Flesh firm, juicy, with a sweet rich flavour. Plant hardy, vigorous, and productive.

Vicomtesse Hénricart de Thury.



Vineuse de Nantes.

Trollope's Victoria (Victoria).—An English variety of great excellence, and one of the best Strawberries for most parts of Australasia. Fruit large, roundish-ovate, and regular in outline. Skin deep bright red. Flesh pale red, tender, juicy, with a pleasant slightly sub-acid flavour. Plant vigorous, and in this part of the world bears more freely and regularly than any other variety. As a bearer it can always be depended upon more than any other kind, and it will adapt itself well to various soils and climates. It ripens early, and comes in immediately after Edith and La Marguerite.

Vicomtesse Hénricart de Thury (Duchess de Trévise, Garibaldi).—A French variety with a high reputation in Europe, but shows a falling off in character when grown in Australasia. Fruit above medium size, roundish-

conical. Skin deep red. Flesh pale red throughout, firm, solid, sweet, brisk, and richly flavoured. Plant fairly vigorous and a very abundant bearer.

Vineuse de Nantes.—An excellent Belgian variety with medium to large flattened fruit. Colour rich glossy crimson. Flesh reddish, solid, and sweet, with a peculiarly rich vinous flavour.

ALPINE STRAWBERRIES.

This class should receive more atttention, as although the fruit will not compare with the common Strawberries in size or high flavour, yet, as it is produced in succession for several months in the year, it can often be utilized to advantage, and more especially by private growers who cultivate for pleasure. One section, the Bush Alpines, is also serviceable

Plant of Bush Alpine.

Fruit of Bush Alpine.

for edgings, as the plants do not form runners, and, therefore, do not make straggling growth. The propagation of this section is generally effected by division of the plants, but some growers prefer to raise them from seeds. The following list embraces the principal varieties:—

Brune de Gilbert—A French variety with reddish-brown fruit somewhat larger than that of the other sorts. Plant strong, prolific, and an abundant bearer.

Galland.—Another French variety with dark red medium-sized fruit. Plant hardy and prolific.

Red Alpine (Red Monthly).—This is the common Alpine. Fruit small, red, conical in shape, and is produced for several months in cool and moderately moist localities. Plant hardy and strong.

Red Bush Alpine (Monthly Bush Alpine).—This variety makes its growth in compact tufts, or bunches, and has no runners but the fruit in size, shape, colour, and flavour is similar to that of the common Red Alpine.

Triomphe de Holland.—A Dutch variety which is considered to be a great improvement upon others belonging to the class. Fruit large for its class, roundish-conical in shape, and in colour a bright red. Flesh juicy, sweet, with a rich aromatic flavour. Plant vigorous, compact in growth, and very productive.

Brune de Gilbert.

Triomphe de Hollande.

White Alpine (*White Monthly*).—This variety is in growth and all other respects similar to the Red Alpine except in the colour of the fruit, which is greenish-white.

White Bush Alpine (*White Monthly Bush Alpine*).—Precisely similar in every respect to the Red Bush Alpine with the exception that it has greenish-white fruit.

WOOD STRAWBERRIES.

These are the Wild Strawberries of Europe, which are found growing in the woodlands of many countries. They bear in abundance small round delicately-flavoured berries, which are similar in appearance to those of the Alpine section with the exception that they are rounder.

There are two varieties known respectively as the *Red Wood* and *White Wood*, the only difference between them being the colour of the fruit, as their names imply.

HAUTBOIS STRAWBERRIES.

This class of Strawberries has quite a distinct flavour from the other class, the varieties are limited in number, and most of these are shy bearers. The following list comprises the best sorts :—

Belle de Bordelaise.—A French variety with large ovate deep crimson berries. Flesh firm and rich Plant very vigorous and productive.

Prolific (*Conical, Double-bearing, Musk Hautbois*) —This variety has large dark purple berries. Flesh firm, juicy, sweet, with a musky flavour. Plant strong and prolific.

Belle de Bordelaise.

Prolific.

Royal Hautbois.

Royal Hautbois.—One of the best varieties in its class. Fruit large, roundish-conical, and in colour dark crimson. Flesh whitish, tender, sweet, and highly flavoured. Plant vigorous and a free bearer.

CHILIAN STRAWBERRIES.

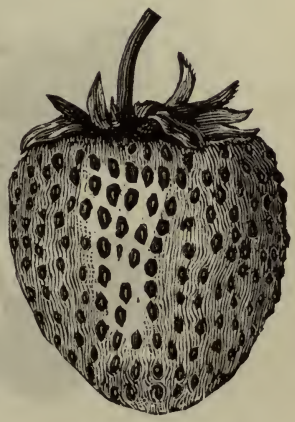
This is another distinct class comprising several varieties, the principal being as follows :—

Red Chilian (French).—This variety has large conical pale dull red berries. Flesh very firm, hollow cored, with a sweet flavour. Ripens late.

Wilmot's Superb.—An English variety with large showy roundish or cockscomb-shaped berries of a deep pink colour. Flesh firm, hollow cored, and has a fairly good flavour. Ripens at mid-season. Plant strong and a medium bearer.

Red Chilian.

Wilmot's Superb.



White Chilian.

White Chilian (*Yellow Chilian*).—A variety with very large showy roundish or irregular berries of a yellowish-white colour, with a pink cheek. Flesh firm, sweet, and pleasantly flavoured. Plant hardy, strong, and fairly productive. This variety is grown in some parts of Australia as the Hautbois, and its flavour is liked by many. It is also a favourite market variety in some places because it packs and carries well.

STRAWBERRY TREE.

This name has been given to *Arbutus unedo*, a small evergreen tree belonging to the order Ericaceæ, or Heath family, because its fruit is supposed to resemble in appearance that of the Strawberry. The tree is also known as the Winter Strawberry because its fruit is produced in the winter. It is indigenous to the south of Europe, and is common in a wild state about the Lakes of Killarney in Ireland. The generic name comes from the Celtic *arboise* (signifying austere or rough), in allusion to the quality of the fruit, it being vastly inferior to the Strawberry, which it is supposed to resemble. It is, however, not unpalatable, and has a some-

Strawberry Tree.

what agreeable acid flavour. When eaten in any quantity the fruit is said to produce narcotic effects. In Corsica the juice of the fruit is converted into wine, which is a fairly palatable beverage, but if drank in excess has powerful narcotic effects. From the wine by distillation a strong spirit is obtained. The Strawberry Tree is a very handsome evergreen with bright glossy foliage and beautiful pearl white flowers, which are produced in the early winter months, and last for a considerable time. The fruit is also handsome, being about the size of Cherries, and in colour from bright yellow to orange and deep red. It will hang for a considerable time, and adds greatly to the beauty of the trees during the winter months. There are numerous varieties which differ somewhat in the size and form of the leaves, as also in colour, some having pink flowers. They are all very desirable ornamental plants, and should be generally planted in shrubberies. They will thrive in any ordinary good soil, and more especially a sandy loam, and will adapt themselves to a great variety of climate from the coldest to medium warm regions. Propagation may be effected by seeds, which should be covered half an inch deep. Plants are easily and quickly obtained from layers, and cuttings of the ripened wood of the current season's growth will strike in sand in a frame or under a glass.

TAHITI APPLE.

This name has been applied to the fruit of *Spondias dulcis*, a noble evergreen tree which attains a height of fifty or sixty feet. It is indigenous to various parts of Polynesia, and belongs to the natural order Anacardiaceæ. The fruit is also known as the Vi, or Wi, Apple. The trees bear freely, and the fruit, which often weighs a pound or over, has an agreeable flavour somewhat similar to an Apple. In its native regions it is highly appreciated as an eating fruit, and makes an excellent preserve. The Tahiti Apple may be cultivated successfully from tropical to medium warm regions that are not too dry. It requires a rich soil, shelter and a moderately moist climate. Propagation is easily effected by seeds, which should be planted two inches deep. Cuttings of the ripened wood strike freely in sand under shelter, and plants may be readily obtained from layers when they are available.

TAHITI GOOSEBERRY.

The fruit known under this name is the product of *Cicca disticha* (*Phyllanthus Cicca*), a small evergreen tree with light green feathery foliage, belonging to the order Euphorbiaceæ. The common name is a curiously inapt one, as the fruit does not in any respect resemble a Gooseberry, and neither is the plant a native of Tahiti. It is indigenous to India and other warm regions in Asia, and usually bears two crops in the year. The flowers are green, and the fruit is round, ribbed, and

flattened, somewhat like a large thick button, with a hard seed in the centre. When ripe it is a waxen white in colour, and has a sharp acid and somewhat austere flavour. It is not palatable when eaten raw, but is excellent for tarts and puddings, makes a pleasant jam and a tasty pickle. Medicinally the seeds are cathartic and the root purgative. This tree may be grown successfully in medium warm to tropical regions, and will thrive in any fairly good soil. As it has handsome graceful foliage it is worthy of cultivation as an ornamental plant in congenial localities. Plants are readily obtained from seeds, which should be covered an inch deep. Layering is another ready means for propagating, and strong cuttings strike freely in sand if protected from the weather.

TAMARIND.

History and Uses.

The Tamarind is a large handsome evergreen tree which, under favourable conditions, attains a height of seventy to eighty feet, and has widely spreading branches. It belongs to the natural order Leguminoseæ, and is indigenous to various parts of tropical Asia and Africa as far north as Egypt. The Tamarind was also found by Baron von Mueller growing in north Western Australia, and a closely-allied species, if not identical, is indigenous to the West Indies. Botanically it is known as *Tamarindus Indica*, the generic name being derived from *Tamar* (the Arabic name for the Date Palm) and *Indus* (Indian), and, therefore, means Indian Date. The West Indian species is known as *Tamarindus occidentalis*, and it differs but slightly, if at all, from the first-named kind. The foliage of the Tamarind is bright green, each leaf being furnished with a dozen pairs or more of small leaflets, and the trees afford a dense shade which is very agreeable in a warm climate. The flowers, when they make their appearance, are white or nearly so, but afterwards they change to pale yellow. The fruit is produced in the form of flat pods, which vary in length from three to six inches and are more or less curved. There are several varieties which differ, though not to any great extent, in the size of the pods and the colour and acidity of the pulp. The pods consist of shells enclosing an acidulous pulp, varying in colour from light brown to reddish, in which from four to a dozen seeds are embedded. In countries where the Tamarind is indigenous or cultivated, the fruit is used in various ways, and is very popular. It is extensively used in cookery, and more especially in making curry, and also in the preservation of fish. A refreshing drink is made by pouring boiling water over the fruit, and this beverage is used medicinally as a laxative and a cooling draught in cases of fever. The fruit is preserved either with or without sugar, and exported in casks or jars. For medicinal purposes, for which the Tamarind is used extensively, the pulp is better when prepared without sugar. The medicinal and other useful qualities are due to the presence of butyric, citric, formic, and tartaric acids in the pulp. Another mode

of preserving the fruit is by drying with sugar and packing like Dates or Figs, or in small bundles. The wood of the Tamarind is heavy, hard, firm, and durable. It affords excellent timber for building and other purposes, and also makes a superior charcoal.

Tamarind.

Cultivation and Propagation.

The Tamarind being indigenous to warm regions can only be grown successfully in tropical or semi-tropical parts of Australasia, or in localities further south where the climatic conditions may be favourable. It is only in warm humid regions that the Tamarind will flourish, and it is a tree well suited for the coast regions of Queensland, northern river districts of New South Wales, many parts of North Australia, the north-west portion of West Australia, and will thrive to perfection in all the warmer islands of Polynesia. Whenever the climatic conditions are

favourable the Tamarind may be profitably cultivated for its fruit. It is also a handsome ornamental tree, and in tropical regions is admirably adapted for street planting, as it affords a dense shade. The Tamarind will grow in any ordinary good soil, but thrives best in a rich deep sandy loam with perfect drainage. Propagation is most generally effected by seeds, which should be planted an inch and a-half deep. Being very hard, the seeds are often slow in germinating, and previous to sowing it is advisable to pour boiling water over them and let them soak for about three days. Germination may also be accelerated by sowing in a hot-bed. Cuttings strike freely in sand if placed in a frame or under a glass, and plants may be readily obtained from layers when low trees are available to furnish them.

VELVET TAMARIND.

This name has been given to *Codarium acutifolium*, a small evergreen tree attaining a height of about twenty feet indigenous to West Africa and belonging to the order Leguminoseæ. It has pale red flowers and small pods somewhat similar in size and form to a Filbert Nut, which are covered with a beautiful black velvet-like down—hence the common name. They contain an agreeable acid pulp, which is used by the negroes for food and also to make a refreshing drink. It possesses to some extent similar properties to the ordinary Tamarind, and may be used for the same purposes. Coming from a warm climate this tree can only be grown successfully in tropical regions in Australia. For cultivation and propagation the directions given for the Tamarind will apply in every respect.

TELFAIRIA.

Telfairia pedata (*Jolliffia africana*) is a strong-growing perennial evergreen twiner whose shoots, under favourable conditions, will extend far and cover a considerable amount of space. It bears in great profusion beautiful lilac fringed flowers, and by European gardeners is held in high repute as an ornamental plant. It is a native of West Africa, and belongs to the order Cucurbitaceæ, or the Cucumber family. The fruit is generally a great size, often attaining a weight of fifty or sixty pounds, and is somewhat similar in appearance to a large long Water Melon. Each fruit contains a great number of seeds as large as Chestnuts, which under pressure yield a considerable proportion of excellent oil. The seeds are also boiled and used as a vegetable. The large fleshy roots are also sometimes cooked and used as a vegetable. Both fruit and roots make excellent food for pigs, and in congenial localities the plant might prove worthy of cultivation for that purpose solely. The Telfairia may be grown successfully from tropical to warm temperate regions, and will thrive in deep rich soils. It bears freely, and yields a large bulk from a

small area. To grow it in perfection the support of a trellis or fence is required, but it may be allowed to trail over the ground like a Pumpkin. Plants are very easily obtained from seed, which should be sown in the spring and covered an inch deep. If necessary, however, plants may be readily obtained from cuttings, which strike freely in sand in a frame or under a glass. While the plants are making their growth it will be advisable to pinch back the shoots at the points two or three times to induce the formation of lateral branches and to cover the space to the best advantage. In all other respects the same treatment is required as recommended for Gourds at page 22.

TEN CORNER.

This is a familiar local name around Sydney for the fruit of *Stenanthera pinifolia*, a pretty native small shrub belonging to Epacridaceæ, or Epacris, family. It is indigenous to sandy soils near the coast in East Australia, and its handsome rosy crimson flowers are familiar in localities near to Sydney. The fruit is small, oval, and consists of a comparatively large seed with a thin covering of gelatinous flesh, the calyx having numerous angles—hence the name. As a fruit it is but of small value, though children around Sydney, and other localities where it grows, are partial to it. For ornamental planting this shrub is very effective, and is well suited for light sandy soils. It also is well adapted for pot cultivation. Care must be taken, however, in cultivation, as with many of our native plants, not to use stimulating manures. Propagation may be readily effected by seeds, which should be covered to the depth of about three-quarters of an inch. Plants may also be easily obtained from layers, and ripened cuttings of the current season's growth will strike in sand under a glass or in a frame.

TOMATO.

History.

Tomatos, of which there are several species, are mostly annual plants, belonging to the natural order *Solanaceæ*, or the *Solanum* family. Botanically they are known under the name of *Lycopersicon*, which is derived from *Lykos* (a wolf) and *Persicon* (a Peach), in allusion to the fruit being deceptive and not possessing so rich a flavour as its handsome appearance would lead people to expect. Tomato is the South American Indian name, under which the fruit was introduced to Europe by the Spaniards. Formerly they were most generally known in England as Love Apples, but the origin of this name is unknown.

With a few exceptions the species that yield edible Tomatos are natives of Mexico or South America. The oldest, best-known, and most generally used species is *Lycopersicon esculentum* (*Solanum Lycopersicum*),

which was taken to Europe by the Spaniards about the middle of the sixteenth century. Though introduced to Spain the fruit came into general use first in Italy, and France was the next country where it became popular. It was taken to England in 1596, but for many years after its introduction it was grown only as a curiosity. For a very long period the belief was common that the plant possessed deleterious properties on account of belonging to the same natural order as the Deadly Nightshade and other highly poisonous plants, and, consequently, there was a strong prejudice against it. After a time, however, this prejudice gradually wore away, and the fruit began to be appreciated, but the Tomato has only become really popular in the United Kingdom within the last half-century. When Tomatos first began to find favour in England they were prepared for table, according to Gerard, in the following way:—"The fruit was cut through the middle so as to make two equal parts, tops and bottoms. These were then broiled over a brisk fire for a few minutes with the cut part uppermost to keep the juice in, adding pepper and butter to taste." Gerard further tells us in his quaint style "that when prepared in this manner they form a dainty dish fit for a queen."

Uses.

Tomatos are now very generally and extensively used in a variety of ways, and more especially in warm climates. In the south of Europe they are very popular, particularly in Italy, while in France their use is general. In the United States the fruit is extensively used in various ways, and in the Australasian colonies it is in great demand. Medicinally Tomatos are considered to be very wholesome, and their use beneficial in various complaints. They are said to be a substitute for calomel when that drug cannot be used without injury to the constitution. Their use in any shape is considered as an aid to digestion, and more especially when rich meats have been eaten. It was customary formerly at the cannibal feasts in Fiji and other South Sea Islands for the natives to eat an indigenous species (*Lycopersicon anthropophagorum*) to assist the digestion of the large quantity of human flesh that they consumed on these occasions. The foliage of the Tomato, as also that of several other kinds of Solanum, is obnoxious to some forms of insect life, and an infusion of the leaves used as a spray is a good remedy for Aphides and other soft-bodied pests. When planted near fruit trees the Tomato is also supposed to keep away various insects.

Tomatos can be utilized in a great variety of ways, and either when ripe or in a green state. The ripe fruit is extensively used when raw, eaten plain with or without meat, or mixed in salads. When fried or baked with meat they are very palatable, and are extensively used for flavouring sauces, soups, and gravies. An excellent and popular sauce is made from Tomatos, and also a very tasty and relishing catsup. They enter largely into the composition of the East Indian Chutney, and can be converted into an excellent jam. The fruit is also sometimes dried with sugar to imitate Figs, and a very palatable wine can be made from

it. In its green state the fruit is often used for tarts or puddings, being flavoured with lemon or tartaric acid. The small green fruit also makes an excellent pickle by pouring boiling vinegar over it.

Tomato Sauce.—There are various methods for making this sauce, but the following one can be commended:—Bake the fruit gently till it becomes soft, when the skins should be removed and the pulp rubbed through a hair sieve or coarse open cloth. To every quart of pulp add an ounce of garlic and the same quantity of shallots, both chopped very fine, with half-a-pint of vinegar. Boil well for about three hours and let it stand till cold, when the sauce should be bottled, leaving out the corks for two or three days, after which time the bottles must be securely closed. Cayenne pepper, Chili vinegar, grated ginger or nutmeg, cloves, allspice, mace, peppercorns, &c. may be used for flavouring, according to taste, before the pulp is boiled.

Tomato Chutney.—This can be made in the following manner:—To twelve pounds of fruit add one pound of salt, two pounds of coarse sugar, one ounce of Cayenne pepper, half-a-pound of garlic, the same quantity of mustard, one pound of raisins, and spices according to taste. In the first place, the fruit must be strained to separate the skins and seeds before the other ingredients are added. It is also necessary that the garlic and raisins should be chopped very fine. Add one quart of vinegar, and then boil for three or four hours. When cool it should be bottled as recommended for sauce.

Tomato Jam.—This is an excellent conserve when carefully made, and spare fruit can always be turned to good account for this purpose. The following will be found a good way of making it:—Boil the fruit after the skins have been removed for about an hour over a slow fire, and then pour off as much of the watery juice as can be separated. Then for every pound of fruit add an equal weight of white sugar, and for every three pounds the juice and peel of a good sized Lemon, the latter being cut into small pieces. Boil well for seven or eight hours, and then treat it the same as other fruit jam.

Dried Tomatos.—Tomatos dried in the same way as Figs make a very palatable sweetmeat. For this purpose medium-sized fruit of thin skinned varieties is the most suitable. The fruit should first be dipped in boiling water to loosen the skins, which must be removed. Then it should be placed in layers in jars or other vessels with sugar between them. Let them stand for two or three days, then pour off the syrup, which should be boiled till no scum will rise. This syrup should then be poured over the fruit and allowed to remain for a week. The fruit must then be taken out of the syrup, laid upon trays, and dried in the sun in the same way as Raisins or Figs. Care must be taken during the process of drying that the fruit is not exposed to rain or dew, or it will be in danger of spoiling. The time required for drying will, as a matter of course, vary according to the time of the year and the weather. When thoroughly dry the fruit should be packed tightly in small boxes, sprinkling white sugar between the layers. Fruit prepared in this way is excellent, and when carefully dried will keep good for several years.

Tomato Wine.—This is a palatable and refreshing beverage when

carefully made and matured. It is made in the following manner:—Take thoroughly ripe fruit, remove the stalks, wash perfectly clean, and press so that the juice will be extracted. Then pass through a fine strainer, and to every gallon of juice add three pounds of white sugar. Brown sugar may be used instead of white, but if it is the wine will not be so clear and sparkling. The juice then should be placed in a cask and allowed to stand a few days to ferment, after which it must be treated in the same way as other wines.

Canned Tomatos.—These have of late years become very popular, and large quantities of fruit are now used for this purpose. The demand is also rapidly increasing, and growers will have a good outlet in this direction for a large quantity of produce. Canned Tomatos are prepared in the same way as recommended for Gooseberries, and for full details refer to the article upon that fruit. Tomatos may also be preserved whole in bottles or jars, the treatment required being nearly the same as for canning.

Cultivation.

Being strong-feeding plants Tomatos can only be grown to perfection in rich soil, and unless the land is very good manure should be used freely. The ground should be deeply worked and well broken up, and more especially in dealing with stiff heavy soils. As it is a tender plant it is useless to sow or plant in the open ground until all risk from frost has passed. The time for getting in a crop will, as a matter of course, vary to some extent, according to the locality, but as the plants are tender the rule should be never to sow or plant in the open ground when there is any risk from frost unless protection can be afforded.

The best way of growing Tomatos is to plant in rows four or five feet apart, leaving about half that space between the plants in the lines. It is also advisable to support the plants, so as to prevent the branches from lying on the ground. This may be done by placing sticks against them in the same way as is practised in growing peas, or, better still, they may be trellised. These trellises may be formed with posts and wire or battens, as may be most convenient. To these supports the branches should be fastened, using broad ties so as not to cut the stems. When the branches are allowed to lie upon the ground the fruit does not ripen so quickly or so well, and it is more liable to rot and suffer from insect pests. Plants may be kept compact in shape and well furnished by nipping off the points of the branches in the early stages of growth. Tomatos require a constant moisture in the soil, and will suffer severely if the ground gets thoroughly dry; therefore, water should be used freely in dry weather. Being very strong-feeding plants they will also derive great benefit from the application of liquid manure about once a week. The necessity for watering will not be so great if the ground is carefully mulched before the hot weather sets in. Though Tomatos are fairly hardy, except as regards frosts, yet the plants are

apt to suffer unless sheltered from strong winds. They also require shelter from both sun and wind when newly planted, and this object may be obtained by sticking a few bushes round them.

Propagation.

It is a great advantage to get fruit early in the season, and this object may be effected by sowing seed in a hot-bed a few weeks before it can be placed in the open ground Young plants raised in this way should, as soon as they are fit to handle, be potted off singly into small pots and kept growing steadily till the proper time arrives for planting them out. By adopting this plan fruit can be obtained several weeks earlier than by sowing in the open ground. In sowing the seeds should be covered about half-an-inch deep. When raised from seed sown in the open ground the young plants should be thinned out as soon as they can be handled, as when left too long they are apt to become drawn and weakly. As a rule, however, it will be advisable to raise the plants in beds and transplant afterwards.

Though Tomatos are usually raised from seeds, yet they may, if necessary, be readily propagated by cuttings, which strike freely in sand or light soil if placed in a frame or under a hand glass. Plants raised from cuttings are generally more prolific than seedlings and come into bearing sooner. They are, however, usually less vigorous, and the fruit, as a rule, smaller. Seed will retain its vitality for two, and sometimes three, years, but it cannot be depended upon after the second season.

Species and Varieties.

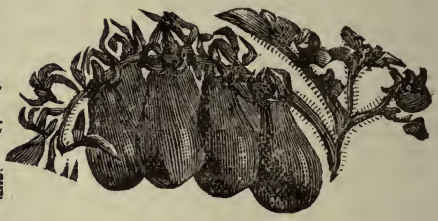
There are a very large number of varieties in cultivation, and they represent several species, but the majority have originated from *Lycopersicon esculentum*. They differ materially in shape, colour, and other essentials, there being varieties with red, yellow and white fruits. The red-fruited varieties are the most numerous and more generally cultivated, while the white kinds are the least popular. Besides the one already named, two other species contribute mainly in supplying the cultivated varieties. *Lycopersicon cerasiforme*, a Peruvian species, is the source of the Cherry and Red Currant Tomatos ; the Pear and Plum Tomatos have originated from *Lycopersicon pyriforme*. The varieties are now so numerous and intermixed that no useful purpose will be served by giving a list of names, but growers will find ample selections in seedsmen's catalogues.

Several species of *Solanum* yield useful edible fruits that may be classed as Tomatos, and are, therefore, worthy of attention as cultivated plants. The principal of these are :—*Solanum Æthiopicum*, an annual plant indigenous to tropical Africa. It bears large red globular fruit, which is largely used in its native regions. *Solanum edule*, a species indigenous to Guinea, yields yellow edible fruit as large as small Apples. *Solanum Gilo*, a species from tropical America, bears large round orange-coloured fruit, which is used to some extent in its native regions.

Solanum Quitoense, a shrubby South American species, indigenous from Ecuador to Peru, bears round juicy orange-coloured fruit as large as small Apples, which has a peculiar but pleasant flavour. *Solanum torvum* is another shrubby species widely distributed in the warmer regions of South America from Mexico to Peru, as also in the West Indies. The fruit is round, yellow, as large as medium-sized Plums, has a fairly good flavour, and is said to be very wholesome.

Shrubby Tomato.—This name has been given to *Solanum Uporo*, a strong-growing species indigenous to various islands in the Pacific Ocean.

Cherry.



Pear.

Shrubby.

Currant.

It is a prolific species that bears large round red fruit, which in size and flavour is similar to an ordinary Tomato. This species is quite as hardy as the common Tomato, and as it yields its fruit for a long period is deserving of extended cultivation. Water in which the leaves of this species have been soaked quickly becomes mucilaginous, and is said to be an effective remedy for dysentery.

Tree Tomato.—The plant known under this name is *Solanum betaceum* (*Cyphomandra betacea*), a tall evergreen shrub or small tree which sometimes attains a height of twenty feet. It is indigenous to Central America, where its fruit is generally used, as also in other warm countries. The fruits are the size of large Plums, produced in succession, have a real Tomato flavour, and are yielded through the greater part of the year. As the fruit can be used for the same purposes as the ordinary Tomato, this species is well deserving of attention in congenial localities. Another recommendation is that the plant will bear the first or second year from the time it is planted. It is also worthy of attention as an ornamental plant, as its large light green foliage is very effective in shrubberies. The Tree Tomato is about as hardy as the ordinary kinds, and is, therefore, only suitable for warm to medium regions where frosts are not troublesome. It may, however, be successfully cultivated in moderately cool localities if well protected from frost during the winter months. Effective shelter is also required for this plant, as its foliage suffers severely from the effects of cold strong winds.

TREBIZONDE DATE.

The fruit passing under this name is that of *Eleagnus hortensis* (*angustifolia*, *orientalis*), an evergreen shrub or small tree, growing from fifteen to twenty feet high, belonging to the order Eleagnaceæ. The generic name is derived from *elaia* (an Olive) and *agnus* (chaste), in allusion to the form of the fruit and the appearance of the tree. It is indigenous to the greater portion of Asia, including China and Siberia, the northern parts of Africa, and the south of Europe. The leaves have a hoary appearance, in shape they are somewhat similar to those of the Willow, and the small yellow flowers are strongly perfumed. The fruit is oval, somewhat similar to a large Olive, has a stony seed, and is produced in great abundance. In Persia the fruit is dried and eaten in the same way as the Date, hence the common name, and it is also pounded and made into cakes. Several other species yield edible fruits that are utilized in various parts of the world, the more prominent being as follows:—*Eleagnus arborea*, a robust evergreen small tree, a native of Nepaul and other parts of Asia. *Eleagnus conferta*, a strong growing deciduous scandent shrub from the same regions, has fruit as large as Damsons of a pale red or Cherry colour, and very acid. Both species are generally eaten in their native countries, and make very good preserves. The last-named species passes under the name of the Wild Olive. *Eleagnus umbellatus* is a deciduous small tree from Japan which bears in

Trebizonde Date—Branch with Fruit.

great abundance sweet and pleasantly flavoured fruit that is highly appreciated in its native country, where it is eaten both in a fresh and dried state. *Eleagnus longipes*, a recent introduction from Japan, with handsome foliage, silvery on the under side, is very prolifiic, its bright red fruit being highly palatable. All the species come into bearing early, and yield their fruit through the greater portio n of the year.

As ornamental plants the species ofe Eleagnus named are all well deserving of attention, as they are very ffective in shrubberies. Their foliage, and more especially the evergreen species, is very attractive, and

the fruit adds materially to their effectiveness. They are moderately hardy, can withstand drought to some extent, also light frosts, and may be grown successfully in from medium cool to warm districts. They will also thrive in any fairly good soil that is not too wet or compact. Plants of any of the species may be easily obtained from seeds, which should be covered an inch deep. Propagation is also readily effected by layers, and cuttings of the ripened wood will strike freely in sand or light soil if protected from sun and wind.

TRIPHASIA.

Triphasia aurantiola is a small evergreen shrub indigenous to China and other parts of South Eastern Asia belonging to the order Aurantaceæ, or Orange family. It is also known as *Triphasia trifoliata* and *Limonia trifoliata*. The flowers are white and highly fragrant, and the fruit is small, but sweet, juicy, and pleasantly flavoured. This plant is worthy of attention for ornamental purposes, and possibly may prove serviceable to the perfume maker. It is moderately hardy, will thrive in any region where the Orange can be successfully cultivated, and requires somewhat similar treatment. Propagation may be effected by seed, which should be covered to the depth of half-an-inch. Cuttings of the present season's growth, when ripened at the base, will strike in sand under a glass or in a frame, and plants may be readily obtained from layers.

VANGUERIA.

The fruit known under this name is the product of two species of *Vangueria*, evergreen shrubs or small trees indigenous to Africa belonging to the order Rubiaceæ. *Vangueria edulis*, whose fruit is also known as Voa Vanga, a native of the warmer regions of Africa, and also of Madagascar, has fruit the size of ordinary round Plums. *Vangueria infausta* is indigenous from tropical Africa to Kaffraria and Natal, and has somewhat larger fruit, which has a pleasant flavour. Both species are moderately hardy, though coming from tropical regions, and may be grown successfully in the warmer parts of Australasia where the winter temperature is moderately high. Both species are ornamental plants, and as such worthy of attention in congenial localities, irrespective of their value as fruit shrubs. Propagation is readily effected by seed, which should be covered an inch deep. Ripened cuttings of the new wood will strike in sand in a glass or frame, and plants are easily obtained from layers.

WALNUT.

History.

The Walnut is known botanically as *Juglans*, and it is the type of the

natural order of *Juglandaceæ*. There are several species, all of them being stately deciduous trees, which attain a large size, and are valuable both for their fruit and timber. Some species are widely distributed through the cooler parts of Asia and are also found in Eastern Europe, while others are indigenous to North America. The Common, or English, Walnut (*Juglans regia*) is supposed to have originated in Persia or China, as it is found growing naturally in great abundance in the higher parts of those countries, as also in the Caucasus. Among the early Greeks the fruit was generally known as Persicon, or the Persian Nut, in allusion to the country from which it was obtained. Afterwards the Greeks called the plant Caryon, because (according to some authorities) of the strong smell of the leaves, which caused heaviness. Other authorities inform us that this name comes from Carya, the daughter of Dion, King of Laconia, who was changed by Bacchus into a Walnut tree. The Walnut is said to have been introduced to Italy in the time of Tiberius, and rapidly became popular with the Romans, who called it Jovis Glans, or Jove's Nut, and from this the botanical name has been derived. By the Romans the Walnut was used extensively upon all festive occasions, being ranked as the Queen of Nuts, and from this circumstance the specific name of *regia* originated. The English name Walnut was originally Gaul Nut, owing to the supposition that the tree had been first obtained from France.

For its supposed medicinal qualities the Walnut appears to have been held in great esteem by ancient nations, who employed it as a remedy in many complaints. Pliny speaks highly of its virtues, and says, "The more Walnuts are eaten, the more worms will be driven out of the stomach," and he says further, "If eaten before meals they will lessen the effect of any poison that may be in the food." The bark of the Walnut tree was considered to be a sovereign remedy for the ringworm, and, when chewed fasting, an antidote for the bite of a mad dog. We are informed that Mithridates, King of Pontus, recommended the following preparation as an antidote against poison:—Two dry Walnut kernels, as many Figs, and twenty leaves of rue, beaten into a mass, with a grain of salt" This mixture he advises should be used in the morning, and says it will prevent the ill effects of poison taken the same day. Walnuts were eaten to prevent an unpleasant breath after eating onions. The bruised leaves, after being steeped in vinegar, were also used to take away pains in the ears. But, though the Walnut was so highly esteemed for its many supposed medicinal virtues, yet the smell of its foliage was thought to be productive of headache and other troubles. For this reason it was considered unsafe to plant trees near dwelling houses or to sit beneath their branches. The Walnut was supposed by the Romans to have a great antipathy to the Oak, and Pliny says that these trees would never thrive when growing near to each other. Some few years ago the opinion was entertained by many British gardeners that Strawberries would not thrive if growing in the vicinity of Walnut trees.

The Walnut was probably taken to Britain at the time of the Roman invasion, though in botanical dictionaries 1562 is the date given for its introduction. It appears to have been for centuries a very popular tree

in England, not only for its fruit and timber, but also for its supposed medicinal value. The bark was generally used as an emetic, either in a green or dried state, and the unripe fruit was considered to be an invaluable remedy in cases of worms, and to prevent infection from contagious distempers, such as the plague. Medicinally, Walnuts were considered to be very wholesome, and the oil obtained from them was supposed to be a sovereign remedy for stone or gravel. It was formerly a common practice in England to preserve the Nuts when young and green as a sweetmeat. This was effected by gathering the Nuts before the shells hardened, and boiling them till they became tender. For every pound of fruit an equal weight of sugar, with sufficient water to make a thick syrup, with cloves and small pieces of Lemon peel to flavour, and this was poured over the boiled Nuts. They were allowed to stand for ten days, and then boiled for several hours, after which the mixture was gradually cooled and sealed down in airtight jars till required for use. The green fruit was also often sent to table after being boiled for three or four hours in a thick syrup.

Uses.

Though at the present time the Walnut scarcely ranks so high in public estimation as it did formerly when so many virtues were attributed to it, yet it is still cultivated extensively in Europe, and utilized for a variety of purposes. The Nuts are greatly esteemed for the dessert, and are relished by most people. They can be kept sound for a long period, and when the kernels begin to shrivel if soaked in milk and water for ten or twelve hours they will generally become plump again. Under pressure the kernels yield a bland oil in large proportions, and this is frequently used as a substitute for Olive oil. The seeds of the Black Walnut (*Juglans nigra*) are, however, more oily than the English Walnut. As a rule, the Nuts are left to ripen on the trees and fall of their own accord. The green Nuts make an excellent and popular pickle when used just before the shells begin to harden, which may be easily ascertained by pricking them with a pin. The leaves, green fruit, and husks, when macerated in water, yield a bitter astringent liquor which is useful for destroying insects, and more especially those of the Aphis tribe. From the husks a permanent dye is obtained, which will effectually stain the skin, nails, and hair a dark brown. It will also have the same effect upon wool. The green husks, after soaking several days in a strong solution of salt and vinegar, yield what is known as Walnut ketchup, which is much used as a condiment, and forms a leading material in the composition of Worcestershire and other leading table sauces. The use of the Walnut medicinally in modern times is not nearly so extensive as formerly. In some parts of Eastern Europe an infusion of the leaves mixed with lard is considered to be a useful remedy for scrofula and other skin complaints. The Circassians are said to pierce the trees in the spring, collect the sap, which is allowed to coagulate, and is then used for diseases of the lungs or in cases of general debility. The oil, which is white, sweet, and without unpleasant odour,

is used for mixing delicate colours in painting, in cookery, for lamps, and for polishing woodwork. The material left after the oil is expressed from the kernels makes an excellent food for cattle, pigs, or poultry. As in the case of the maple and some other trees, the Walnut contains a good proportion of sugar in the sap, and this may be utilized if necessary by tapping the trees in the spring when growth is most vigorous, collecting the juice, and evaporating it in the usual way. It is not advisable, however, to cultivate the Walnut as a sugar-yielding tree, as other plants will give much more satisfactory returns.

The wood of all the species is very valuable, and they are worthy of cultivation as timber trees alone, without regard to their other qualities. Walnut wood is hard, tough, fine grained, durable, is not liable to warp or split, is not subject to the attack of insects, and takes a fine polish. It is largely employed by cabinetmakers, and was still more extensively used in Europe formerly before the introduction of mahogany and other choice woods. The wood is also used to some extent by coachbuilders, and for the making of gunstocks is employed almost exclusively. When young the wood is white, but as the trees get old it becomes brown. As regards its durability, specimens of Walnut wood are to be found in Europe in churches and other buildings, also in furniture, which are in a good state of preservation, though several hundred years old. Formerly, the demand for Walnut wood was so great in England that single trees, when large and in good condition, often fetched from a hundred pounds upwards. It is on record that in one case a very fine tree realized six hundred pounds sterling. Though Walnut timber is less valuable now, it still commands high prices in Europe, and the demand exceeds the supply.

The Walnut is a tree well deserving more attention in Australasia than it now receives as a commercial plant. There is a considerable local demand for the ripe Nuts, and the greater portion of what we consume is now imported from Europe and America. For pickles and the making of sauces the demand will probably rapidly increase as the supply becomes better and more regular. In time, possibly oil may be made from the Walnut, which yields a large percentage. Then, again, the trees are well worth cultivating for their timber, which, though it takes many years to produce, cannot scarcely fail to prove a profitable investment to the planter, as each year a plantation increases in value. Being large-growing and stately trees, Walnuts may be planted with excellent effect in parks and shrubberies, and for avenues. They are also well adapted for street planting, and are worthy of special attention for this purpose.

Cultivation.

No fruit-bearing tree will adapt itself to the varying conditions of climate better than the Walnut, which appears to be equally at home in the medium warm as in the cooler districts. In fact, it will thrive in most parts of Australasia, excepting tropical regions. Any moderately good land will prove suitable to the Walnut, but it thrives to the greatest perfection in a deep rich soil with a moderately dry and open sub-soil.

Trees also do well upon chalky or limestone formations. When growing under favourable conditions the Walnut will attain a great age and size. In preparing the land let it be worked deeply, if of a heavy nature more especially. In lighter and more open soils deep stirring is not so essential. Drainage must also be provided for if necessary, as the Walnut is somewhat impatient of an excess of water at its roots. The trees will require to stand at least forty feet apart to permit their free development. As, however, it will be some years before they require such an amount of space, temporary trees may be planted between, to be removed when necessary. In choosing trees be careful to get those with straight clean stems and a fair proportion of roots. Planting may be done at any time between the fall of the leaves and the commencement of a fresh growth, but it should, if possible, be done before the end of August. Young trees, as a matter of course, must receive careful attention in pruning so as to insure well-formed heads as soon as possible. But little pruning is required after the trees have been got into shape, all that is necessary being to thin out the branches when too much crowded, remove rank or misplaced shoots, and shorten back growth when required to keep the trees compact and symmetrical. The fruit is borne upon the wood of the previous season. Sometimes, in the case of over-luxuriant trees, root pruning or partial ringing may prove useful in inducing fruitfulness. Walnuts are not liable to many of the diseases that are so troublesome to other fruits, and they are seldom attacked by insects.

Propagation.

Propagation is effected by seeds, layering, budding, and grafting. Seed should be sown in the autumn and covered to the depth of about two inches. The following winter transplant the young trees into rows thirty inches apart, leaving half that space between in the lines. In the next season the plants may be planted out permanently. As the plants suffer materially when their roots are broken, the better plan is to sow the seed singly in pots. When this plan is adopted there is less risk in shifting the young plants. Seedlings often vary considerably from their parents, and cannot be depended upon for sorts. Plants are readily obtained from layers, but they do not make such large and durable trees as can be obtained by other means, though they come to maturity sooner. Budding is the method most generally adopted for perpetuating varieties and hastening maturity. Grafting is sometimes practised with the same objects, but not to such an extent as budding, which is certainly the better of the two methods As in the case of other deciduous trees, grafting must be done before active growth commences in the spring, and budding after mid-summer, when the bark can be raised from the wood without difficulty. The best and most reliable trees are seedlings that have been budded with approved varieties.

Species and Varieties.

The following list embraces several of the best-known and distinct species, and these will serve every practical object to be gained by

cultivating the Walnut family. There are several other species, but in most cases they have little to distinguish them from those named :—

American Butter Nut (*Juglans Cinearea*).—This is a North American species which grows to a height of fifty or sixty feet. The Nuts are much indented, and have pointed ends. They are palatable, and yield a large proportion of oil, which is of excellent quality when freshly extracted, but it is apt to become rancid in a short time if exposed to the air. The wood of this species is very durable, not liable to split or warp, or to the attacks of insects. It is in great request in America by coachbuilders, turners, and others for purposes where strength and durability are essentials. The bark, leaves, and fruit husks of this species are used medicinally in America, and an extract from the inner bark is considered to be a mild laxative. The American Butter Nut will thrive under the same conditions as the English Walnut.

Black Walnut (*Juglans nigra*). —This is another North American species, which in its native regions attains a height of seventy or eighty feet. The Nuts have thicker shells than, and are not equal in quality to, the English Walnuts, but they contain a much larger proportion of oil, which is of good quality. The wood is tough, strong, durable, and not liable to either warp or split. In colour it is a reddish-brown, and becomes darker with age. As the wood of the Black Walnut is fine-grained and takes a good polish it is in great demand by American, and also European, cabinetmakers, and is also extensively used for gun-stocks. This species grows somewhat more rapidly than the English Walnut, and will thrive under the same conditions.

Chinese Walnut.—This is a robust tree indigenous to Central and Eastern Asia, known botanically as *Juglans stenocarpa* (*Pterocarya stenoptera*). It bears large thin-shelled Nuts that are well flavoured. The timber is valuable, and it is also a fine ornamental tree.

English Walnut (*Common Walnut, Juglans regia*).—This species will, under favourable conditions, attain a height of from eighty to a hundred feet, and an age of several hundred years. The wood is tough, fine-grained, and much used for gun-stocks, superior furniture, and in the manufacture of pianos. The Nuts are popular for the dessert and largely used for oil.

There are several cultivated varieties, which differ materially in some cases in size of the trees and Nuts, flavour, earliness, and lateness. The more noteworthy of these are as follows :—

Cluster.—An excellent English variety that bears its fruit in long bunches or clusters, hence the name. These clusters generally consist of a dozen or more, the Nuts being of medium size and well flavoured. Tree robust, hardy, and prolific.

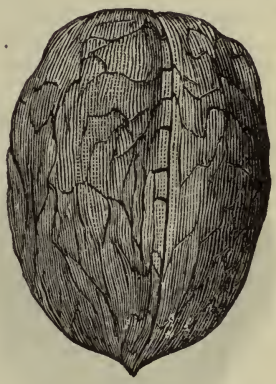
Dwarf Prolific (*Early Bearing, Fertile, Præparturiens*).—A French variety of but moderate growth that commences to bear while the trees are quite young, and for this reason alone it is a desirable kind. The Nuts are of a good size, and have well-flavoured kernels. Tree hardy and very prolific, but is not dwarf in habit of growth in the ordinary sense of the term. This kind has the reputation of reproducing itself true from seed, but the plants cannot be absolutely depended upon.

Highflyer.—An English variety that has a reputation for ripening two or three weeks earlier than the other sorts. Nuts of a good size, and kernels well flavoured. Tree strong in habit and a free bearer.

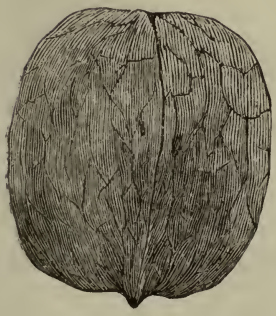
Large-fruited (*Double French*).—A strong variety with very large Nuts, which are often more than twice the size of the common Walnut. The kernel is, however, small in comparison to the size of the Nuts, and does not nearly fill the shells. It is pleasantly flavoured when eaten fresh, but when kept long it becomes rancid and bitter. Tree robust and bears freely. Not a very desirable variety.

Late (*Tardif, St. Jean*).—This variety starts into growth very late in the season, a useful quality in districts where the frosts are troublesome when the spring is advanced. Nuts of medium size, well filled, and kernels of good quality. The Nuts, however, do not keep well, and must be used quickly. Tree vigorous and very productive. This kind has the reputation of coming true from seed, but will sometimes produce plants differing from the parent.

Dwarf Prolific.



Large-fruited.



Late.

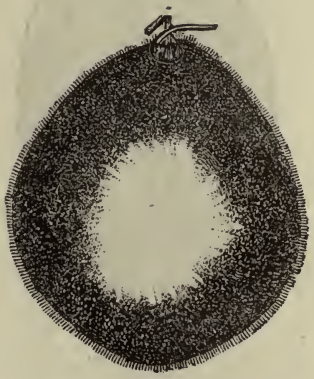
Mayette.

Thin-shelled.

Mayette.—A desirable French variety that is very late in starting into growth, and, therefore, specially suitable for cold regions where spring frosts are troublesome. The Nut is large and well flavoured. Tree hardy and a free bearer.

Thin-shelled.—This is one of the best and most popular varieties, and should be generally cultivated. Nuts oblong, with a well-filled shell that is thin and easily broken. Kernel well flavoured. Tree robust and bears very freely. This is one of the best kinds for cultivation, as the Nuts are more readily saleable than other kinds.

Yorkshire.—A variety that bears large well-filled Nuts, which, however, are not nearly so big as those of the Large-fruited. Kernel large and well flavoured. Tree strong and a very good bearer.



Japanese Walnut.—Fruit with Outer Shell or Husk. Fruit without the Outer Shell.

Japanese Walnut.—This is a robust, large, and very hardy species widely distributed through Japan, and known botanically as *Juglans Sieboldiana*. It has very large leaves, and produces its Nuts in clusters of from fifteen to twenty. They have thicker shells than English Walnuts, but not so thick as Black Walnuts, and in appearance are similar to Pecan Nuts, the kernels being sweet and well flavoured. Will thrive in most parts of Australasia, excepting tropical regions, and deserves more attention as a fruit, timber, and ornamental tree.

Persian Walnut.—This is a species indigenous to Central Asia, extending to Russia and Persia, known as *Juglans fraxinifolia* (*Pterocarya fraxinifolia*). It is a robust tree of large size, and bears in profusion Nuts larger than English Walnuts, with somewhat thinner shells, and

having a sweet pleasant flavour. The wood of this species is hard, fine-grained, durable, and suitable for a variety of purposes. This species will thrive under similar conditions to the English Walnut, and should be generally cultivated.

WAMPEE.

This is the Chinese name for *Cookia punctata*, an evergreen shrub or small tree belonging to the order Aurantaceæ, or Orange family. It has white flowers, handsome winged leaves, and attains a height of about fifteen feet. The fruit, which is about the size of a large Grape, is covered with a yellow woody rind or shell, contains a richly-flavoured juicy pulp. This fruit is very popular with the Chinese, and also in the Indian Archipelago, where it is generally grown. The Wampee may be grown successfully in from tropical to medium warm regions, and in suitable localities is worthy of cultivation both for its fruit and as an ornamental plant. Propagation is readily effected by seeds, which should be covered an inch deep. Cuttings of the ripened wood of the current season with their leaves on will strike under a glass or in a frame, and more certainly and quickly if bottom heat can be given. Plants may be also quickly obtained from layers, if available.

WATER CHESTNUT.

The plant most generally known under this name, and also as the Water Nut, is an annual belonging to the order Onagraceæ, or Evening Primrose family, known as *Trapa natens*. It is an aquatic plant widely distributed throughout Middle and Southern Europe, some parts of Asia, and Northern and Central Africa. The farinaceous seeds contain a large proportion of starch, and are used for food in some parts of Europe and Africa. There are kindred species that may also be classed as Water Chestnuts, though they are commonly known under other names. The principal of these is *Trapa bispinosa*, a valuable species indigenous to Middle and Southern Asia, extending to Ceylon and Japan, and is also found on the east coast of Africa. This species, which is far superior to *Trapa natans* as a food-yielding plant, is commonly known as the Singhara Nut. The seeds abound in starch, and are generally used in their native regions, where they are a staple food for the inhabitants. The Nuts are carefully collected, dried, and eaten either raw or cooked, or when ground into flour and converted into cakes, bread, or porridge. Another useful species is *Trapa bicornis*, the Leng, or Ling, Nut of the Chinese. This plant is largely cultivated in China, where the seeds or Nuts are extensively used for food purposes in a similar way to those of the previously-named species. Both the Singhara and the Leng Nut may be cultivated with advantage in from tropical to medium warm regions in Australasia. When grown under favourable conditions they

are very prolific and yield a large bulk of seeds. They are well suited for shallow lakes, ponds, or tanks, where the water is comparatively still. Propagation is effected by dropping the seeds in the water two or three yards apart. When the temperature of the water reaches about fifty degrees the Nuts begin to germinate, and the young plants rise to the surface. They float upon the water, and their leaves spread out and gradually cover the surface if not disturbed. The plants have an ornamental appearance, and are supposed to assist in keeping the water in which they are growing pure, as also to check excessive evaporation, as the surface covering of leaves neutralizes the power of the sun to a great extent.

WINEBERRY.

Fruit enclosed by the Calyx.

The plant to which this name has been given is a species of Raspberry from Japan, where its fruit is highly esteemed. Botanically it is known as *Rubus phœnicolasius*, and it is a strong-growing species with an abundance of leaves, which to some extent resemble those of the common Raspberry, but are of a silvery white on the under surface. The flowers are produced in terminal panicles. the pedicels and elongated calyx lobes being densely covered with long crimson hairs, each one tipped with a small globular gland. From this peculiarity the plant derives its specific name—*phœnix* (red) and *lasios* (shaggy). The fruit is orange red in colour, about the size of a small Cherry, and while unripe is covered by the calyx lobes, which fold over it. In this way it is protected from birds, and the thick covering

Fruit after the Calyx opens.

of viscid hairs keeps away many troublesome insects. When the fruit ripens the calyx sepals part and are thrown back, forming a flat plate. The fruit is then fit for use, and should be promptly gathered. It is somewhat similar to a Raspberry, though it has a distinctive flavour, and may be used for the same purposes. The Wineberry is fairly hardy, and should thrive in medium cool districts. Cultivation and propagation are the same as for the Raspberry.

XIMENIA.

Ximenia americana is an evergreen large shrub or small tree, belonging to the order Olacaceæ, or Olax family, which, under favourable conditions, attains a height of about twenty feet. It is widely distributed through tropical Asia, Africa, and America, and is also found in northern Queensland. The specific name, consequently, is by no means an appropriate one. The tree bears greenish-yellow strongly-scented flowers and yellow fruit, which in size and appearance is like medium-sized Plums. In flavour the fruit is sweet and aromatic, but is somewhat astringent for most palates, By the Mexicans the tree is called Alvarillo de Campo, and the wood, which is perfumed, is used for various purposes. The Ximenia can only be grown successfully in tropical and semi-tropical regions, and in congenial localities is useful both as a fruit-bearing and ornamental plant. Plants may be raised from seed, which should be covered an inch deep. Cuttings of the season's growth when ripened will root in sand under a glass or in a frame, and plants are readily obtained from layers.

INDEX.

VOL. 2.

The Scientific Names and Synonyms are printed in Italics.

GOOSEBERRIES, VARIETIES.

GREEN.

RED.

HAZEL VARIETIES.

NECTARINES, VARIETIES.

OLIVES, VARIETIES.

SWEET ORANGES, VARIETIES.

PINE-APPLES, VARIETIES.

PLUMS, VARIETIES.

RASPBERRIES, VARIETIES.

BLACK CAP RASPBERRIES, VARIETIES.

STRAWBERRIES, VARIETIES.

ALPINE STRAWBERRIES, VARIETIES.

HAUTBOIS STRAWBERRIES, VARIETIES.

CHILIAN STRAWBERRIES, VARIETIES.

Minerva Printing Works.
Anderson Street.
Melbourne West.