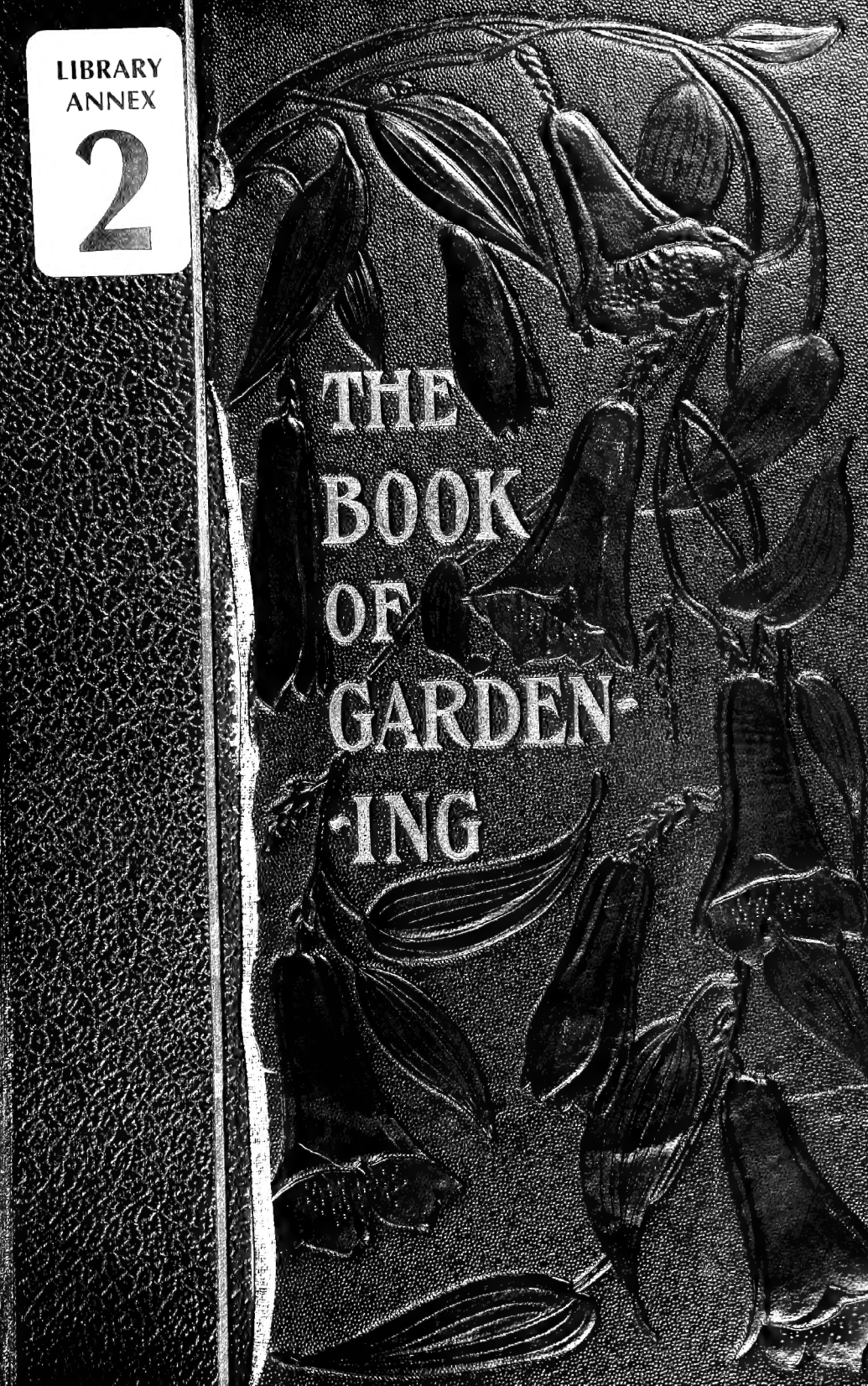


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2

The book cover features a detailed embossed floral design. The design consists of a central stem with several large, pointed leaves and clusters of flowers. The flowers have prominent, layered petals and central stamens. The embossing is set against a dark, textured background, likely leather or a similar material. The overall aesthetic is classic and elegant.

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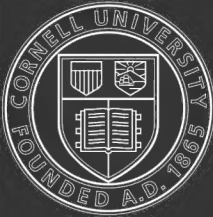
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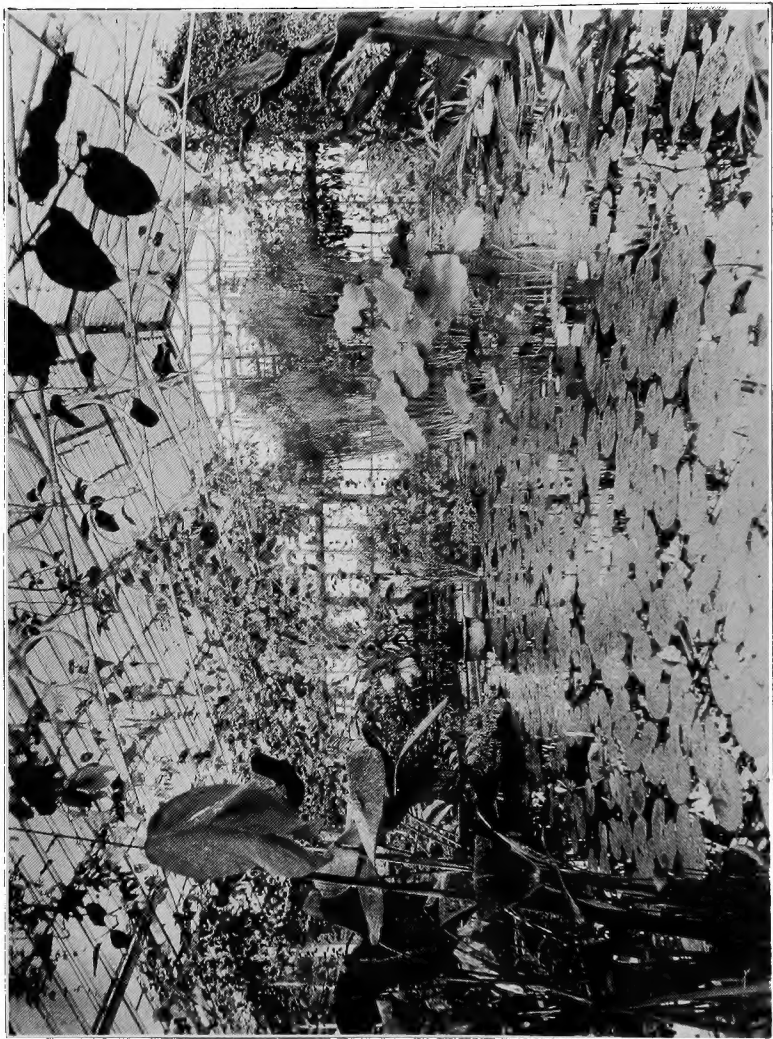


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The Book of Gardening.



WINTER-LILY HOUSE AT KEHI.

The Book - - - of Gardening:

A Handbook of Horticulture.



By J. M. ABBOTT, W. G. BAKER, CHARLES BENNETT,
H. J. CHAPMAN, JAMES DOUGLAS, CHARLES
FRIEDRICH, A. GRIESSEN, F. M. MARK, TREVOR
MONMOUTH, GEO. SCHNEIDER, MORTIMER
THORN, J. J. WILLIS, AND ALAN WYNNE,

AND

Edited by W. D. DRURY

(AUTHOR OF "HOME GARDENING," "INSECTS INJURIOUS TO FRUIT,"
"POPULAR BULB CULTURE," &c.).



VERY FULLY ILLUSTRATED.

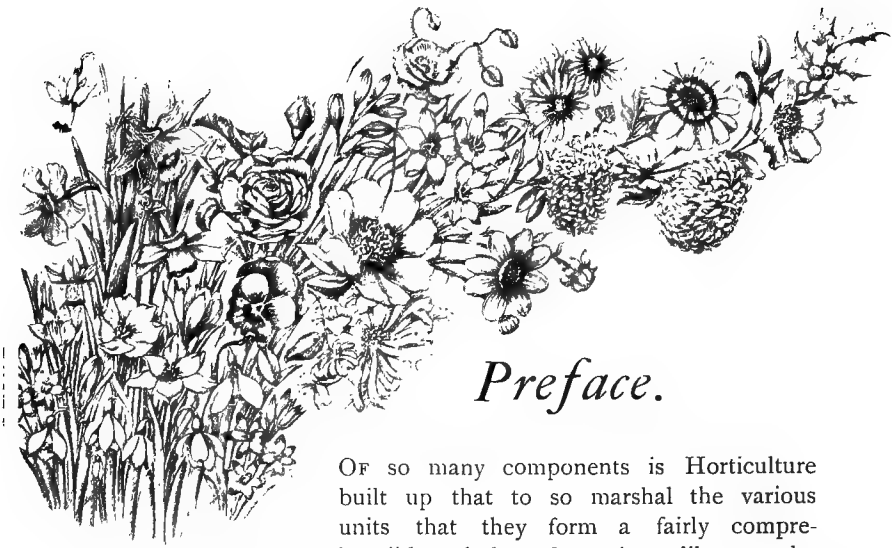


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Preface.

OF so many components is Horticulture built up that to so marshal the various units that they form a fairly comprehensible whole, of service alike to the amateur and professional, is not by any means an easy task. The fact is, the professional gardener is called upon to play many parts. In some establishments he has not only to prove himself an adept in the cultivation of flowers and decorative plants, but he has also to positively excel in the raising of fruits and vegetables for the table. Indeed, it would not be untruthful to say that in a very large number of places his position greatly depends upon the amount of skill he is able to bring to bear upon the latter departments. In the preparation, therefore, of this book the multifarious duties of the professional on the one hand, and the exacting requirements of the present-day amateur on the other, have had to be kept steadily in mind.

As hinted in the Introduction, places have been found for subjects which often are neglected, and the endeavour to give prominence to these phases of Horticulture will, it is hoped, prove acceptable to the garden-loving public. Trees and shrubs for instance may be cited as amongst those subjects of which far too little is known, considering their value and importance in the beautification of the outdoor garden, for there is nothing that for permanent effect can compare with them.

What trees and shrubs are to the outdoor garden, the Palms and the Bamboos are to the indoor one: their habit and form are as diversified as are the uses to which they may be put.

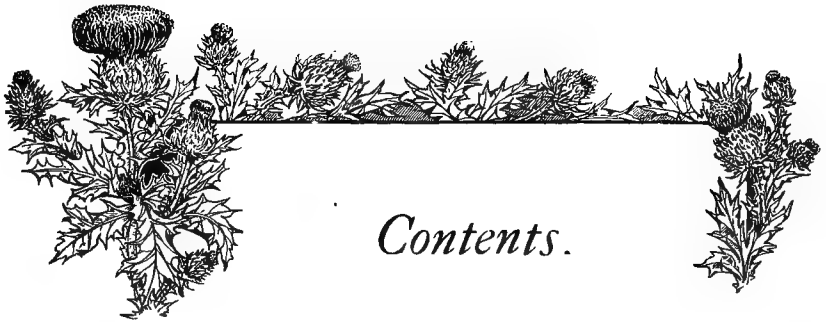
Yet for all that, so far as the first-named are concerned, there is very little information obtainable in a readily accessible form. Then to take a widely different class of plants, what possibilities are there bound up with the hardy and the tender Aquatics—plants which are not half as much recognised as their merits deserve. And similarly with Orchids—at one time popularly supposed to be the exclusive property of the rich—which, thanks to the Gardening Press and the enterprise of importers, are brought to the doors of all who can afford to indulge their tastes for plants under glass. In fact, what at one time was voted a little understood and very expensive hobby, is now regarded to be alike as economical and as easy of achievement as almost any other section of indoor plants.

Manures, again, are of the highest importance to the successful cultivator, yet in far too many instances it is to be feared they are employed on the rule of thumb principle, with disastrous results upon the crop they were intended to help. No apology, therefore, is needed for devoting a chapter to their consideration.

Of the freemasonry which exists between professional gardeners and nurserymen and their less enlightened amateur brethren I must speak in the highest terms. There is no craft of my acquaintance which has fewer so-called trade secrets. This has abundantly been demonstrated to me during the progress of the work, and I should like to testify to the many kindnesses in the form of useful hints and practical advice which I have received from the profession and the trade. Particularly, however, am I indebted for such help to Mr. William Barr, Mr. George Schneider, Mr. S. T. Wright, and Mr. H. J. Chapman. To Messrs. Veitch and Sons and to Messrs. Barr and Sons I must also tender my grateful thanks for readily placing at my disposal some excellent illustrations, and for the generous assistance they gave our artists on very many occasions, by providing, often at considerable personal inconvenience to themselves, facilities for obtaining drawings from good subjects.

Outside the ranks of the profession and the trade, I must acknowledge my indebtedness to my colleague, Mr. W. Baker-Bartlett, for kindly assistance during the passage of the work through the Press. And it is largely owing to the generous help received from many quarters that the labour in connection with the book has been so materially lightened.

W. D.



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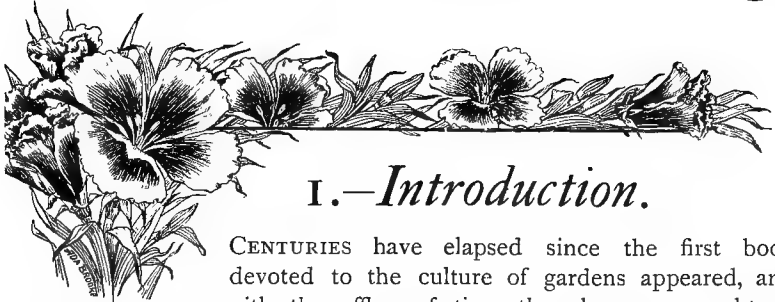
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THE VICTORIA REGIA HOUSE AT KEW.

The - - Book of Gardening.



I.—*Introduction.*

CENTURIES have elapsed since the first book devoted to the culture of gardens appeared, and with the efflux of time the changes wrought in actual practice have been almost as great as those which have marked the contemporary political eras. Naturally, "the old order changeth," and on every hand there are indications of the great advances made in the study of Horticulture, even as compared with those of our fathers' days. For all that, we look back with pride, nay, with veneration, to those remote ancestors who were instrumental in laying the foundation for that superstructure of knowledge by which we have been enabled to build up, as it were, by degrees, the practical and popular Science to-day recognised as Horticulture. That it is a practical Science few will attempt to deny; and that it is popular is abundantly evidenced by the number of recruits which are daily being enlisted in its ranks.

Gardens are not the introduction of to-day, nor even of a few centuries ago, nor yet again of this country. Their origin is lost in the mists of ages. It was Lord Bacon who said that "God Almighty first planted a garden; and, indeed, it is the purest of human pleasures." In the Bible we have ample testimony that gardens existed; while those who are acquainted with the Greek and Latin Classics are aware of the scale of magnificence which

Sallust, Lucullus, Seneca, and many another planned their gardens, and thus laboured for Horticulture in those far-off days. Again, from time immemorial, gardens have been associated with progress, and they were wont to be regarded as civilising and refining influences. In fact, we are told upon excellent authority, that it is only among the most brutal and degraded races of savages that gardening is unknown.

So far as England itself is concerned, Horticulture made but very slow progress until the sixteenth and seventeenth centuries—a time when Gerard, Gervase Markham, and John Parkinson began, by their writings, to make their influence felt. How far we had advanced prior to this, is shown by the restricted list of subjects then known to cultivation. It is, however, the last fifty years that mark an epoch in gardening. During that time Horticultural Science has advanced by leaps and bounds, but at no period has it been so practically understood, or had so many workers in its ample field, or even offered such scope for enterprise, as now. Treated commercially, it is, of course, not a field in which those who, having been unsuccessful in other walks of life, can embark with safety, though popularly it is supposed to be so. Yet for the man of intelligence, enterprise, and dogged perseverance, the possibilities are great indeed.

And what, too, of the educational value of Horticulture—of its refining influence? Money, it is true, will purchase all the products of a garden, but it cannot purchase the pleasures connected with their raising. Each intelligent worker in the field of Horticulture finds that gradually those difficulties which appeared insurmountable are overcome as if by magic. What looked like hidden mysteries stand out as plain truths. Thus is Nature revealing her choicest secrets. As, too, the store of knowledge increases, so is the interest quickened, until the guiding principles of the Science are in the proverbial nutshell.

Much of the popularity Horticulture now enjoys is due to an intelligent Press, to the fostering influence of those societies which have sprung up all over the country, to the yeoman service rendered by the Parish Councils, and, lastly, to the many excellent handbooks which have been published. The Literature of the subject is vast, and increases with the growth of knowledge; but the information is not always in the most accessible form. Books on special branches of Horticulture are issued in great profusion, but the all-round gardener is not and has not been at all well catered for. Books devoted to

general gardening are unaccountably few, and the majority not of recent date, and therefore not in accordance with modern thought and the progressive spirit of the age. The fact is that gardening is such a many-phased subject, that it is impossible for a man, be he never so enthusiastic or never so energetic, to excel in every branch. The man who essays, for instance, to become a specialist finds, as a rule, that the subject he has on hand engrosses all his time and attention, though for all that he may be a fairly good all-round gardener, but not the best of teachers on subjects outside the one which he has made specially his own. And thus it is that many of the books on general gardening, launched with the best of intentions, fall very short of the ideal of perfection aimed at by their promoters. It has therefore occurred to the writer that a book which would fairly well cover the field of general gardening in a practical manner, and at a moderate price, would be useful. The main idea embodied is to have each subject dealt with as far as possible by a specialist. By this means one is able to command the most up-to-date ideas in respect of the various branches of gardening, as each contributor gives of his best in the space allotted.

The field covered is, as already intimated, a very wide one, and herein lies the chief difficulty. It is not of course pretended that in the comparatively small space allotted one can exhaust subjects like Propagation, Fruit Culture, Orchid-Growing, or even Manures. What is possible is to give the marrow of each subject in such a simple yet concentrated form that it will be readily assimilated by those who seek after knowledge. Every phase of Horticulture is treated, from Landscape Gardening and Orchid Culture to Plant Propagation and Aquatic Plants. These latter have hitherto been dealt with in the most cursory fashion, being in most works on general gardening dismissed in a very few lines. Here they will be treated with that prominence which, by reason of their beauty and decorative value, they deserve. They are rapidly coming to the fore, and promise to become still more widely known, and therefore more highly esteemed.

As regards insect and other foes, these must necessarily be briefly dealt with. The aim will be rather to give guiding principles, enabling the gardener to combat, at any rate, the most formidable of the pests, both animal and vegetable, which he finds arrayed against him.

To the nomenclature employed, due regard will be paid, and an endeavour made to bring generic and specific limitation so far up-to-date. At the same time, in a work which claims to be popular, it has not been thought desirable to altogether ignore purely trade names. Where, therefore, a plant is familiarly known in commerce by a certain name, this will be given as a synonym. For instance, few amateurs would recognise by the name of *Fatsia japonica* the very familiar *Aralia Sieboldii*; or in *Pieris floribunda* the almost equally common *Andromeda floribunda*; or yet again the favourite *Latania borbonica* as *Livistona chinensis*, grown in such quantities for the markets. For this reason the names by which plants are known in nurserymen's catalogues will be as far as possible respected.



A QUIET CORNER AT KEW.



2.—*On Landscape Gardening.*

BY CHARLES
FRIEDRICH.

IN the formation of a garden or park there are certain rules which must guide the landscape-gardener. These vary according to the situation, size, and purpose of the garden whose creation they are intended to control. In any case, however, good taste must prevail. A garden cannot be laid out according to a set pattern; it must be as natural as possible, and the different parts must harmonise in every detail with the surrounding neighbourhood. Advantage may be taken of the existing landscape, and its aspect may be improved; but the general character of a situation must not be changed. All creations must remain true to natural laws. In a flat country one must not endeavour, for instance, to give to a garden a mountainous aspect by creating a rushing stream, dashing in cascades over rocks: it would be offensive to both the sight and the imagination. The landscape-gardener must study the general aspect of the situation, the nature of the soil, the altitude, the climate, and the local vegetation. He must think what will be the aspect of his creation thirty or forty years hence, when the trees will be in the fulness of their development, in order to be able to judge of the correctness of his conceptions. Full attention must be devoted to the views which one can command over the neighbourhood, or in the garden or park itself. Everything which he

considers pleasant and picturesque—as, for instance, a view of a church, a ruin, water, or any agreeable feature of a landscape—

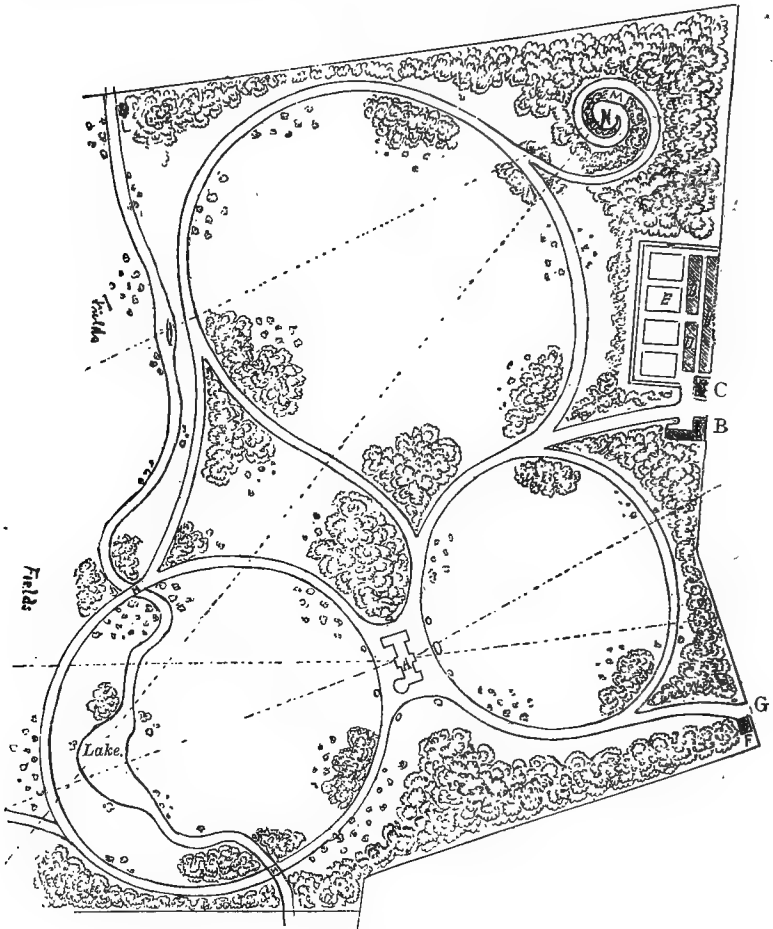


FIG. I.—PLAN OF A COUNTRY RESIDENCE.

A, Mansion; B, Stables, close to the servants' entrance, hidden from the Mansion by thick plantations; C, Gardener's Cottage, opposite to the Stables; D, Greenhouses, one lean-to and two span-roof houses; E, Kitchen Garden, surrounded by walls, against which are trained fruit-trees; F, Lodge; G, Main Entrance; H, Bridges; L, Water Pump and Engine House; M, Reservoir; N, Summer-house. (The dotted lines are the lines of sight.)

must be utilised to the best advantage. He can heighten the effect of such views by directing the line of sight between narrow openings amongst trees. The area of a garden may be made

to appear larger than it really is, and boundaries may be so dissimulated that the garden may appear to embrace the whole of the surrounding landscape. The boundary walls and fences may be clothed with ivy; hedges may be kept low; or again, they may be set in a ditch so as to be completely hidden when viewed from a certain distance.

The gardener should bear in mind that trees serve to frame the view, and give, by the variation of their forms and colours, light and shade to the picture. By these helps the lines of sight may be broken, thus giving life to a landscape, and preventing even the most beautiful views from becoming monotonous. In some cases a view hidden by trees may be brought into sight, while at the same time the most charming effects can be created, by making openings amidst the trees by cutting down branches, or, when necessary, by altogether removing the trees which intercept the view. If recourse be had to the latter expedient, the gardener must make sure before sacrificing a tree that the general aspect will benefit thereby, as any mistake in that direction cannot afterwards be easily rectified; he should well consider, too, the number of years a tree takes to attain its full development.

The choice of a site for the house in respect to the points of the compass is of the greatest importance. It must come before every other consideration; it must even take precedence of the view, as the comfort of the dwelling, which must never be undervalued, depends largely on its aspect. It is not easy to state the best position to meet every case; but, all things considered, perhaps a south-easterly one presents the most advantages. A house facing the south on that side gets too much sun in the summer, while the side facing north gets none in the winter. With a south-easterly position, however, every side gets the benefit of the sun. Fig. 1. gives a plan of a country residence, embodying the usual accessories.

The gardener has also to consider the approaches in their relation to public roads leading to say the railway-station, the post-office, or the church. They must appear to lead as directly as possible to the intended points.

One of the most charming features of a landscape is the water. A river imparts life and action in proportion to the rapidity of its stream; while a lake suggests repose.

PRELIMINARY OPERATIONS.—When the formation of a garden has been decided upon, the first operation will be a careful study of the ground, with the plan of the site at hand. If

such a plan does not exist, one must be made before any other work can proceed. The plan is taken off after the manner adopted by surveyors. It is not proposed here to go into a detailed description of this operation; suffice it to say that, in the ordinary way, a line is first staked which will serve as a working-base. From this line the surface is measured out, transforming it, according to requirements, into squares, trapeziums, and triangles, and the results are taken note of, and drawn. The situation and area of any existing buildings, the exact position of the trees, &c., must all be noted. When this has been done, the levels of the ground have to be similarly dealt with, sections being taken of the principal parts of the area, both longitudinally and transversely; well-defined figures of the lines followed by the surface of the ground being thus obtained.

The best position for the house, if it has to be erected, must be fixed in relation to the point of the compass, the outlook, the natural shelter, the surrounding views, and the height of the situation. The conveniences of communication with the neighbourhood, the form and the nature of the soil, and the sites of the various buildings which it is intended to erect, have all to be determined. The natural advantages of the situation, which will facilitate the creation of picturesque effects, will have to be well studied, as well as the best methods of remedying any defects. The result of the observation on all these points must be well noted.

TRACING.—The necessary appliances required for tracing the design of the future garden or park are an optical square, a chain, a rule, a garden line, and some sticks and pegs. With the pegs will be marked the positions of the buildings, trees, &c., the outlines of the alleys, water, and beds, and the heights of the levels of the earthwork to be thrown up. Two different kinds of pegs will be required: (1) Long poles, to indicate the positions of the buildings to be erected; (2) Pegs 2ft. long, $1\frac{1}{2}$ in. to 2in. square, thick, and pointed at one end, for marking the outlines. The sticks should be as straight as possible, 3ft. to 4ft. long, with a slight slit in the centre of the top. In this should be inserted pieces of white paper; these are used for tracing the lines of sight and are the bases to work upon in the general tracing.

The outlines of the house have first to be traced as exactly as possible, the situation of the principal rooms being marked, as according to their disposition the lines of view will have to be arranged. The greatest number of lines of view will be con-

centrated at the centre of the principal front. From these points the gardener must start to stake, taking, one after the other, the different objects which it is decided to include in the picture—such as a church steeple, a ruin, water, rockery, &c. Sometimes these views may be hidden by trees, through which openings will have to be made, or by other obstacles, which will likewise have to be overcome. Their positions will be found on the plan by taking the angle formed by two lines, of which one will mark the future opening, and this will then be noted on the ground by the aid of the compass.

The different views and aspects, regarded from other parts of the garden or park, must afterwards be fixed with exactness. For this purpose the lines used and marked on the plan of situation will be reproduced on the ground, and with some perpendiculars and angles measured and traced from them the

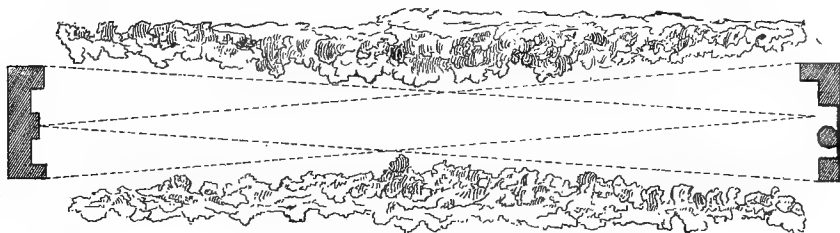


FIG. 2.—DIAGRAM OF RECIPROCAL VIEW.

gardener will arrive at the required situation. The start and the direction of the view will then be found. In fixing these lines of sight the peculiarity of the angle of sight must be taken into consideration. The object to be set in view must be seen in all its width: it must not be concentrated into a narrow opening; such an opening must be wider at its extremity than at its start, close to the point of observation. If the view is to be reciprocal—that is, if the two ends become each in turn top and base of the triangle—the opening must not be bounded by two parallel lines, but must be managed as shown in Fig. 2.

The outline of a lake, river, &c., must be pleasing, and in harmony with the situation. Very often the agreeable forms given to creations on paper will have to be altered on the ground. It must be remarked here that a curve appears much more accentuated when traced on the ground. It will be well, after the principal points of the lake have been determined, to join them

by inserting intermediate pegs at short distances from each other, say, every 14ft., or every 6ft. when the curves are short.

The tracing of the alleys is most important, as it is in fact the reproduction on the ground of the design of the garden. The tracing of an avenue or of a straight alley, or, indeed, of any other straight line which may occur in the design of a garden, is such an easy operation, that it hardly requires any description. The extremities are fixed, and intermediate pegs inserted upright in the line at equal distances. The curved lines are more difficult to trace. Geometrical curves can be calculated and traced with invariable precision, but generally speaking they only occur in geometrical or formal gardens, or in flower-beds. In the tracing of gardens or parks, one has generally to deal with fantastic curves with long, sweeping lines, and contra-curves with ever-changing centres. Their execution requires great practice,

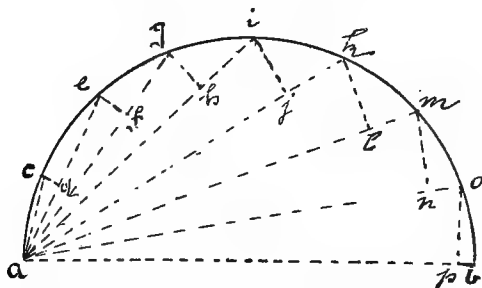


FIG. 3.—TRACING A CURVE FROM A FIXED POINT.

as they are traced by sight, without the help of any instrument. Their outlines, so long as they are pleasing, do not require to be traced with mathematical precision. Though this could be obtained, it would entail considerable trouble and great loss of time without giving any appreciably better result.

I will begin by demonstrating the principle employed in tracing a regular curve with only one centre, an operation which may be done in two different ways. In the first, shown at Fig. 3, the worker stands at *a*, and directs the operation without moving from that spot. The pegs are set at equal distances, and the *apparent* interval between them increases with the distance from the point *a*. The represented curve is divided into eight parts, and the apparent distance between each peg, as seen from *a*, will be respectively *cd* for *ce*, *ef* for *eg*, *gh* for *gi*, &c.; that is, the intervals seen between those pegs are equal to the

lengths of the perpendiculars dc , fe , hg , &c., erected on the straight lines ac , ae , and ag . From the point a , situated on an eminence, the worker could see all the different points of the

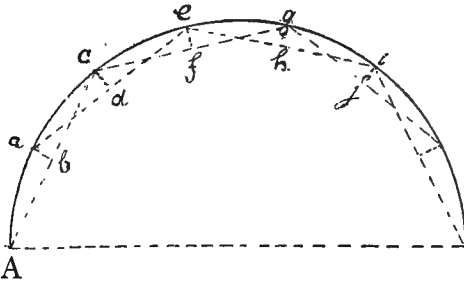


FIG. 4.—TRACING A CURVE BY CHEMINEMENT.

curve, whereas, if he were standing in a hollow of the ground, one part would be hidden.

By the second method the curve is traced by what is known, in French, as *cheminement*, and differs from the first in that the operator, instead of directing the work from one point, goes forward as it proceeds. It is based on the principle that if the perimeter of a circle is divided into equal parts the abscissæ are all equal to each other. In Fig. 4 the curve is equally divided in a , c , e , g , and i ; the abscissæ of the chords

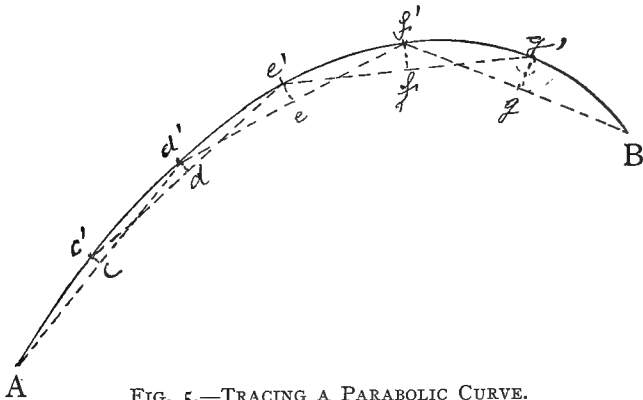


FIG. 5.—TRACING A PARABOLIC CURVE.

Ac , ae , and ag will be equal to ba , as all the arcs of the circle are equal to each other. Starting at the point A , the operator has the pegs at a and c inserted, and notes the length of the

abscissa ba , keeping it in mind. Going forward to a , he has the peg e inserted, reproducing in dc the length of the abscissa ba , and so on. Irregular curves, with several centres, are those which occur most frequently in tracing a garden; they are also traced by *cheminement*, as just explained.

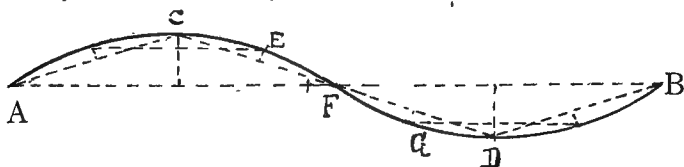


FIG. 6.—TRACING A CONTRA-CURVE.

Fig. 5 represents a parabolic curve equally divided. In working gradually forward from c' to d' it will be seen that the abscissæ $e'e$, ff , and $g'g$, gradually lengthen, and that the flatter the curves the shorter they become. The operator, therefore, as he proceeds, must remember these proportions. Contra-curves (Fig. 6) very often occur in the tracing of alleys, the object being to get round an apparent or a real obstacle in the formation of the ground, such as a rock, &c. In such a case the gardener has to trace first one curve and then the other, with the same proportions, taking care that no breach of the line occurs at F.

In tracing an alley it is usual to first insert pegs at a considerable distance from each other; say, every 60ft. Some workers

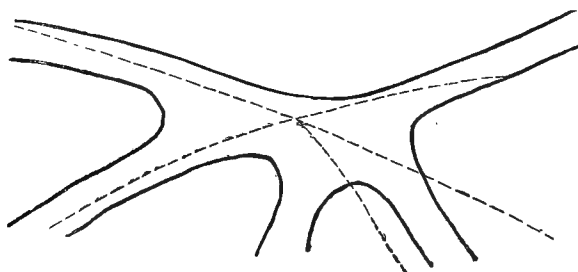


FIG. 7.—DEFECTIVE JUNCTION OF ALLEYS.

trace first one side of the alley and then the other, but it is preferable to trace the axis first, as it will afterwards be easier to effect a harmonious junction of the different alleys. The axis traced, it is usual to go over the work again, correcting the defects. Two men take a rod, equal in length to the width of

the proposed alley, and mark its centre. They stop at each peg and set the rod at right angles to the axis, while a third man holds the mark just on the axis, and a peg is then inserted at each extremity of the rod, marking exact points in both sides of the alley.

In Fig. 7 is shown a defective junction of alleys (a result easily obtained when one side of an alley has been first traced, and then the other), where the different axes do not meet well. Fig. 8 represents a correct junction (formed when the axes have been first traced), in which the alleys converge well at their point of junction, so that when the sides have been traced it is only necessary to round the angles.

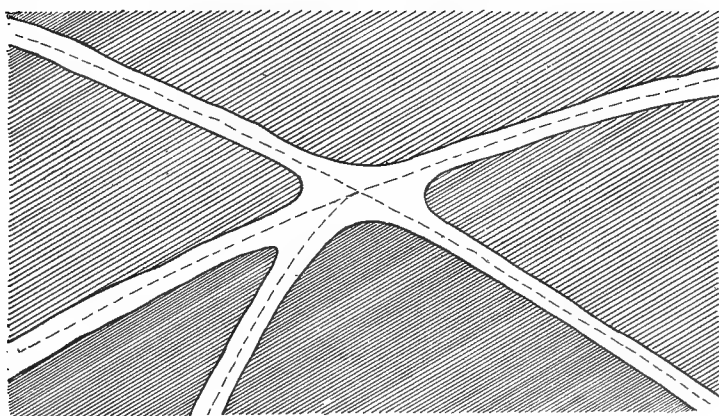


FIG. 8.—CORRECT JUNCTION OF ALLEYS.

When the general tracing has been done, and the defects have all been corrected, some intermediate pegs on the sides are inserted 15ft. from each other, and driven well in. Those marking the axis are then taken out. Pegs marking the outlines of beds, in order not to be confused with those marking the alley, must be painted at the top or else inserted in an inclined direction. In gardens the outlines of beds bordering an alley must be strictly parallel to them; but the sides facing the lawn may be irregular.

Practical methods for tracing on the ground symmetrical designs, with the help of instruments, are numerous; but the following simple rules will enable those who do not possess the latter, and are not accustomed to their use, to obtain

a similar result simply with the aid of a garden line and a few pegs.

(1) To trace with the line a straight line perpendicular to another straight line (Fig. 9): On the line AB two pegs are inserted at E, F , at equal distances from the centre (C); nooses, however,

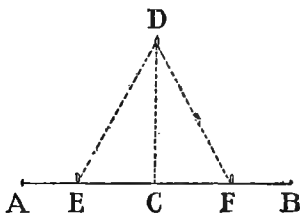


FIG. 9.—TRACING A PERPENDICULAR AND AN EQUILATERAL TRIANGLE WITH A GARDEN LINE.

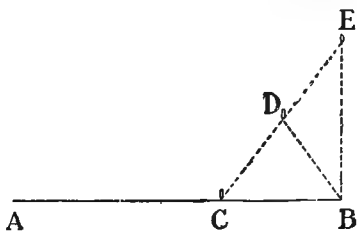


FIG. 10.—TRACING A PERPENDICULAR AT THE EXTREMITY OF A STRAIGHT LINE WITH A GARDEN LINE.

formed at each extremity of the garden line, are passed over E and F , and in the middle of the line a knot is made. By holding the line at D and tightening it, DC , the perpendicular to AB , is found. A similar result may be obtained by tracing a circle from each extremity of the line AB , with radius EF . The two arcs of the circles will meet in D , from which the perpendicular to AB may be traced to C . This latter method can be used to advantage on a flat surface, while the former is preferable on uneven ground.

(2) To trace a perpendicular at the extremity of a straight line (Fig. 10): In the line AB a peg (C) is inserted anywhere, and the nooses of the garden line are passed over the pegs B, C .

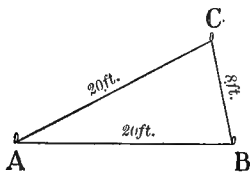


FIG. 11.—TRACING A TRIANGLE.

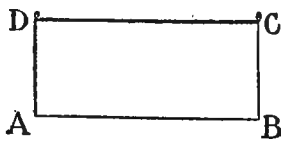


FIG. 12.—TRACING A RECTANGLE.

This is drawn tight till the knot made in the middle gives the point D , where another peg is inserted. The noose over the peg B is then taken off, and by putting it in a line with DC the extremity of the garden line will give the point E , the line from which to B is perpendicular with AB .

(3) To trace on the ground an angle or triangle (Fig. 11): A line (AB), in this case 20ft. long, is measured. Then a garden line, 20ft. long, is fastened at A, and another, 8ft. long, at B. Both free ends are joined together, and the point C is found, giving the apex of the triangle. When the triangle is to be equilateral, it can be traced by Example No. 1, used to find the perpendicular, or by this method with lines of equal length.

(4) To trace with the garden line a rectangle (Fig. 12): At B in the line AB, 20ft. long, for instance, a perpendicular (BC), 8ft. long, is traced. Another line, 20ft. long, is fastened at the peg at C, and a third one, of 8ft., at the peg at A, both ends being joined in D.

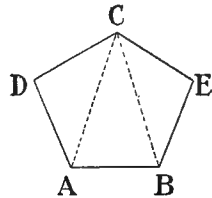


FIG. 13.—TRACING A REGULAR POLYGON.

(5) To trace with a garden line a regular polygon: Say Fig. 13, representing a pentagon, ABECD, is to be reproduced. The line AB and the line AC are measured; with these measures the triangle (ABC) may be traced by Example No. 2 (Fig. 11). Two lines, equal in length to AB, are fastened by one end in A and in C, and by joining the other ends together the point D is found, while, proceeding similarly on the other side, the point E is found.

(6) To trace with a garden line a circle or an arc of a circle: A peg is placed in the centre, and the noose of a string, equal to the radius (the half of the diameter), is passed over it, the tracing being done by moving round with a stick fixed at the other end of the tightened string.

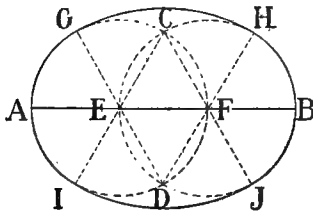


FIG. 14.—TRACING AN ELLIPSE. (First Method.)

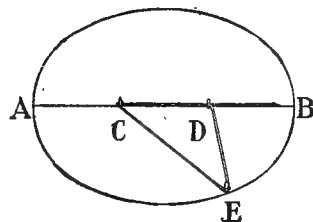


FIG. 15.—TRACING AN ELLIPSE. (Second Method.)

(7) To trace an ellipse, of which only the major axis is known (Fig. 14): The line AB is divided into three equal parts at E

and F. With the length of one of those parts as radius, and the points E, F, as centres, two circles are traced, of which the circumferences cut each other in C and D. From C, two diameters of the circles are traced, of course passing through the centres, E, F, and meeting the circumferences in I, J. A similar operation is performed from D. From the point C as centre, and the diameter CJ as radius, the two circles are joined by an arc, which will meet them in I and J, and this can be repeated from D at GH. Another way: The major axis (AB) being given (Fig. 15), at rather less than a third of that line from the end, a peg is inserted as at C. That distance is measured from B, and a peg inserted at D. A string is

fastened at C and D, and put loosely over B. Then a stick (E) is put in the loop, and moved round the foci C and D in one direction, the string being kept taut. This is by far the easiest method to practise on a large scale.

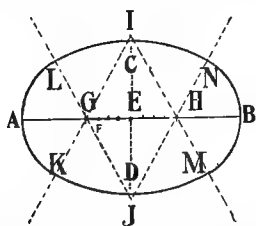


FIG. 16.—TRACING AN ELLIPSE.
(Third Method.)

(8) To trace with a garden line an ellipse of which the major and minor axes are known (Fig. 16): The major axis AB is divided in E into two

equal parts by the minor axis CD; taking the half of CD, and measuring it on AB, will give AF. FE is then divided into three equal parts, of which one is measured in G on FA. The length AG is then also measured on BE, giving the point H. With the garden line two equilateral triangles are traced according to Example 3, having as common base GH, and as apices I and J respectively, the sides being produced. With GA as radius, the arc KAL, and with HB, the arc MBN, are traced. The ellipse is then completed by tracing two other arcs having as centre I and J, and touching the previously-traced arcs at the points L, K, M, and N.

With these examples most of the plain figures of a geometrical garden can be traced, even if the gardener has no other instruments than line and pegs at hand for the purpose.

The tracing of orchards and fruit and kitchen gardens is, as a rule, very easy. The right angle is the dominating feature, and great care must be taken in well fixing the axes and their perpendiculars. When the tracing of a regular garden has to be executed on very inclined ground, it must be done according



THE GARDENS, COUNTY OF CLIFFE, CROYDON.

to the horizontal plane. The principal point of the tracing, and especially the lines of operations, will have to be fixed by stretching garden lines well tightened in a horizontal direction, while with the plumb the exact places for the pegs are indicated. The pegs or poles used must be of such a length that a part may be left in sight till all the work is done, even if the other part should be hidden by the filled ground.

LEVEL.—When the tracing has been executed, the points of level which will have to guide the formation of the earthwork, have to be fixed. In the scheme of transformation, the levels fixing the different gradients of altitude, and describing the original lines followed by the surface of the ground—obtained when taking-off the plan of situation, and when making the study of the ground—have been altered or rectified. When dealing with the work of formation of the ground, some of the considerations and rules which govern such alterations will be discussed.

The principal points of level are fixed with the theodolite or with the water-level, and the intermediate points with the boring-rods. The last-named consist of three pieces of wood, 4ft. long and 2in. wide, with a strip of board placed exactly at right angles across their tops. They are used in the following manner: Given two points of level the operator, with the help of two men, sets his rod on one point while a man holds his upright on the other point. The second man holds his in the line at the intermediate point. The operator then looks over the top of the little board, and if he sees the top of the other two in even line, the level is obtained; while if he sees the second higher or lower than the third, it has to be lowered or raised accordingly.

Where the soil has to be removed, a hole is made, and a peg inserted at the bottom and sunk to the right level; its top may be painted red. If, however, soil has to be brought to that place, that is if the level of that particular spot has to be raised, the peg will have to be painted on three sides only, the fourth being utilised for marking the height of the future level above the original soil.

APPROACHES.—The ways of communication determine more than anything else the style of a garden. The principal points for consideration, in laying-out approaches, are not numerous, but they are of the utmost importance. The communications between the entrance from the public road and the house, and between the latter and all other parts of the place, must be as

convenient and as easy as possible. Their appearance must be harmonious and in accord with the style of the garden. They should always appear to lead direct to their destination, and any deviation should only arise from a decided obstacle. Approaches must be solidly established, and well kept.

The different ways of communication in a park or a garden are as follow: The drive, which can be straight or curvilinear; the walks, which may also be either straight or curvilinear, according to the style of the garden; and the paths and back road for the service of the house, of the garden, and of the stables.

THE DRIVE leads from the public road to the residence. If the estate is a large one, and the house of pretentious appearance and situated in flat country, a straight drive is advisable; but if the ground is undulating, a curvilinear drive is more appropriate. A straight drive, though imposing, is monotonous. A straight avenue must start from the centre of the house, and put the latter into relief. When the centre of a residence is not prominent or particularly decorative, two avenues may start from each of the extremities of the front, each one becoming a centre. The space between the two avenues must on no account be planted with trees, though it may be turfed, and be brightened with flower groups. The number of rows of trees on each side of an avenue may vary from one to four. If more rows than one are planted, they may be arranged in either squares or chequers.

A drive with one or several curves is best adapted—in fact, the only suitable one—for undulating ground; and it has to be closely studied after the site of the house has been chosen. The site of the entrance from the public road must be determined according to the exigencies of the situation and the proprietor's needs. If a curvilinear drive is chosen, it must, nevertheless, not deviate too much from the straight line. The entrance thereto must be as near to the house as the natural conditions will allow. The curves must be easy, forming broad, sweeping lines. Every change of curve must have its apparent reason, *i.e.*, an obstacle, such as a tree, which it is desired to conserve, a rock, or a wooded hill, which has to be allowed for. To increase the variety of a long drive, such "obstacles" may be artificially created. The more undulating or hilly the ground, the more numerous must be the turnings, and each sweep of a curve must be hidden from the succeeding bend. The entrance from the public road must, if possible, be at

right angles with the latter; and the commencement of the drive from the public road, and also the house end, must be nearly level. The entrance ought not to be situated on a higher level than the house. The slope of the drive must, if possible, be regular, even, and continuous all the way along, except at the ends. It must not go up and down hill if this can be avoided, unless water has to be crossed or a hill to be turned.

The gradient of a good drive must not exceed one in fourteen, and its width must be at least 14ft., so as to permit

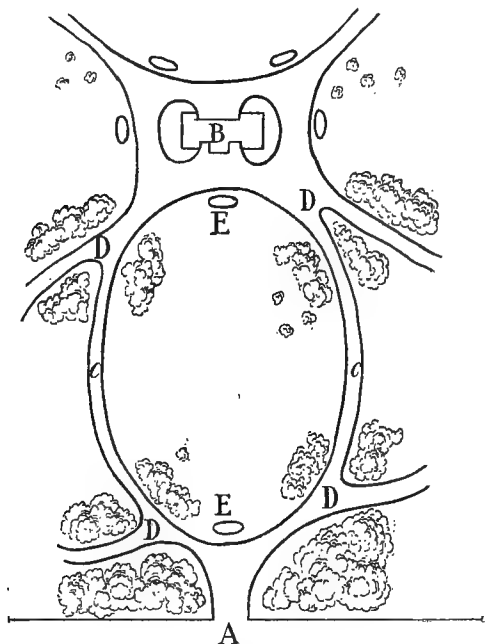


FIG. 17.—APPROACH IN FRENCH GARDENS AFTER ANDRÉ.

of two carriages passing each other. There must not be an open view of the house at the entrance of the drive; the house must only be seen from the points at which it will appear to its best advantage, through occasional openings between groups of trees. A good impression should be made on the visitor from the entrance, and as he proceeds towards the house this ought to be strengthened.

Trees bordering such a drive must not be planted at regular distances, as that would prove monotonous. They must be skilfully arranged in groups at alternately varying distances.

A proper treatment of each end of the drive is of great importance. The custom in England differs from that of several continental countries—France in particular. In French gardens the drive very often divides, almost from the start, into branches, which go round a large lawn and meet again in front of the house, the general aspect remaining constantly similar. There is only one curve on each side, forming round the lawn a kind of regular track of a fairly decorative appearance when well treated, but still presenting, as M. Ed. André, in his famous work, "L'Art des Jardins," deplors, many serious defects, of which the principal is the uniformity of design. He says that the result of an invariable model applied to the most varied circumstances is to reduce the design to an

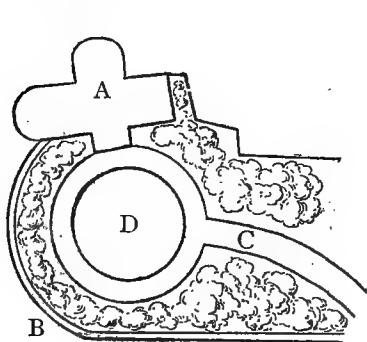


FIG. 18.—APPROACH AFTER
MACINTOSH.

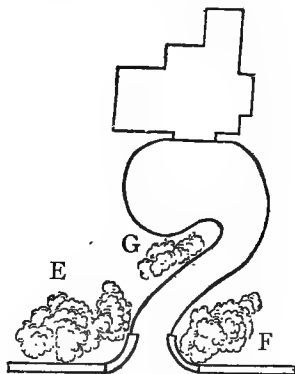


FIG. 19.—APPROACH AFTER
HUGHES.

artificial and inartistic proceeding, though he does not intend to proscribe the bifurcated alley when applied to a suitable situation. Fig. 17 illustrates this type. The entrance (A) is opposite the house (B). The drive divides into the branches (C, C). The crossway (DD) is surrounded by groups of trees and shrubs. The elliptical lawn is undulating; the centre has been lowered and the verges have been raised. Beds (E, E) are planted with flowers, and trees are scattered about in various places. Everywhere regularity, with an apparent variety of aspect, prevails.

As a rule in French gardens the drive goes round the house; while in England this is not the case. The drives are not divided, but usually end in front of the house, there forming a narrow ring. The interior of the garden or park is hidden either

by sinking the carriage-drive, by raising banks along the garden, or by planting; therefore, the space in front of the house must be large enough to permit of carriages making a circuit as easily as possible, say not less than 30ft. for a small house, or 100ft. for a large one. There must also be enough space on either side of the porch to allow carriages to draw close to the steps. Fig. 18, after MacIntosh, represents a house (A) confined on the side of the entrance in a narrow space by a wall (B). The drive (C) skirts a circular turfed space (D). Both sides are planted with compact groups of shrubs. In Fig. 19 there are two big groups (E, F) at the entrance, and a third at G; the house is hidden by those groups without being itself deprived of air or of view. The last two examples are only suitable for

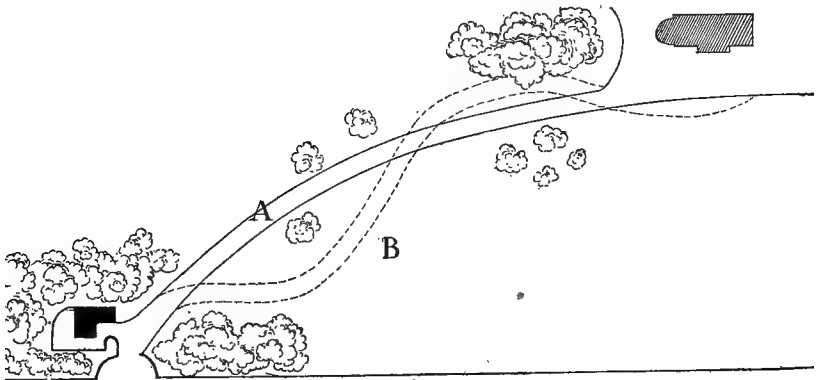


FIG. 20.—(A) CORRECT AND (B) BAD DISPOSITIONS OF AN APPROACH.

small gardens. Fig. 20 shows a good design of drive (A), a bad one being shown by the dotted lines (B).

THE WALKS AND THE PATHS, like the drive, are governed by a very few general rules, though they present a great variety of forms. They must lead in a natural and agreeable way to any place of interest—say, to one commanding a good view over the country, or having itself a picturesque aspect; to a tree, to some water, or to a playground. Alternate curves are a necessity, as they enable one to view an object under different aspects, but their number must not be greater than is strictly necessary. On hilly ground the curves and turnings will have to be more numerous. The width of a walk is, as a rule, 8ft., and of a path 4ft. Their edges must be kept strictly parallel, and must never be crooked, as they are sometimes seen in gardens.

Two or more walks and paths need not in their forms follow definite shapes, as the delineation of such would be hidden by the plantations. One alley must not run into another at right angles, but their axes, as I have said before, must join harmoniously. It must (Fig. 21) join obliquely after such an angle that the direction of B may be taken naturally, but at the same time one should also be able to turn with ease towards C if one chooses to take that direction. When an alley (A) divides, each of the two branches (B and C) must take at once a decided opposite direction in order not to leave any doubt about its destination (Fig. 21). Such a disposition as that shown in Fig. 22 must be avoided. The separation is seen at once to be unnecessary; as the two branches show that they will meet again at a short distance.

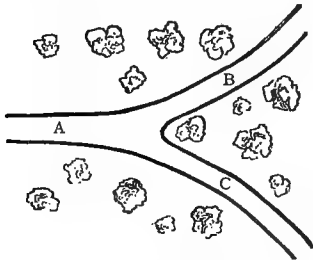


FIG. 21.—GOOD BIFURCATION.

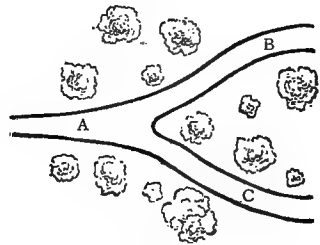


FIG. 22.—BAD BIFURCATION.

In the formal garden the alleys not only characterise but create the kind of garden. Their turfed grass borders, flower-beds, terraces, &c., must be in strict harmony with the architectural lines of the house, and the former must have their axes in common with the latter. There must be a marked delineation of the limits of the formal and the landscape garden, in the form of balusters, steps, or banks.

If the formation of the drives, walks, and paths is very carefully attended to, it will afterwards be much easier to keep them in good order. The lines forming the widths of the drive must be well defined, and that width dug out. The depth of the depression and the thickness of the road material depend on the use to which the road is intended to be put. A main drive, on which there is likely to be a lot of carriage traffic, must be made as solid, and maintained in the same condition, as a public road; it will require a layer of broken stones or rough gravel 6in. to 10in. thick. Other kinds of

porous material, in the form of broken bricks, clinkers, or burnt ballast, may be first employed, and these may be covered by a thin layer of the first-named material. A drive 14ft. in width should have a "crown" of 3in. The materials named must be well rolled down, and watered at the same time, in order to get them to bind well. The weight of the roller to be used depends on the thickness and quality of the road material employed, the slopes of the ground, and the number of horses to be used to draw it. It is not advisable to use a horse roller heavier than four tons, as it will require too many horses, and these would cause too much cutting up. Should a heavier

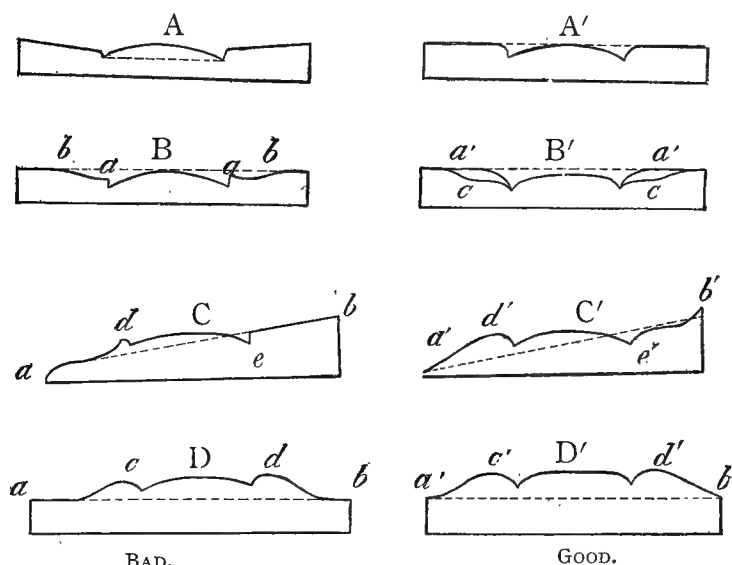


FIG. 23.—SECTIONS OF ALLEYS.

one be required, a steam roller is preferable. The lightest of these weigh ten tons, and good and solid work is done with them. When the roller has gone several times over the surface, a thin coat of fine, good binding gravel should be spread over, rolled, and watered, filling as well as possible all the cavities, and thus forming a solid and smooth surface.

For a walk, 3in. and 4in. of rough gravel, with a crown of 2½in., is sufficient. A path requires just enough fine gravel to keep it dry. Drives or walks traversing damp spots or following the falling ground have to be drained. Drains may

be placed in the middle or on either side. Drives and walks must have gully-holes, with gratings, in sufficient number, according to the gradient of the ground. The outlet pipes of the gully-holes must be 6in. above the bottom to allow spaces for the deposit of gravel displaced by rains.

Turfed walks are more economical, but they must be kept clean by mowing them and trimming their edges frequently.

The centre of an alley must never be of a higher level than that of the verges. From the lawn bordering an alley one should step down to the alley. The less apparent the walks and alleys are, the better is the general aspect of the garden. Both verges must be kept at the same level at the start, even if the ground is rising on one side and falling on the other.

There are numerous forms of verges, which vary according to circumstances. In Fig. 23 a few sections of good and defective dispositions of verges are reproduced. In Section A they are flat, as is very often seen; while A' represents a better disposition, the walk being sunk a little, and the edges of the verges rounded. Sometimes the edges are seen (as in Section B) to be cut straight out as in *ab*, before joining the level of the lawn in *bb*. The lines *a'*, *a'*, of B' are more deeply sunk, and of a better aspect. They can also be disposed as in *c*, *c*, putting the alley more in view. In Section C the ground is falling according to the line *ab*, and the broken line *de* must not be imitated, while the section on *a'b'* in Section C' could be replaced with advantage by *d'e'*. When the ground is boggy, the alley must not rise abruptly over the level of the ground (as in *cd* in D); it must be kept above the average surface (*a' b'* in D') which is flooded, and be supported by the verges, *c'*, *d'*, which gradually join the level of the general surface.

When the fall of the ground is too rapid, it can be interrupted now and again by steps, either of wood or stone, between which the slope will be gentler. Stone steps must have a rustic appearance, so as to appear as if naturally found on the spot. They must not be higher than 4in. or 5in. each, and must also be wide enough to allow of taking several steps on each before getting on the next. Wooden steps are made with long branches either left whole or split in the middle; they are then fastened by stout pegs, inserted on the outside, or nailed against the latter when the pegs are inside. Their disposition must be the same as that of stone steps.

PLANTING.—Plants are the fundamental ornament of nature, and therefore of the garden ; and it is on their association that the charm of the landscape mostly depends. Planting is, therefore, of paramount importance in landscape-gardening. In the creation of a garden the formation of the ground may not be well harmonised—the waters may look artificial, the rocks may not be well disposed ; but all these defects can be amended by a cleverly-arranged plantation. Failure in making a good choice of plants, or in grouping them well, is an irreparable mistake. Each tree has its particular aspect and charm when well developed, though its æsthetic qualities may be differently appreciated. On the Continent one is accustomed to see trees with large crowns supported by naked trunks forming the woods, and they are appreciated there as much as those splendid isolated specimens which have been able to grow freely, and whose branches touch the ground. In England a tree is really only appreciated when its trunk is densely covered with branches. In the United States, inspired by the same taste a tree is not allowed to have its crown supported by a nude trunk, and gardeners there go so far as to top the heads of big trees. Beauty can express itself in many ways without one being obliged to have recourse to such radical methods. It can never manifest itself better than when an object is allowed to develop itself freely under its natural conditions. For this reason, all operations tending to modify the natural form and beauty of a tree ought to be condemned. To cut isolated trees into any shape whatever is bad taste. Such proceedings may be tolerated when dealing with a mass ; for instance, in the form of a straight avenue, an arbour, or a hedge, the lines of which are in harmony with the style of the garden. Without any consideration of species and stature, the beauty of a tree lies in the elegance and lightness of its general aspect. A tree with compact and regular foliage, its apparent surface not being broken by the projection of a few branches, is not of agreeable appearance. The white Horse-chestnut is in this condition in its early stage, but it improves in appearance as it grows, and the branches of a fully-developed tree often droop to the ground. How inferior beyond any comparison is the glow of light falling on an unbroken mass of leaves compared with that falling on the noble outlines of an Oak or a Beech ! What a variety of gradation of lights and shadows are produced by their prominent branches and deep recesses !

Trees must not only be judged for their particular qualities as isolated specimens, but also for their effects when associated with other species; their position in the landscape has to be studied. The variety in grouping is infinite, but it has been found that the best effects in nature are obtained when compact masses of trees cover the top of a hill, which they thus make to appear higher. The summits may be crowned by forests of Conifers. Below these should come trees in groups, then isolated specimens, and lastly, mere bushes, which, as it were, break away from the masses on the hill-side to unite themselves with the vales.

Great variety of form and of colour, of light and of shadow, is brought into play. In the meadows groups of big trees should rise here and there. In order that big trees may produce a harmonious effect, they must be grouped with their natural associates in a landscape, and the introduction of exotic species, though they may be hardy and of good appearance, must be avoided. A large bush of dark green, growing at the foot of a slender tree with foliage of a light hue, produces a happy contrast. A group of two trees produces a good effect only when one differs from the other in a very marked manner. Groups of three trees are often met with in nature, but they are never of the same kind, or at least of the same strength. It is by their difference of size, and by the variety of their foliage, that they attract notice. An equilateral triangle presents a too regular aspect. A scalene triangle will be a better disposition for a group, and its appearance will be enhanced (if the triangle is large enough) by planting a fourth specimen in the middle, especially if the different species contrast well. Groups of five are well disposed when they are planted at the four angles of a trapezium, and at its centre. They can also be disposed in the shape of an irregular pentagon, but this arrangement has the disadvantage of presenting too circular an appearance. Groups of over nine or ten trees will only have a pleasant appearance if planted in several irregular sections, composed of different kinds of trees. Not only must trees be planted at suitable distances, but in order to present a good appearance the mingling of their branches with each other must be harmonious; their profile and colours will only be appreciated if those points have been happily met. It sometimes happens that these differences are secured in trees of one variety, but of different sizes. It may also be the result of mixing together a group of species, well defined by their forms and the colour of their foliage.

Trees of a pyramidal shape look well by the contrast they present when grouped with trees with round crowns, such as when towering above a group of Elms. In forming groups, it can be accepted as a rule that whatever the number and the form of the trees, they must, as a whole, in order to produce a satisfactory effect, present that balance in all their parts which should also characterise the isolated specimen. A group, it will be understood, forms a whole, and must be treated as a single object. When Nature is left to provide for herself, the balance of the different parts will seldom be missed. In order to produce a better effect, planted groups of trees must remain in harmony with existing woods, of which they must appear to be only detached parts, and their number must be regulated as may be required.

In shrubs and bushes we have an unlimited variety. In our latitude groups composed of plants of one species are not met with. If any species is the prevailing feature of a position, it is, nevertheless, always found associated with some other kinds of plants, giving variety to the picture. The natural conclusion is that in planting large groups they must never be formed of only one species. An exception may be made in planting small gardens where natural disposition is out of consideration. The number of shrubs that are found growing on the banks of rivers is rather small, but, nevertheless, charming effects are obtained by forming groups of some of the following Willows: *Salix Caprea*, *S. purpurea*, *S. rubra*, and *S. vitellina*. Amongst rocks a great variety of vegetation is always met with, growing in most picturesque fashion. Dog Roses, Brambles, Barberries, Elders, and many more form very attractive contrasts. The plants, though many of them are not very decorative by themselves, present in such associations very picturesque effects.

After having considered some of the most striking aspects of the plants in their natural state, we now come to their practical application for the decoration of parks and gardens. In the creation of the latter the landscape-gardener has to deal with old and new plantations. In the first instance, the existing plantations have to be preserved or modified in their outlines when necessary; while, in the second, the surface of the ground may be devoid of vegetation, and the plantations may therefore have to be created. In most cases, both conditions have to be complied with at the same time. It has been stated before

how openings can be made, letting light into the boundaries of the landscape. A park cannot be created under more advantageous conditions than when situated in a wood; here the most fascinating results can be obtained at once. As already said, the indigenous species of trees suffice to create varied effects. The masses which will form the background of the picture, and are seen only from a distance, impart to the landscape its dominating character, and it is less the beauty of the individual subjects than that of the whole that must be taken into account. From a distance, trees of middling appearance produce good effects; but close to the walks the particular ornamental qualities of each tree have to be taken into consideration.

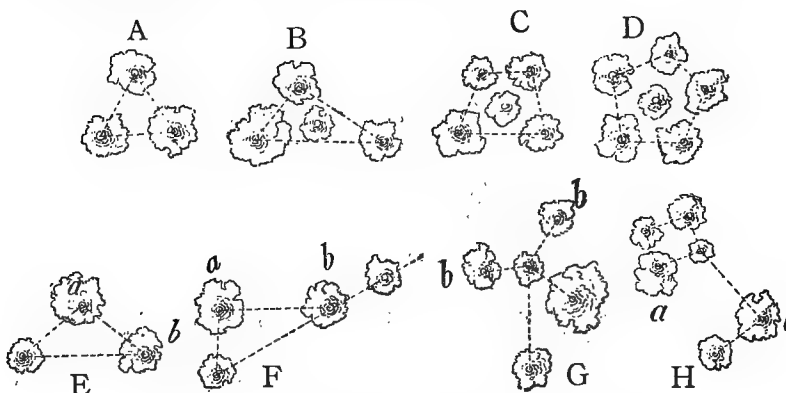


FIG. 24.—POSITIONS OF TREES IN ISOLATED GROUPS.

In making openings, the outlines must present varied forms, but lines, or a succession of sweeps and serpentine that are sinuous to excess, must be avoided. Prominences marked by detached trees and more or less deep recesses, sometimes penetrating into the masses, then breaking sometimes only slightly, will create an infinite variety in lights and shadows. Walks through woods must be treated as openings, and their sides must present the same varied aspects.

Deplorable effects are produced by crowded clumps of circular appearance, often of one species only, and yet such are often met with. It is advisable to leave sufficient space between each specimen, especially when Conifers are concerned, that they may develop under normal conditions, and that their lower branches may be allowed to cover the ground. Isolated groups

must not present any formal disposition. In fact, any tendency to a regular aspect must be avoided. Fig. 24 shows some groups of three or four. Of A, B, C, and D, the first (A) and the last (D) are bad, being too regular; while B and C are tolerable, though the trees are of a too regular aspect, being of the same strength. In the forms E, F, G, and H there is a more accentuated variety of aspect. The highest trees are those marked *a*, while those of second height are indicated by *b*; the remainder are trees of varied and bushy appearance. The differences of height and the forms of foliage produce a striking diversity.

When groups are composed of more than six trees, they must be considered as consisting of several groups, and not as composing only one. Groups of two trees may produce good effects but, as has been said, one must be bushy, and the other must be slender and rise above the first.

It is not advisable to group Conifers with other trees, except when planting large wooded masses, where a few specimens here and there, towering above the others, will break the sky-line. It is better to group them by themselves, and to leave their lower branches to develop themselves naturally, and cover the ground. Conifers are very decorative, especially on a falling lawn, close to rocks. If some shrubs are planted at the foot of a big tree, they must not form a circular group, but their outlines must be as varied as possible. They must be all of one kind, the tree providing sufficient contrast. In grouping trees, the pyramidal forms are kept in the middle. Poplars (*Populus nigra fastigiata*) in small isolated quantities, on the banks of rivers and lakes, look very nice, but their effect is enhanced when supported by groups of Willows.

The best time for planting is towards the end of the autumn, when the trees have lost all their leaves, and thence till the weather gets too frosty. In heavy, damp, and cold ground, planting must be done only in the spring (in March and April). Conifers can be planted from August to October. Several kinds of evergreen shrubs and certain trees with fleshy roots, like the Tulip-tree, Magnolia, and others, are better planted when growth starts in the spring. The ground must previously have been dug to a depth of about $2\frac{1}{2}$ ft. If the soil is poor and sandy, it is advisable to add some clay; or, if it is too heavy, some sand and lime. The subsoil, if impermeable, must be well drained. Large groups in the park are planted, as a rule, with small

forest trees in irregular lines and rather close to each other, as they can, after a few years, be thinned out. The species are well mixed and, as said before, prominences and recesses are formed on the outlines.

There must be a marked difference between the plantations of the park and those of the garden close to the house. In the former, as has been said, all the disposition of planting and the choice of the plants must be in harmony with the surrounding landscape. In the latter the planting may be more apparently

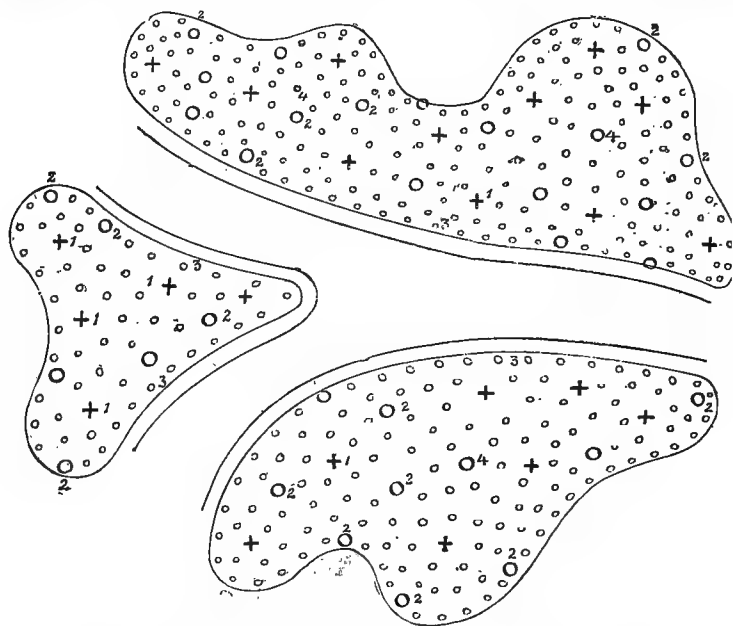


FIG. 25.—DISPOSITION OF TREES AND SHRUBS IN GROUPS.

connected with the design of the garden. The plants should be finer, and may also be of exotic origin, which, by their growth and tint of foliage, are such as we are accustomed to find in a garden. In the park we have "plantations": in the garden we have to a certain extent a "collection of plants." The planting in a garden is not proceeded with in the same way; trees are never on a line, and all regularity in the distances is avoided. The big trees of first height (No. 1) in Fig. 25 are 12ft. to 18ft. from each other, and those of second height fill the intervals, and are more on the sides of the group. The shrubs (No. 3)

on the edges are 4ft. to 5ft. from each other, and those in the centre (No. 4) fill all the empty space, in such a manner, however, as to leave about 5ft. free round the trunk of each tree. A verge of from 2ft. to 3ft., according to the size of the garden, is left between the group and the alley. The first row of shrubs is planted 10in. from the inner line of the verges. The different species of shrubs and trees of which the group is formed must be well mixed. After a few years of growth, the varied aspect obtained will be very good. The strong-growing species will blend themselves with the weaker ones, and will form a delightfully compact whole, while still retaining their individual beauty.

It is wrong to distribute the different species with which a bed is planted in small groups of one species only, as is sometimes seen. The growth, form, and colour of such groups being naturally different, the result obtained is far from presenting a harmonious whole. The trees must not necessarily be in the centre of the groups, although the shrubs must be disposed in such a way that all are seen to their best advantage, the small ones being placed in front and the tallest in the centre. The trees planted close to the alley on the verge of the group are intended to give shade, as well as decorative effect. A shady walk is always appreciated.

Small, isolated groups scattered on the lawns produce very nice contrasts, but are only recommended where great attention can be devoted to the keeping of the garden in order. The place of each tree and shrub will have to be marked beforehand, and they must be planted in well-dug and properly-prepared ground. A calm and, if possible, cloudy day should be selected, and the roots well spread in the soil at their proper depth. The branches should be left intact, but on growth commencing they may be slightly cut back. After planting, if the weather happen to be dry, the shrubs, &c., must be well soaked with water. This is particularly necessary for evergreens and Conifers. It is also advisable on the same account to cover the surface of the ground with rotten dung or dry leaves from the wood, in order to protect the roots from frost in the winter and from drought in the spring.

The planting of isolated trees requires particular attention in order to ensure success. Circular holes are dug out—deep if they are intended for species having roots like the Pear-tree or the Sophora, and broader than deep for those with spreading roots. The average depth in rich soil is $4\frac{1}{2}$ ft., and

the diameter 3ft.; but in poor soil a hole 7ft. wide and $4\frac{1}{2}$ ft. deep is required. It is a great advantage when the hole can be dug out several months in advance, and the soil left exposed during that time to the beneficial influence of the air. Before planting, all injured roots must be cut away with a sharp knife, and the branches must be thinned out and pruned in proportion, as the roots are taken off, imparting at the same time a good shape to the crown. The tree must, if small, be kept upright in the middle of the hole by a man holding it, or when large by means of three ropes tied in the crown, and held, stretched at equal distances, by three men. The roots should be covered with fine soil, this being well rammed in between them with a pointed stick in order not to leave any cavities. The hole must be filled to the height at which the tree used to be, allowing for the sinking of the soil. Some trees, Poplars and Willows for instance, ought to be planted deeper than they were before. Previous to planting, a strong stake must be driven into the middle of the hole to prevent the tree from being shaken by the wind; if it were driven in after planting, some of the roots would be injured. Very large trees are kept in position by three well-stretched wires fastened to the crown, and secured to three strong pegs planted at equal distances. During the first year after planting, in order to protect the trunk from the scorching sun, it can be covered from the ground to the lower branches with a coating of long straw or with reeds. During the summer, if the weather is dry, all the new plantations must be well watered.

American plants, such as Rhododendrons, Azaleas, Kalmias, and Andromedas, are, as a rule, grown close to the house. They delight in a peaty soil, though one may sometimes see Rhododendrons doing well in loam. The bed intended for such plants is excavated a foot deep, and the bottom of the ground is covered by a layer 2in. or 3in. thick of coarse gravel or brick rubbish. This will serve to provide drainage, and will isolate the peat from the natural ground, preventing it from getting sour, and keeping the worms off. This layer is covered with clods of peat, coarsely broken, and all the roots are put at the bottom. The coarser the peat, the better do the plants prosper in it. The bed is rounded, and the total thickness of the peat is about $1\frac{1}{2}$ ft., of which 9in. is above the soil. When small plants are inserted that depth is not necessary. Rhododendrons must be planted in March, the tallest being placed at the



*SUMMER-HOUSE IN THE GARDEN, THE GRANGE, HACKBRIDGE.
The Residence of A. H. Smees, Esq.*

back, so that they may be seen better when in blossom. They can be either of one colour or mixed. A good disposition is to plant in the middle different red varieties, such as Chelsoni and John Broughton. The edges should consist of one sort only, such as the dotted pink variety, Prince Camille de Rohan, or some with white blossoms, such as *R. caucasicum*, or Boule de Neige. *Kalmia latifolia* forms very nice edges round groups of varieties and hybrids of *R. maximum* and *R. arboreum*. The intervening spaces may be planted with *Lilium auratum*.

For planting hedges, different ways have been recommended, of more or less practical value. The most advantageous method is to insert a row of young plants at 20 in. from the boundary line of the property—often marked by a ditch. They may also be planted at the bottom of the ditch, the double advantage of which is that they are not seen from a distance, and, at the same time, are protected. Good hedges are formed with *Berberis vulgaris*, *Cratægus Oxyacantha*, *C. lucida*, *Ilex Aquifolium*, and *Maclura aurantiaca*. Hedges of *Cratægus* and *Ilex* together are very effective and decorative at the same time. Full information as to planting and the selection of trees and shrubs for various purposes will be found in Chapter XI.

GROUNDWORK.—This cannot be governed by hard-and-fast rules: the natural forms of an undulated surface are so numerous, that practically every case has to be treated differently. The natural ground inclinations cannot be altered, though their defects can be improved. While dealing with the details, the natural character of the situation must remain predominant. The centre of a lawn can be hollowed out and its verges raised, giving to the whole surface an agreeable undulating appearance, and at the same time increasing its surface. The places intended for groups of trees and shrubs and flower-beds should be raised above the ground-level, forming mounds which harmonise with the general inclination of the lawn. Between these groups and beds long, sweeping, dale-like depressions should be formed, of which the principal must have their lines of sight directed to the house or other points of rest, and their middle—that is, their lowest part—must never on any account be planted.

If in front of the house, or anywhere in proximity to it, there are hillocks interrupting the view, they must be removed. Fig. 26 is a section representing such a ground disposition. The house (A) is required to be seen in elevation from B, at the bottom of the park, where there is a ruin of picturesque

appearance: from B the view of the house is partly hidden by the crest C and the hillock D. To remedy this evil, all the soil above the dotted line in C and D should be taken off and brought to E, filling the deep hollow there represented. A long sweeping line should be formed. Such obstacles as C and D not only intercept the view, but also give to the surface a confined appearance, while by their removal the opposite effect is obtained. In large gardens and parks it is only the surface of the ground close to the house and the drives that are dealt with. The remainder is left untouched.

Artificial undulations of the ground, if used with care and taste, are very decorative, and the happiest effects and contrasts, giving a great variety of aspect, are possible. On a perfectly flat ground, when a large surface has to be dealt with, it is not advisable to use them. In the case of a lake, which has been

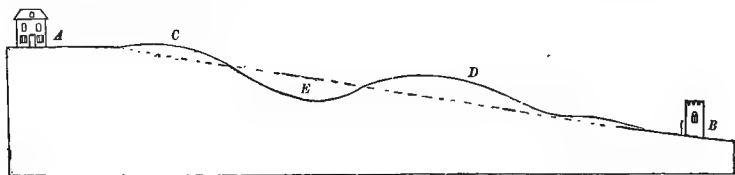


FIG. 26.—METHOD OF ARRANGING DIRECT VIEW.

dug, the excavated soil can be used to raise the verges of the lawn; but, in such situations, decorative aspects depend more on the plantations. In Fig. 27, the plan of a villa garden is given, together with the longitudinal section (AB), and the transverse section (CD), illustrating the formation of the ground-surface. In the middle of the lawn is a cemented lake (F), and with the earth excavated, a mound has been formed at E, serving as background to the picture. The side facing the lake (F) is covered with rocks, planted with herbaceous plants and ferns, hiding the filling-pipe, and so disposed as to form a cascade. The remainder of the mound is planted with shrubs and trees, and on the top is a summer-house. The boundary walls are hidden by thick plantations of shrubs and trees (G,G), and H is a shady resting-place. The groups JJ, close to the house, are composed of Rhododendrons and Kalmias. The groups KK are planted with evergreen shrubs and other plants. LL are two Weeping Willows. MM are Conifers planted on small eminences with soft slopes. N is a Bamboo. O is a red Horse-Chestnut, and at PP are specimens of Chamærops in their summer garb. The beds

Q,Q are occupied during the summer with bedding plants. R is a bush of Gyneryum. The beds Q,Q are about 2ft. above the level of the alley, and the directions of the undulations, starting from them in varied forms to the lake, are marked in the sections AB, CD.

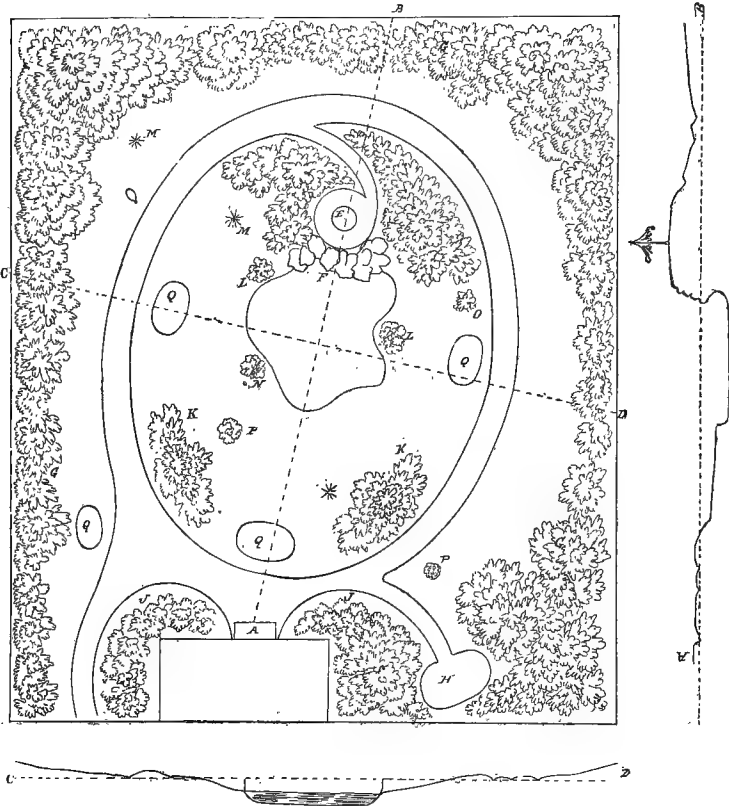


FIG. 27.—PLAN OF A VILLA GARDEN.

A B, Longitudinal Section; C D, Transverse Section.

Strong slopes, when the soil is of a loose nature, or when they exceed 45deg., must be supported by blocks of stone, inserted in the ground at different places, and of which the tops only are seen. Steps can also be formed in the subsoil and the top soil; they should be well rammed down, in order to prevent any "sliding." As a rule, sufficient earth to form the groundwork of a garden can be found on the spot. It

is really the quantity of soil available in a place which should guide the operations. The rough-cast of the work is formed with the subsoil. The thickness of the top soil required depends on the quantity at command; but for a lawn, or for turfed borders and verges, a coat of 1oin. to 1ft. is generally allowed. The portions which are to be planted will require a thickness of soil of at least 2ft.

When the necessary thickness of top soil has been roughly spread over the surface, it must be levelled by taking with the shovel the soil forming the uneven surface, and filling up with it the holes, thus giving to the surface a finished appearance. Levelling is a delicate operation, which requires taste, clear sight, and practice. For this work one cannot absolutely rely on the points of level fixed on the plan. One has to be guided by the effects produced. When the levelling has been done, the whole should be slightly forked and raked over. The limits of the flower-beds and the groups of shrubs should be marked, the verges formed, the edges trimmed, and lastly the pegs should be taken out. There remains to be done only the sowing of the grass.

WATER.—The charm water gives to a landscape has been pointed out in the introductory remarks. Whenever possible, it should be utilised in the creation of gardens. If existing, it must be preserved and its effects improved. In creating water effects the gardener must restrict himself to natural fitness. A stream rushing over a stony bed, leaping now and again over a rocky barrier, and forming cascades full of boisterous life, characterises mountainous or hilly surroundings; while a placid lake or a quiet, sleepy river running in sweeps across grassy meadows belongs to the low-lying land: yet the latter in its proper position equals in effect the wild mountain torrent. It would be wrong, as already stated, to imitate artificially such scenes amidst inappropriate surroundings. Small lakes, it is true, may be met with on high grounds, but it is rather the exception than the rule. Various effects are to be obtained by creating a lake with its outlines forming bays, promontories, and creeks; but these must depend more or less upon the undulations of the shores and the surrounding grounds, and on the different obstacles the water has met with, or is supposed to have met with, in breaking its way through. When creating a large lake, it must, as before said, look natural, and the work of man must not be apparent. In a small place it is not easy to deal with

the outlines of the water in the same way, for a small garden necessarily looks artificial.

It may be necessary to hide from the view of the spectator, by plantations at certain points, portions of the lake, in order to vary the impressions created as he goes round. If the shores are flat and uninteresting, variations can be made by raising the opposite banks at different spots, and planting them with trees which will be reflected in the water. Trees must not fringe the shore, for they would impart to the water a gloomy appearance; but single trees, especially those of pendulous habit, may be planted to hang over the water. Light must be allowed to reflect freely, giving freshness and colour to the scene. The views from the house or other points of the garden should be directed towards the lake where the largest water prospect is obtainable. For the same reason views on a river must be guided, if possible, up or down stream, and not across it. Islands give variety to the outlines of a lake or river. They should not be placed in the centre, but on the side, and there should not be less than 16ft. of water between them and the mainland. If a bridge is constructed, its narrowest point should be at right angles with the shore. The banks, where there will not be any planting, should be turfed below the water-lines. The slopes of the sides immediately below the water-level should be steep, so that when the water falls there will not be any muddy shore laid bare. The depth of the water should not be less than 4ft., in order to prevent a too rapid evaporation from taking place.

The construction of a lake must be done with great care, though it does not actually differ much from the work in connection with the formation of the ground already dealt with. If the earth-work consist only of an ordinary excavation, the earth obtained, when not needed to raise the level of the soil intended for groups of trees or to fill depressions of the ground, may be employed close by, in order to avoid unnecessary cartage and work, to vary the aspect of the shores, or to form plantations near the lake or the river. It may, however, happen that the excavation of a lake, or the modification of the bed and the course of a river, demand a special treatment. The soil may be boggy, rendering the task difficult. The work ought to be done in the winter, when the ground is hard, and in portions. Dykes of clay should be erected between the excavated part and the water, and the pump kept working without interruption.

The running water must be led away into ditches, and great care must be taken to prevent the flooding of the work by erecting a strong dam at the deviation of the stream. When the soil has been excavated to the intended depth the bottom of the lake should be smoothed, giving the necessary fall to the ground. It must then be made watertight by using either cement or puddle. In the majority of cases, when a solid foundation is available, concrete is used. The bed, when levelled and well rammed, is covered with a layer of not less than 6in. of concrete at the bottom and 8in. on the sides.

The concrete used should be composed of a mixture of three parts of broken stones or coarse gravel and two parts of hydraulic mortar and sand. This mortar itself is a mixture of two parts of sand and one of hydraulic lime. The concrete should then be well and evenly rammed, the surface made smooth with the back of a shovel, and left to dry for a few days. It should then be covered with a layer of Portland cement 1in. thick.

When puddle is used, the ground should be excavated to the required depth, allowing 1ft. thick at the bottom and 18in. on the sides. Puddle is prepared by cutting clay, pouring water on it, and treading it until it is plastic enough for use. When it has been applied on the surface, it must be well trodden and rammed. The shores can be solidified, if the ground should happen to require it, by driving in a few pegs at the edges with branches and interlacing them. If there is any fear of the shores getting washed away, the side can be covered under the water-line with coarse stones.

A lake may also be formed by utilising a stream and erecting across its lower end a strong dam of one and a half to three of base to one of height. This dam should be built up in layers of clay, well rammed, and supported by earth. The surface could be planted with grass and shrubs, but not with trees, as the roots of the latter, when shaken by the winds, would loosen the soil, and allow the water to run through. The top of the dam must be at least 5yds. or 6yds. wide, according to the nature of the soil employed and the volume of water to be kept back, and 5ft. above the water-line. Rocks can be scattered about the shores, especially close to the inlet and the overflow, which can be hidden by the aid of plants. The sides below the inlet must be paved to a width of about 6ft. The

inlet, the overflow, and the emptying pipes must be built in the solid ground.

DRAINING.—Soil that is always saturated and boggy is necessarily cold and poor, as the circulation of warm air, which promotes the evaporation of the moisture, is prevented. The soil gets into a state of decomposition, rendering the existence of any sound vegetation impossible. This condition is due to the subsoil being impermeable; the cold water cannot, therefore, find its way through, and it must be led away by artificial drainage. This operation consists in digging trenches, at the bottom of which pipes are laid to collect the water and lead it out of the ground.

The depth at which drain-pipes should be laid, and the distance at which they must recur, depend upon the nature of the soil. In heavy ground they should be placed at from 2ft. to 3ft. deep, while in light soil 4ft. below the surface, and at intervals of from 20ft. to 40ft., would suffice. The collecting-drains must run parallel with the line of ground having the greatest fall, and the main drain should lead to the lower ground and fall into a lake or a river, being discharged above the water-level. The drains of the lawns should be made to join those running parallel with the drives and alleys. Collecting-drains should have a fall of 1in. to the yard, and should join the main channel at an acute angle. The pipes must be covered with porous material, such as ordinary soil, broken bricks, corks, stones, or clinkers, &c., within 6in. of the surface of the ground.

LAWNS.—Verdant grass is one of the most beautiful features of a landscape, and nothing tends more to enhance the charm of a garden than a well-kept lawn. In large gardens there are two different kinds of lawns. One is close to the house, and belongs to what may be termed the pleasure-grounds. This is formed of short, velvety grass, to which all the necessary attention can easily be given. The other belongs to the park, and is formed in pasture expected to produce a regular crop of hay. Lawns can be made by either sowing seed or laying turf. It is proposed to describe both methods here, giving preference to the first. Experience has proved that better results are to be obtained as regards appearance by sowing, though these advantages may not be manifest at first; they are, nevertheless, very striking. During hot weather, in the case of a laid lawn, the sods, though they have been placed as closely as possible, very often separate, and show ugly crevices. The

advantage of time gained by laying a lawn as compared with one made by sowing is hardly worth consideration.

The preparatory work, which is the same for either sowing or laying the turf, has already been described in the pages dealing with the formation of the ground. We have also seen that if ground is inclined to be damp it must be drained. Success depends largely on these points. If the soil is exhausted it will be necessary to dress it with good rotten stable- or artificial manure. Of the latter the following mixture may be recommended: 2cwt. of superphosphate of lime, 1cwt. of bone-dust, and 1cwt. of Peruvian guano; these quantities are sufficient for an acre. It must be scattered and raked in a fortnight before sowing the grass seed. This lapse of time is necessary to allow of the artificial manure fermenting, and to prevent it from being injurious to seed-germination. The ground of the meadows must be ploughed, broken with the harrow, and rolled over. In the case of heavy ground it is preferable to do this work in the autumn in order that the frost may get into the soil and pulverise it. In the spring it should be harrowed and rolled.

Grass seed should be purchased from a reliable source, and a mixture suitable to the conditions of the soil selected. The quantity of seed required depends on the circumstances; but it should not be less than three bushels to the acre for a good garden lawn. The varieties of grass used in the composition of this latter do not fill out like the pasture varieties, and have therefore to be sown more thickly. Thick sowing is the only way to obtain a growth of fine herbage and a rapid clothing of the ground. Sowing must be done on a calm day, from the middle of March to the beginning of May, or from the middle of August to the 15th of September. In heavy and cold ground, it ought only to take place in the spring. The seed must be evenly distributed, and this is best effected by sowing twice, the second sowing crossing the first at right angles. Where the ground forms a steep slope it is better to sow when the earth is wet. After the seed has been sown, it must be lightly covered with the rake, or in meadows with the harrow. Before the ground is rolled over the clover must be sown. It is advisable to proceed in this way, sowing the clover separately, because, being heavier than the other grass-seeds, it gets to the bottom of the sack when mixed with them, and it is not then possible to sow it regularly.

VERGES.—The lines marking the limit of the verges and of the alleys (called, in French, the *filet*), are made by tracing a little furrow with the back of a rake. When sowing, a little more seed gets into this, and the grass grows thicker, showing well the *filet*, even when the alley is also sown with grass. The verges cannot be rolled, and recourse must therefore be had to the turf-beater. The 2in. of soil allowed beyond the *filet* must be cut out when the grass has grown.

The growth of the grass will be hastened by early and frequent mowing. Until the young grass is well rooted, this work must be done with a sharp scythe. The use of the mowing machine, while the grass is tender, would be injurious. After mowing, a light roller should be used, and subsequently, when the grass gets harder, a heavier one. To keep a lawn in good order, it must be mown and rolled more or less frequently, according as the growth is rapid or otherwise. When dry weather prevails, lawns ought to be watered, if that can possibly be done. If they cannot be watered, they must not be rolled, as it would not do any good. Rolling, therefore, will have to be done after rain and especially in the spring and in the autumn. A lawn must also be kept as free as possible from weeds like dandelions, daisies, thistles, plantains, &c., which should be removed bodily.

IMPROVING OLD LAWNS.—An old lawn may be improved by well raking over the bare places or even the whole surface, then spreading a top-dressing of well-rotted stable manure over it, sowing seed, raking in, and rolling. The best time to do this work is in February or March. It is very beneficial to any lawn to give a top-dressing now and again, as such by increasing the fertility of the soil stimulates the growth of the grass.

LAYING TURF.—The surface from which it is intended to take turf must previously be mown and rolled for some time before it is wanted, and also just before lifting. It must also be kept clear of weeds. The sods, as a rule, are cut 1ft. wide and 3ft. long. The surface to be turfed must be quite even and the turfs laid as closely together as possible. Some fine, light soil should then be sifted over and brushed in to fill up all the cracks, and the turf-beater should be thoroughly applied.

TENNIS-GROUNDS.—The surface of a tennis-ground must be made as level as a billiard-table, and measure 100ft. long by 50ft. wide. The ground must, moreover, be well drained. The

whole surface should be excavated and the space filled with clinkers to a depth of 1 ft., these being well rolled to prevent sinking. The clinkers should then be covered with a layer of 8 in. of soil, which must also be well rolled, and then sown with a special mixture of seed.

SHADED PLACES.—In woods, grass does not succeed well; but, where there is still enough air and light, some may be obtained by sowing a mixture of *Poa nemoralis*, *Anthoxanthum odoratum*, and *Festuca heterophylla*. Borders under trees which cannot be formed with turf are very effective when planted with Irish Ivy (*Hedera Helix hibernica*), transferred from pots, pegged down with wires and covered with sifted soil. They should be kept clean and watered when the ground gets dry, and be trimmed every year. In the case of deciduous trees, there are many bulbs and tubers—Cyclamens, Winter Aconites, &c.—which may be utilised. See Chapter X.



THE LAKE, KEW GARDENS.



3.—*On Florists'*

Flowers.

BY
JAMES DOUGLAS.

By common consent the favourite plants of our gardens have been designated "Florists' Flowers," and for very many years they have been known as such. The most beautiful, and of highest value amongst them, are the Rose, Chrysanthemum, Carnation, Pink, Auricula, Pansy, Viola, Tulip, Dahlia, Hollyhock, Ranunculus, Polyanthus, and Gladiolus. Some, like the Viola, are of modern conception; others, like the Carnation, Auricula, Tulip, &c., have graced our gardens for over three-hundred years. By careful selection and cross-fertilisation all of them have attained a high standard of excellence. The work of improvement has been going on for many generations of amateurs. For instance, we have a very definite account of the Carnation in "The Historie of Plants," published by John Gerard, in 1598. This worthy florist cultivated the Clove and the Great Double Carnation, and he informs us that the first yellow Carnation was procured from Poland, and grown in his own garden. Doubtless, he would speedily raise new varieties from seed, and the yellow Carnation has been going through a course of improvement since that time.

In these days the florist has a standard of excellence in his mind, and by cross-fertilising the best varieties, and by careful attention to minute details, he effects some improvement in the colour or in the form of the flowers of his favourites. Some excellent work has been done by men in comparatively humble

walks of life, such as Mr. Benjamin Simonite, of Sheffield, a working cutler, who has done a good work amongst the Auriculas and Carnations, as his father also did amongst the Pinks.

The first decided improvement in the Hollyhock was made by Mr. Charles Baron, a Saffron Walden shoemaker. What splendid work was done, too, by the Lancashire weavers in the old days! They improved the Auricula, the Carnation, the Pink, the Tulip, the Polyanthus, and other beautiful garden flowers, and their work has come down to us in the Lancashire Hero Auricula of Robert Lancashire, and the Smiling Beauty of James Heap.

When a very high standard of excellence has been reached, progress is necessarily slower, but it still goes on, and if but little progress seems to be made season by season, the work shows itself in the course of years. The cultivation of florists' flowers is not well understood, even amongst gardeners; but it is a fact that every section of them may be successfully produced with very little labour indeed. The amateur has a love for his favourite flowers, and the time spent in attending to them is a pleasure to him. He soon finds out their requirements, and gives them the attention they need at the right time. He is always thinking about them, and daily, at a certain hour, they are looked over, water is given when needed, decayed leaves are removed, and if plants require repotting, they are done before it is too late. Insect pests are noticed at once by the attentive observer, and they must be dealt with before they do mischief.

There are so many details required in the various classes of work, that some would-be florists may be inclined to remark, "That if the things require so much attention, it may be better not to grow them at all." In answer to that objection, I can only say it is the same with orchids and all other choice plants: the amateur or fancier must have a real love for his flowers, and when this is in evidence, attention bestowed upon them is a pleasure, and toil and trouble are not thought of.

Another source of pleasurable excitement is found in the raising of seedling varieties. My friend Ben Simonite says a man is not worthy of the name of florist if he does nothing in the way of seedling-raising to improve the flowers he cultivates. Cultural directions are of little use to those who do not take sufficient interest in their plants to follow them up.

All florists' flowers are not included here. Several are of sufficient importance to have a chapter devoted to themselves—

the Rose and Chrysanthemum, to go no further—while the remainder will be dealt with in their respective sections.

The Auricula (*Primula Auricula*).

Amongst the choicest of florists' flowers must undoubtedly be accounted the Auricula, which has been long under cultivation in English gardens—three-hundred years at least. During that period it has seen many changes. In those days of long ago it was designated in some districts "Bear's-ears," in others "Sow's-ears"; while in Scotland, the cottagers know it as the "Dusty Miller," the leaves being in many instances so thickly coated with a mealy substance (*farina*) as to appear quite white. These Auriculas are quite hardy in Scottish gardens, and the refined Auricula of the florist will stand the winter out-of-doors. This I have proved; but the edged flowers are worthless when treated in this way, owing to their delicate tints and the white *farina* on leaf and flower being so easily injured by rain-drops. The Wild Auricula is freely distributed in the mountainous districts of Switzerland, Austria, Syria, and the Caucasus. Under natural conditions the plants are found, as regards the foliage, in two states—some heavily powdered with *farina*, and others quite destitute of it; and so we find them in the garden varieties.

SHOW AURICULAS.—This section has long been under the careful hand of the florists, and the flowers have been brought through their fostering care to the highest standard of excellence. Fanciers divide the Show section into four classes—Green-Edged, Grey-Edged, White-Edged, and Selfs—and the usual method is to begin with the Green-Edged. In describing fully the properties of this section, I would remark that in all the other classes there exist varieties with green and powdered foliage, but the foliage of all the Green-Edged varieties is quite destitute of *farina*, or meal. The Auricula should possess a stout flower-stem—one that holds the truss erect above the foliage. The fancier is quite satisfied with seven to nine pips. A strong plant will produce as many as twenty pips, or more; but where there are so many it is necessary to thin a number of them out, otherwise they will not fully develop, and the central flowers, or "pips," of the truss will usually be the most imperfect.

Green-Edged.—In this class, the edge of the corolla should be quite green and free from *farina*, but in most of the so-called green edges there are usually a few dots of meal, though they

must be so thinly placed, that the edge presents to the eye a green colour. Inside the green margin is the body-colour, and black is most esteemed, although, when closely scrutinised, there is a tinge of purple in it. There are other shades of colour, such as maroon, violet, and plum. The colour strikes or flashes into the green edge, and is never found in a compact ring. Sometimes, the ground, or body-colour, strikes quite through to the edge, which is a great fault. The inner edge of the body-colour, where it touches on the white centre, should be circular, but it is sometimes slightly angular, and what is worse, a scalloped edge is formed. The centre ought to be white, formed by a dense coating of farina, and the eye, or centre of the flower, should be bright yellow, and filled with the anthers. The stigma should be out of sight within the tube: if the stigmatic part of the flower protrudes from the eye, and the anthers are placed lower down, it is termed "pin-eyed," and no florist would own such a flower. Any deviation from the properties I have given above is a fault, and few of the older Green-Edged varieties are faultless. One of the most esteemed of them, Freedom (Booth), has an angular paste, which is the one fault of this fine flower. Admiral Napier (Campbell) is a fairly good Green-Edge, but is also spoiled by an angular paste. Rev. F. D. Horner (Simonite) is perhaps the best Green-Edge we have at present, but the slightly angular paste is its one serious fault. Another fault is a pale-coloured tube, and amongst the older Green-Edged varieties this is possessed by Apollo (Beeston). Prince of Greens (Trail) may be ranked as a modern variety, although it was raised some forty years ago by Mr. Trail, of Aberlady, N.B. It has the most correct green edge of any; but the pale-coloured tube, which takes on an inky tinge as the flowers fade, quite spoils it. There is still room for improvement in this section.

Grey-Edged varieties come next in order, and it may safely be asserted that this class contains the finest edged Auriculas. The edge is termed "grey," owing to its being moderately powdered with farina over the green, but in no other respect does it differ from the Green-Edged varieties. Perhaps the most perfect of all Show Auriculas is George Lightbody (Headly). In all points it is of surpassing excellence. The truss is admirable; the pips, or corolla, are in all points excellent, and when shown with seven pips, in the best condition, from a young plant, this variety usually wins premium at the leading exhibitions. Lancashire Hero, raised by an old Lancashire weaver (Mr. Robert

Lancashire), is inferior to the preceding. It has not such a perfect grey edge; in fact, the farina is so thinly scattered on the edge, that the variety may sometimes be exhibited as a Green-Edged.

White-Edged.—This class is distinguished from the Grey by the greater density of the farina on the margin; it is so thickly powdered as in some instances to be almost as white as the centre. In recent years a good many fine varieties have been added to this class. Perhaps the most typical, when seen at its best, is Acme (Read); Conservative (Douglas) is a flower well up in all the properties, and Mrs Dodwell (Woodhead) is also a first-class White-Edge. A fault in the section, and one from which the Grey-Edged varieties are not exempt, is the body or ground-colour being less or more dusted with powder. A pretty old variety, Catherina (Summerscales), has this fault, as also has Lee's Earl Grosvenor.

Selfs.—In this class there is a margin of yellow, bluish-violet, violet, purplish-maroon, and maroon. The additions to it in recent years have been numerous, and have quite superseded the older varieties. The best are: Heroine (Horner), purplish-maroon; Black Bess (Woodhead), maroon; and Mrs. Potts (Barlow), a lovely violet, whose fault is a long, weak flower-stem.

ALPINE AURICULAS.—The characteristics of this section are that the flowers and leaves are destitute of farina; the centre instead of being white, is yellow- or cream-coloured; and the edge of one colour is darker at the centre, and shades to a paler tint at the margin. The prettiest Alpine Auriculas are those with a deep yellow centre, and a maroon-shaded edge. They are, perhaps, not hardier than the Show Auriculas, but the flowers are not much injured by rains. Auriculas of this section are grown, and sometimes exhibited, with unshaded edges; but they have a heavy, dead appearance, and cannot successfully compete with those having a shaded edge. The prevailing colours of the Alpine Auricula are maroon, reddish-maroon, coppery-yellow, mauve, and purplish.

PROPAGATION.—This is effected by seed and by offsets. The seed should be sown as soon as it is ripe—in July, a season of the year when it readily vegetates. It may be sown in small seed-pans or in flower-pots, and as soon as the first leaf is formed after the seed-leaves, the young plants should be pricked out—about a dozen of them in a small sixty-sized pot. At first the growth is rather slow, and the plants will take from twelve to eighteen months to attain their full size. They will

require after a time to be repotted—three plants in a small sixty, and the next time one in a flower-pot the same size. They will flower in 4in. flower-pots the second season after sowing the seed. Of course, the Auricula fancier, after having obtained a stock of choice varieties, would save seed from cross-fertilising the best of them. This is easily done by cutting off



FIG. 28.—SELECT SHOW AURICULAS.

- | | |
|-------------------------------------|------------------------------------|
| 1. SMITHFIELD GREEN, GREEN EDGE. | 3. MARMION, GREY EDGE. |
| 2. MISS PRIM, WHITE EDGE. | 4. GEORGE LIGHTBODY, GREY EDGE. |
| 5. REV. F. D. HORNER, GREEN EDGE. | |

the anthers with a pair of sharp-pointed scissors, before the pollen is scattered. The plant should be held upside down when doing this, so that the pollen-cases may fall on the ground instead of into the tube.

With a fine camel-hair brush the pollen should be conveyed to the stigma of the flowers intended to bear seed. It is needless to add that only the best varieties in each class should be used alike as seed- and pollen-bearers. Above all, the classes should not be intermixed. The Green-Edged

should be crossed with another variety having a green edge. The same remark applies to the Alpine Auriculas. In crossing, the yellow-centred kinds should be kept together, as also should the white or cream.

Propagation by offsets is the way to obtain a stock of named varieties. Such offsets are produced very freely by some

varieties, and very slowly by others. I have grown an old plant for six years without obtaining an offset, while others will produce as many as from six to a dozen in one year; but from three to six are as many as one might expect. I use what the trade term "thumb" pots for the offsets. In the case of very small offsets, three or four may be planted in one pot, though in some cases one or two will be better. They become established most readily in close hand-lights in a shady place. When the plants begin to grow, admit more air, and pot off when necessary. The old growers used to have specially-constructed frames for their plants, and mysteriously compounded soils in which to plant them. In a word, the whole art and culture of the Auricula was supposed to be known only to the initiated. The day has long gone by for the public to be gulled with floral jargon, and it is now well known that the Auricula is one of the easiest of all plants to grow when its simple requirements are understood. A good compost for Auriculas is made with four parts of decayed fibrous loam, one part of decayed cow-manure, and one part of leaf-mould. I never use artificial manure in Auricula potting material. The manure must be free from grubs and worms.

Auriculas can be grown and flowered to perfection in ordinary garden-frames; these should be placed on the north side of a wall or fence, as the Auricula is very impatient of bright sunshine, especially during the summer months; but the plants like an abundance of air. The lights should therefore be removed whenever the weather is favourable, and by this method well-developed plants and compact trusses will be obtained. There is in the diversity of foliage, as well as in the quaint, and marvellous beauty of the flowers, a never-failing source of delight to the fancier during the spring months when the trusses are in course of development.

The Auricula is one of the oldest flowers that has been specially cultivated for exhibition purposes, and many of the fanciers of the present day, I fear, would scarcely care to cultivate the Auricula unless they could exhibit it. In order to ensure having plants in good condition and in full blossom on the right day, heated houses are built in which to flower them, and the heating apparatus is always used to keep out the frost. As soon as the first pips on a truss open, the plants must be shaded from bright sunshine. A dry atmosphere is injurious to them, but it must not be over-moist; a medium pleasant atmosphere is best. Great care must be exercised in conveying the plants to exhibitions, as the least touch upon the thickly-placed farina on flower

and foliage is injurious. The fancier should also place some nice green moss on the surface of the soil in the pots. The truss should be supported by means of a neat stick, and when a careful arrangement is made, a very pretty effect is produced.

SHOW VARIETIES.—A prize group is shown at Fig. 28, and the following is a list of the six best show varieties at present in cultivation in each class of this section :

Green-Edged.—Rev. F. D. Horner (Simonite); Abbé Liszt (Douglas); Prince of Greens (Trail); Mrs. Henwood (Barlow); Freedom (Booth); and Shirley Hibberd (Simonite).

Grey-Edged.—George Lightbody (Headly); Lancashire Hero (Lancashire); Marmion (Douglas); Richard Headly (Lightbody); Frank (Simonite); and Mabel (Douglas).



FIG. 29.—ALPINE AURICULA APOLLO.

White-Edged.—Acme (Read); Conservative (Douglas); John Simonite (Walker); Mrs. Dodwell (Woodhead); Smiling Beauty (Heap); and Ne Plus Ultra (Smith).

Selfs.—Black Bess (Woodhead); Heroine (Horner); Mrs. Potts (Barlow); Sapphire (Horner); Buttercup (Horner); and Ruby (Simonite).

Alike in the Show and the Alpine sections, some very fine varieties have been introduced within recent years; but it takes a long time before they can be sent out after

being exhibited. It is best therefore to enumerate those only that can be obtained by purchase through the usual trade channels. Two excellent and very promising new varieties in the Alpine section are Apollo (Douglas) (Fig. 29) and Melaine (Douglas) (Fig. 30).

ALPINE AURICULAS.—The following are the best twelve: Dean Hole (Douglas); Diadem (Gorton); Duke of York; Edith (Turner); Firefly (Douglas); Minstrel (Douglas); Defiance (Turner); Mrs. Martin (Henwood); Mrs. Harry Turner (Turner); Miss Moon



FIG. 30.—ALPINE AURICULA MELAINE.

(Douglas); Nellie Hibberd (Douglas); Toujours Gaie (Douglas); and Perfection (Douglas).

PESTS.—There is one disease in connection with Auriculas which ought to be mentioned—the “rot”; this attacks the main root at its base. The old varieties are most liable to be attacked, and it is necessary to examine the base of the main roots at the time of repotting. Sometimes they will be a mass of decay, although the plant itself may look right enough. All the decayed portions must be cut away with a sharp knife, and some dry quicklime pressed firmly into the cut portion. Water must be very carefully applied to the roots until the plants are well established again.

A species of woolly aphid (*Trama auriculæ*) is a pest recently noted as attacking the roots of the Auricula. The insects cluster around the stem above and below ground, but do not seem to do so much mischief as one would think. I take a small brush, dip it in dry tobacco-powder, and brush the powder well in amongst them. When repotting the plants, remove any of the aphides found amongst the roots, for they will get down as far as the drainage. The ordinary greenfly is also troublesome, but this is destroyed by fumigating, or by dusting with tobacco-powder if the plants are not in a close greenhouse or frame.

The Carnation and Picotee (*Dianthus Caryophyllus*).

During the last quarter of a century a great advance has been made with the Carnation. At that time Carnation fanciers thought most of Flakes, Bizarres, and White-Ground Picotees. The Malmaison Carnations were few, the old Pink and Blush being almost exclusively cultivated. Soon, however, a great improvement took place in the Yellow-Ground Picotee, a fine variety, Prince of Orange, being used as the seed-bearer; but most of the above were grown in flower-pots, and cultivated under glass. By and by amateurs asked for a hardier type of Carnation for border culture, and when a want is felt the supply is not long in coming. There are now in cultivation a very large number of Border Carnations, and the names of the best varieties will be found under the "Selves" and "Fancies." New varieties of Malmaison Carnations have also been introduced, many of them of rich and perfectly distinct colours. The Yellow-Ground Picotees have been improved quite as much as the Selves and Fancies during the last decade. The Flakes, Bizarres, and White-Ground Picotees seem to have attained to perfection, little or no improvement having been made during the last quarter of a century.

The Carnation, which also includes the Picotee, is one of the good, old-fashioned flowers that never ceases to please. The old authors, like Gerard and Parkinson, wrote about them three-hundred years ago. The myriad-minded magician, Shakespeare, did not omit the Carnation from his plays. What florist does not admire the amusing dialogue between Polixenes and Perdita in the "Winter's Tale."

Perdita says :

"Sir, the year growing ancient,—

Not yet on summer's death, nor on the birth

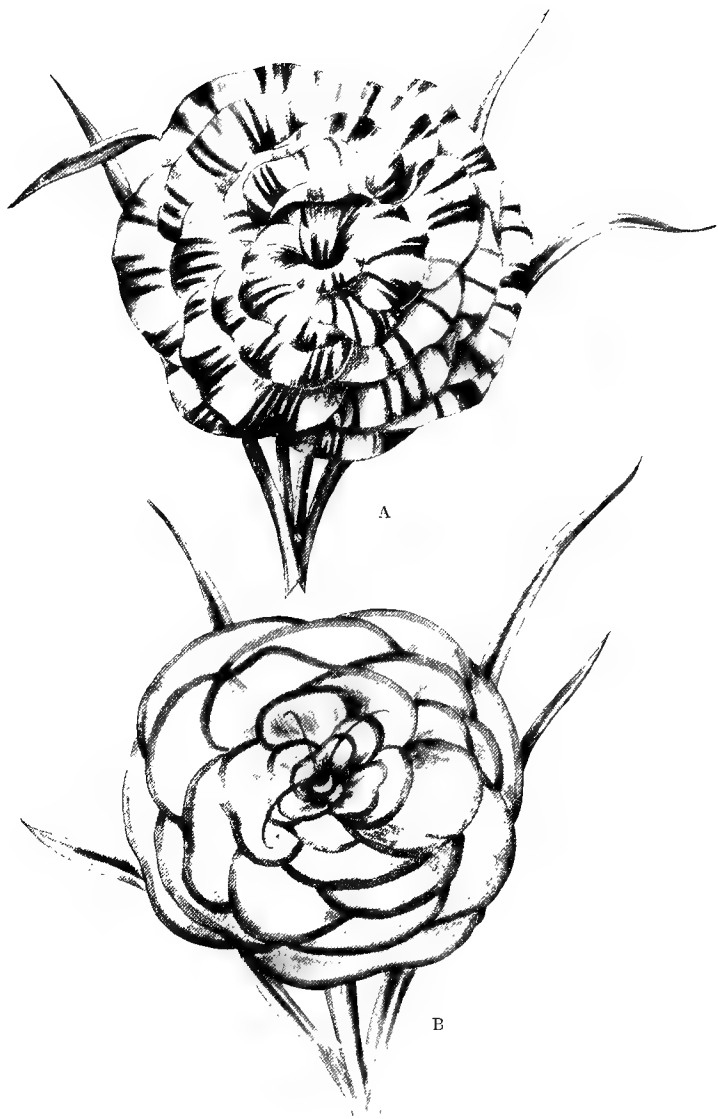


FIG. 31.—CARNATIONS.
A, FLAKE CARNATION B, PICOTEE.

Of trembling winter,—the fairest flowers o' the season
 Are our carnations, and streak'd gillyflowers,
 Which some call Nature's bastards."

And so we love our Carnations for old-time associations as we do for their sweetness and surpassing beauty. There is no need to write a historical retrospect on these flowers, the fairest and sweetest in the garden; but they are now divided into so many classes and sections that the tyro in their culture is puzzled to comprehend the arrangement of the fancier.

CLASSIFICATION.—For garden and exhibition purposes, Carnations are divided into the following classes:

Scarlet Bizarres have the petals striped and flaked with scarlet and maroon on a white ground. Crimson Bizarres have crimson and purple on a white ground. Pink and Purple Bizarres have those colours on a white ground. Purple Flakes have purple flakes and stripes on white. There are also Scarlet and Rose Flakes (Fig. 31 A). Then there are Sells. These, of course, have the flowers all of one colour. Fancies include all the varieties that cannot be admitted in any of the other classes, such as those with a yellow- or a white-ground, as well as those mottled, flaked, or spotted with various colours.

Picotees (Fig. 31 B) are really Carnations, and are comprised in both the White- and Yellow-Ground sections. They have a continuous edge of colour, wide or narrow, the rest of the flower being white or yellow, and the fewer stripes, spots, or bars, on the petals, the more are they esteemed. The Yellow-Ground Picotees have not yet attained to such a high standard of excellence as the White-Ground. The latter for show and garden purposes are divided into six classes, according to the colour or width of the margin, thus: light and heavy red edges; light and heavy purple edges; light and heavy rose and scarlet edges.

CULTURE.—The Carnation is propagated by seed, layers, and slips, or cuttings. The first method is employed to obtain new varieties. Whether cross-fertilised or not, the Carnation is certain to vary very considerably from seed. Many of the seedlings will be as good as, or better than, the parent plant, but many more of them will not be so good, and even if the seed is obtained from the finest double flowers, there will still be a number of single-flowered varieties among them—about ten per cent. These varieties with single flowers are pretty enough, but very fugacious, evidently because they fertilise so readily. There is much pleasure in

anticipating the flowering of the seedlings, especially if the flowers from which the seed was obtained had been cross-fertilised. By far the best results may be expected from seed obtained by carefully transferring the pollen of one good variety to the stigmatic part of the flower of another, but, in doing this, it is well not to mix the classes. Sells should be cross-fertilised with Sells, Fancies with Fancies, &c.

The seed should be sown in the spring, in a frame or greenhouse, and the plants treated much like small, half-hardy annuals, as Stocks and Asters. The seedlings should be pricked out about 3in. asunder. They should be finally transplanted in the summer and autumn on to good, deep, well-enriched garden soil, allowing 15in. between the plants. Such seedlings will produce from about one hundred to two hundred blossoms on each plant. Nearly all the Border Carnations are propagated by layering. This is done in the autumn, or as soon as the flowers are past. Some fine soil is prepared, consisting of good loam, leaf-mould, and sand in about equal portions, while some of the earth should be removed from the base of the plant. The lower leaves should be stripped from the growths clustering round the base of the flower-stems. These growths are termed the "grass." An incision with a sharp knife should next be made into the stem at a joint, which should be cut through, and the layer pegged firmly into the prepared soil. As many as a dozen of these layers may be found at the base of one plant. They will be ready to be severed from the plants six weeks after layering, and they may be planted out in the open garden, or potted up into small pots to be kept in frames through the winter.

Cuttings, or slips, may also be taken from Border Carnations, and be struck in close hand-lights or garden-frames with just a little bottom-heat. Only such growths as are too high up the stem to be layered should be treated in this way. Tree or Perpetual-Flowering Carnations are generally propagated by slips, as being the most convenient.

The Carnation is a perfectly hardy plant, and succeeds very well indeed in the open borders of the flower-garden, or in beds specially prepared for them. When the time arrives for taking off the layers, the ground in the flower-garden should be in a condition to receive them. Some amateurs do not think it is necessary to prepare the soil until the plants are ready to go out; but to do the Carnation well, the ground ought to be freely exposed to sun and air for at least six weeks previously; the

longer the better, providing the soil is in a friable condition. Plant firmly, and put a thin layer of decayed manure on the surface of the ground amongst the plants: they form roots more readily when this is done. If the plants are set out in beds, they ought to be about 15in. asunder; if in borders, three plants should be arranged in a triangular form, about 6in. apart; in this way an imposing head of blossom is obtained. It is well to put up a number of layers in small pots in case any of the plants should die during the winter.

The time of planting is of some importance, and on this head experts differ. Some say plant as soon as the layers are ready: others advocate planting out as late as November. I have done it in September, October, and November, and could not observe any difference. In fact, the best lot of plants I ever had was put out the second week in November. The weather was favourable at the time of planting, and for two or three weeks after.

All exhibitors of Carnations, and those who wish to enjoy them in perfection, grow a full collection in flower-pots. The layers are inserted when ready in what the trade term "sixties," two plants in a pot, and they are wintered in garden-frames. They are placed fairly close to the glass, in order that they may have the full benefit of light and air. In some districts damp is troublesome, doing some damage to the leaves by what is termed "spot," but free ventilation will usually prevent its appearance. The work during winter consists in keeping the plants clean by removing dead and decaying leaves, stirring the soil on the surface, and by paying careful attention to the watering. In March they must be transferred to their flowering-pots. Two plants should be placed in a pot 8in. in diameter, or three in one 9in. The pots must be drained well, and the compost packed in firmly around the plants. In the process of transferring the plants from the small to the large pots, care must be taken not to disturb the roots more than is absolutely necessary. As the plants are repotted, they should be placed again into garden-frames until they are established, when the best way to treat them is to stand them out in the open air on a hard bottom of ashes. When the weather is mild, and the potting is not done until after the middle of March, it may be as well to stand them out-of-doors at once, as in the spring the frames are often required for half-hardy and tender plants. The flower-sticks ought to be placed to the plants very soon after they go

out-of-doors, as high winds may snap off valuable plants close to the surface of the ground.

Careful attention must be given to watering all through the season, and as soon as the flower-buds show colour the plants must be removed to the greenhouse, where they are to flower. Green-fly and thrips between them will disfigure both leaves and flowers if not dealt with at the outset. Fumigating must therefore be resorted to to prevent the "grass" from drawing up weakly. Air must be freely given, and when the flowers open they must be shaded from bright sunshine to preserve their beauty as long as possible. About the end of July, layering may be commenced, and it will be better to place the plants out-of-doors, as the layers become drawn if the plants are kept under glass. Those plants growing in the open borders should be layered, of course, where they are. To do this scratch some of the ordinary garden mould away from the base of the plants, replacing it with the compost already recommended.

Tree Carnations require rather different treatment. As the growths are mostly found up the main stems, they cannot very readily be layered, and are propagated by slips from the main stems of the plants. These strike freely in hot-beds, or early in the season in a forcing-house with a little bottom-heat. The temperature of the house should be about 55deg. If possible, the bottom-heat should be kept about 80deg. to 90deg. The slips will readily form roots in sixty-sized pots; when the young plants are established, they should be potted singly, and gradually inured to greenhouse culture. From May until the end of September Tree Carnations do best out-of-doors. The best potting soil for Carnations is three parts of good loam, one part of decayed manure, and one part of leaf-mould; sand to be added to lighten heavy soils. Mortar rubbish, broken up and run through a $\frac{1}{2}$ in. sieve, is also excellent to mix with the compost.

VARIETIES.—The following is a list of the very best varieties now in cultivation, arranged in their classes:

Scarlet Bizarres.—Robert Houlgrave, Dr. Hogg, Othello, Admiral Curzon, Joseph Crossland, and Robert Lord.

Crimson Bizarres.—J. S. Hedderley, J. D. Hextall, Patriot, Master Fred, Phœbe, and Edward Rowan.

Pink and Purple Bizarres.—William Skirving, Edith Annie, Arline, Sarah Payne, Harmony, and Autocrat.

Purple Flakes.—James Douglas, Gordon Lewis, Earl Stamford, Charles Henwood, George Melville, and Mayor of Nottingham.

Scarlet Flakes.—Sportsman, Guardsman, Matador, Miss Constance Grahame, John Wormald, and Alisemond.

Rose Flakes.—Thalia, Lady Mary Currie, Rob Roy, Mrs. Rowan, John Keet, and Tim Bobbin.

Selfs.—Mrs. Eric Hambro, Lady Hindlip, Her Grace, Dick Donovan, Silver Strand, Mrs. McRae, Cecilia, Queen of Scots,



FIG. 32.—CARNATION CZARINA.

Garville Gem, Endymion, Mrs. Colby Sharpin, Mrs. James Douglas, Nox, Helmsman, Barras, Bendigo, Germania, and Miss Maud Sullivan.

Fancies.—Czarina (Fig. 32), Brodick, George Cruickshank, The Czar, Mogul, Artemis, Perseus, Cardinal Wolsey, Monarch, Lady Jane Grey, Hidalgo, and Pelegia.

Picotees White Ground, Light and Heavy Red-Edged.—Brunette, Emily, John Smith, Mrs. Gorton, Princess of Wales, Mary D. Anstiss, Charlotte Brontë, Ganymede, Mrs. Bower, Norman Carr, Thomas William, and Lena.

Picotees Light and Heavy Purple-Edged.—Amelia, Calypso, Her Majesty, Mrs. Chancellor, Muriel, Polly Brazil, Ann Lord, Clara Penson, Jessie, Mrs. Kingston, Nymph, and Silvia.

Picotees Rose- and Scarlet-Edged, Light and Heavy.—Constance Heron, Mrs. Payne, Liddington's Favourite, Mrs. Rudd, Rosie Sydenham, Cordelia, Daisy, Ethel, Little Phil, Mrs. Sharp, Nellie, and Amy.

Picotees Yellow-Ground.—Annie Douglas, Eldorado, Golden Eagle, Mr. Nigel, Badminton, Stanley Wrightson, Mrs. Robert Sydenham, Hygeia, Mrs. Tremayne, Countess of Jersey, Florrie Henwood, Ladas, Voltaire, Miss Alice Mills, Empress Eugenie, Wanderer, Dervish, and His Excellency.

The new disease, *Helminthosporium echinulatum*, or "Rust," has been very troublesome in recent years, and it has certainly done much mischief when not taken in good time. It may be recognised by the blisters which appear on both sides of the leaves. These burst in time, and a chocolate-coloured powder is scattered. The best time to deal with the disease is on its appearance. All the diseased leaves should be picked off before the spores of the fungus are scattered. There are certain prepared liquids said to be effectual in destroying the fungus, but my own impression is that nothing will touch it when it has developed between the membranes of the leaves. The liquid might kill the resting-spores before they have penetrated the leaf.

"Spot" (*Uredo dianthi*) is sometimes very virulent; it is induced by certain states of the atmosphere in autumn, favourable to its development. The affected portions of the leaves should be cut off. The plants are seldom attacked if kept in a greenhouse; and if they be attacked in a frame, the disease may be checked by removing the plants to an airy greenhouse. It is a waste of time to dip and wash plants in various solutions to destroy "spot."

Greenfly is very troublesome, but it can be destroyed by fumigating with tobacco-smoke, if the plants be under glass, or, if out-of-doors, by dusting with tobacco-powder. Greenfly seldom, however, does any damage to planted-out Carnations, but the insects are found frequently on those in pots.

Thrips also attack the flowers when in an unopened state, and those who grow for exhibition are frequently obliged to hurry

the plants into the house in order to fumigate them, as this is by far the most effectual method of disposing of the pest. Ear-wigs are troublesome when the flowers are open; they lurk in the calyx and eat the petals through at their base. They must be destroyed by hand picking, or trapped by hollow beanstalks fixed between the stem of the Carnation and the supporting stick.

A species of *Tylenchus* (eelworm) attacks the young layers at their base. The eggs are deposited in the stem or base of the leaves, and the worms feed inside, causing a considerable swelling of the stem, which becomes ruptured, and the plant ultimately dies. Burning the diseased plants is the only way to get rid of the pest, which is usually introduced with the soil. The old soil should be thrown away.

The Carnation Maggot (*Hyalemia nigrescens*) has become very troublesome of recent years. It eats down the centre of the young growths, or it will attack seedling-plants as soon as the first leaves after the seed-leaves are formed. Its presence is discovered by the decay of the centre leaves, when it must be dislodged by means of a pin or a needle. The maggot is the larva of a small black fly very much resembling a house-fly.

The Garden Pink (*Dianthus plumarius*).

This time-honoured inhabitant of our gardens is presumed to be the original source from which has been derived the beautiful varieties of the Garden Pink. It is a charming, old-fashioned garden plant, easy to grow, very beautiful, and with a delicate Clove scent, which to some is more grateful than the perfume of the Carnation. Many persons can grow Pinks who have not the means to cultivate the Carnation and Picotee; they can be grown in almost any garden, and require no glass protection at any time.

CULTURE.—This is simple enough. The plants should be obtained in the autumn, and be planted out where they are to flower early in October, or even in September if good, strong plants can be obtained. The object of planting out early is to have them well established before the winter sets in, as alternate frosts and thaws will lift them out of the ground. If this occurs, they must be pressed in again with the fingers, when the ground is in a condition to admit of this being done.

Another detail which must not be lost sight of is the fact that unless Pinks are planted out early in the autumn, the lacing, which is the first point in the standard of excellence, will not be

perfect. Spring-planted Pinks put on the lacing badly, or not at all. They are sometimes grown in pots; but in this way the lacing never comes out well.

Any good garden soil is suitable for the Pink, but it ought to be worked to a depth of about 18in., and should be enriched with a liberal dressing of decayed manure; it ought also to be in a good easy-working condition at the time of planting. Florists who make a speciality of the Pink, prepare beds for it, and the plants are set out some 9in. asunder, and the same distance between the rows. If the soil is rather heavy, or not in a good working condition, the plants have a much better chance if they can have some soil prepared similar to potting-soil placed around the roots. This gives them a fair start, and may even mean the difference between success and failure. Stirring the ground between the plants with a Dutch hoe keeps down weeds, aerates the soil, and does much good. When hot weather sets in, the surface of the ground should be mulched with decayed manure, and if water is required this should be given freely—merely wetting the surface soil is of no use; it must reach the roots. The plants are sometimes eaten over in the winter by an unseen enemy. It may be rabbits, but it may also be what gardeners term the Leather Jacket, or larva of the Crane Fly, or Daddy Long Legs (*Tipula oleracea*). This is really a troublesome pest, and can best be destroyed by watching for it with a good lamp at night. It burrows in the ground, and is seldom found feeding by day.

Propagation is effected by pipings, by layers, and, to obtain new varieties, from seed. The first is the usual method. The growths at the base of the flower-stems are slipped off, and inserted in fine soil in a garden-frame or hand-light, but they must not be shut up too close, or they are likely to damp off. They may even be put out in the open garden, in a shady part, and when this is done a cloudy, damp day should be selected. The pipings should be put into the ground with the finger, pressed firmly, and afterwards watered with a fine rose. The end of June or beginning of July is a good time to insert them. If the growths are layered, this may be done about a month earlier than the Carnations, and in a similar way. Seed may be sown in the spring, and the plants will flower the following season. They should be planted out in the open garden, and be treated exactly as advocated in the case of the named varieties of Carnations.

Two classes of Pinks are recognised. The Laced or florists' type, which has been in cultivation for many years, are grown exclusively in the border. The forcing Pinks are self-coloured, or purple and reddish-purple combined. The old-gardeners did not hold this flower in so much esteem as the Carnation. Rea, who published a "Complete Florilege," in 1676, says: "Pinks are of many sorts, and little esteem; they flower with Roses in June, and every ordinary gardener knows how to dispose of them, as also that vulgar plant called Thrift."

The forcing Pinks are really very charming, and a succession of blossom can be kept up from March until June. The pipings must be put in as early as March, and the plants can be grown on in boxes until they are ready to plant out in the open garden in May. If provided with good, rich soil, they form large clumps by the end of the season. In September they should be lifted and planted in 6in. pots, larger or smaller ones being used according to the size of the plants. They should be potted firmly, and placed in frames until the plants are removed into warmer quarters, when successive batches of them may be stood in the forcing-houses.

VARIETIES.—The following Laced Pinks are now in cultivation. It must, however, be observed that they vary very little in colour, and one may fairly describe them as deep red, rosy-red, and reddish-maroon. The colour is in the centre of the flowers, the remainder of the petals being white, with a band of colour near the margin: Bertha, Bertram, Boiard, Clara, Device, Emerald, Empress of India, George Brown, George White, Harry Hooper, Lady Craven, Minerva, Miss Pomeroy, Mrs. Darke, Mrs. Waite, Reliance, Sarah, and The Rector.

The best of the forcing Pinks, Selfs and Fancies, are as follow: Alice Lee, white mule Pink; Anne Boleyn, rosy-purple, darker centre; Ascot, pink, deep red centre; Clove Pink, rose; Ernest Ladhams, large blush, claret centre; Her Majesty, large white; Homer, rose, darker centre; Mrs. Lakin, white, pale rose centre; Mrs. Sinkins, large white; Paddington, pink, dark centre; Snowflake, pure white; Albino, a new white variety, with large, well-formed white flowers.

The Dahlia (*Dahlia variabilis*).

For the decoration of the flower-garden in autumn this is certainly the showiest of flowering plants grown; it is also the mainstay of the autumn flower shows. There has been a great

advance, during the last decade or two, in the improvement of the Dahlia. By careful cross-fertilisation and judicious selection, improvement has been continuous. The reputed parent of the garden varieties is *Dahlia variabilis*, discovered in 1789, and named in honour of Dahl, a Swedish pupil of Linnæus. It first found its way into England through Lady Holland, who sent seeds of it from Spain; plants were raised from these seeds, and flowered in the gardens at Holland House in 1805. The first double flowers were produced four or five years subsequently. By referring to the gardening books published early in the century we find that in 1814 the Dahlia was extensively cultivated, and considerable improvement began to be effected. Twenty years later, on March 1st, 1833, the first number of the *Floricultural Cabinet* came out, and the first coloured plate published that month was of a new Dahlia—Commander in Chief. The coloured plates in this cheap publication were of poor quality, but it shows a flower quite double, of a deep reddish colour, and reflexed petals. The first really good double Dahlia was raised in 1832 by a Mr. Line, at Springfield, near Bromley, in Kent, and was sent out by Mr. Inwood, of Putney Heath, under the name of Springfield Rival.

At this time Dahlia exhibitions were organised near London, and the fame of the Dahlia spread all over the country. With the demand for new Dahlias, raisers of seedlings abounded. The most successful amongst them was the late Mr. John Keynes, of Salisbury. He was fortunate, he says, in raising a fine variety with flowers approaching to blue, which he sold to a Mr. Mountjoy, for £50. Mr. Keynes adds: "Since that time (about 1840) I have never ceased to grow seedlings, and I am free to confess that the great charm of floriculture would be dispelled, if I had no seedlings to anticipate." He adds the following practical remarks: "I leave my flowers pretty much to themselves until about September 15th, making it a rule never to cut any plants for show, when I would sacrifice seed by so doing. About that date I cut the plants to scarecrows, leaving only the few flowers that may be coming into blossom, and these produce seed in abundance. I sow my seed about March 10th, taking care that the pans containing the soil are placed in heat a day or two previously. Good seed is generally very thin. I care little for a plump seed." The seed sown in spring will produce plants that will flower in the open border the same season. The work so well begun by Mr. John Keynes, was carried on by other

enthusiasts, until large, handsome, perfectly-globular flowers were produced, of what amateurs termed Show (Fig. 33) and Fancy

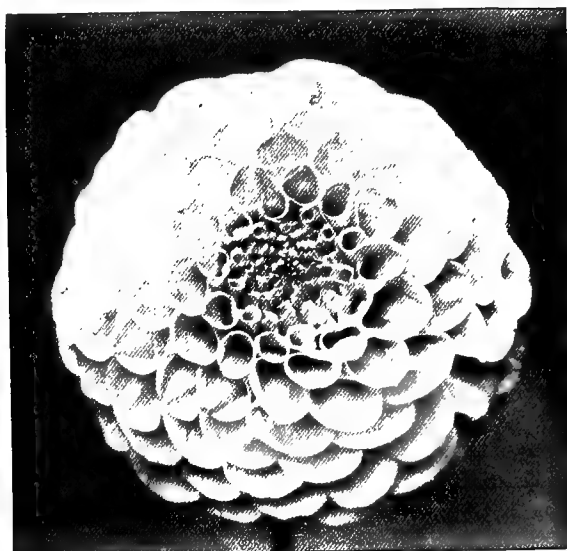


FIG. 33.—SHOW DAHLIA GLOIRE DE LYON.

varieties, when the highest standard of excellence was reached. Small forms were produced, which have been designated Pom-pone Dahlias (Fig. 34). These are more useful as cut-flowers, and when well set up, quite as effective as exhibition plants. They have attained as high a standard of excellence as the large-flowered section.

By the introduction of *D. Juarezii*, the Cactus Dahlia, quite a new type of flower was introduced. Fanciers have taken it in hand, and still further improved it for border-culture, while the variety is a distinct feature at the autumn exhibitions. About the time of the introduction of the Cactus Dahlia, there was introduced a pretty form of *D. variabilis*, named Paragon. It had single flowers like its first parent; but soon the single-flowered varieties became popular, and now we find certain amateurs rejecting the double-flowered varieties in their seed-beds, and saving only such as have flowers of improved form, with single flowers (Figs. 35 and 36).

The garden varieties in all the above sections are very numerous, and are being added to year after year. Almost every florist of any pretensions, publishes lists of the best varieties, and these are being altered every season, so that it is needless to give descriptive lists in this place.

CULTURE.—The methods of saving seed and raising seedlings have been already described. We will now deal with propagation by cuttings, which is the usual way of obtaining a stock of plants. The tubers which have been preserved during the winter in a dry place, where frost cannot penetrate, should be planted



FIG. 34.—POMPONE DAHLIA LITTLE SWEETHEART.

in boxes, in February, and placed in a hothouse where there is a moderate temperature. They will soon begin to grow. As

soon as the shoots have attained a length of 2in. or 3in., they may be taken off and planted singly as cuttings in thumb pots, and stood in a forcing-house or on a hot-bed. Each cutting will form roots, and as soon as they are well-established they should be potted on into larger sizes, and inured to a cooler atmosphere.

The Dahlia is one of the very easiest plants to propagate, and also to grow on for planting out. All that is required in

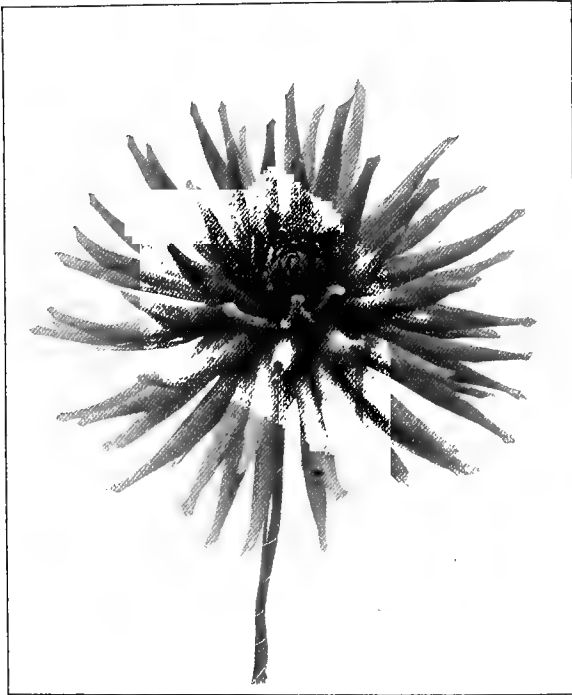


FIG. 35.—CACTUS DAHLIA MISS FINCH.
(Cheal.)

the early spring is to see that the plants receive no check to their growth. They are necessarily propagated in a warm temperature, and in the process of inuring them to that of a greenhouse or a garden-frame, they should not receive any check from cold winds or a low night temperature.

Another method of propagation is by producing what gardeners term "pot-roots." These are produced by taking off

the surplus side-growths from the Dahlias in the summer; they are cut through just under a joint, and struck as cuttings in garden-frames. When well-rooted, they should be potted off into large "sixties" or small "forty-eights." They will finish up their growth in the autumn. Such plants can be started in the spring, and when they have made some growth they should be transferred to larger-sized flower-pots. It is a

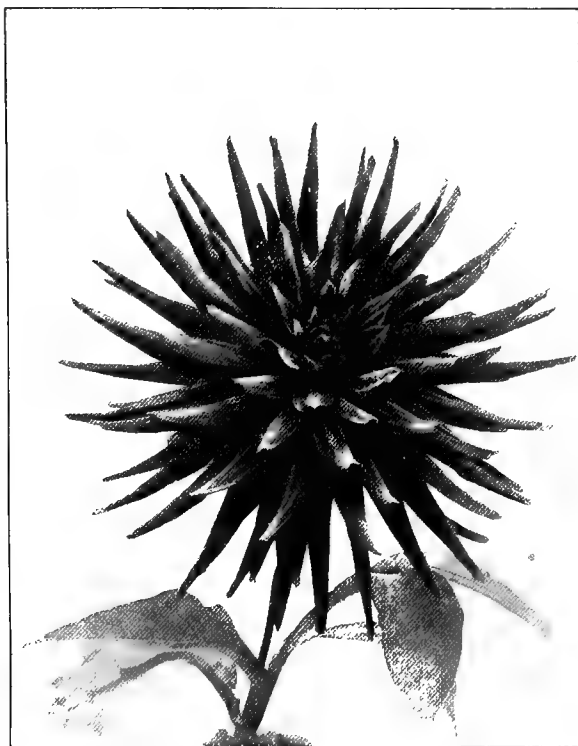


FIG. 36.—CACTUS DAHLIA MRS. JOHN GODDARD.
(Cheal.)

mistake to plant out too early. The first week in June is a good time. I would rather transfer the plants to larger flower-pots than turn them out, if there is any danger of frost. The plants are usually kept in ordinary garden-frames, and before planting out they should be thoroughly inured to the open air by the lights being removed by day, and also at night if there is no probability of frost.

The Dahlia is a gross-feeding plant, and requires a rich, deep soil in order that the blossoms may be fully developed. It ought, moreover, to be trenched about 2ft. deep, and during the process a good supply of rich farmyard manure should be worked in. The operation of trenching should be done in the previous autumn, before the ground is saturated with the autumn rains. In fine weather in winter the surface ought to be forked over to a depth of 3in. or 4in. This will allow the air to penetrate more fully into the soil, getting it into the very best condition for planting in the season. At planting-time it is best to put the permanent sticks into the ground. Stout sticks, standing 3ft. to 4ft. out of the ground, and 15in. less or more into it, should be selected. If the soil is in good condition, sufficient should be dug out in front of the sticks to allow the ball of the roots to go well into the soil. The plants should be firmly inserted, and tied to the sticks at once. If the soil is not in good condition, it is an excellent plan to dig out a spit or two of mould, and replace it with some prepared soil, such as would be used in repotting the plants. In favourable weather they will soon grow away vigorously, when all the side-growths ought to be removed except four. These should not be tied up in a bundle—each should have a separate stick to support it; then by careful training a very handsome plant will be produced.

At this time it cannot be denied that the plants require considerable attention. As the growths advance they must be tied to the sticks, and the earlier ties must be seen to, as otherwise they have a tendency to cut into the succulent growths of the plant. When hot, dry weather sets in, water must be applied very freely to the roots, and a mulch of decayed manure is excellent to prevent the moisture from too rapidly evaporating. If the very finest show blossoms are required for exhibition, it is necessary to shade some of the varieties. Cardboard caps are put over the flowers, and held in position by a stout stick driven into the ground.

The plan adopted by the old florists, when the Show and Fancy varieties were the only kinds grown for exhibition, was to drive a stout stick into the ground, and on the top of the stick was nailed a board about 9in. square. There was a slit in the board wide enough to draw in the stem of the Dahlia blossom intended to be shaded; the tips of the back petals of the blossoms rested on the board, and an inverted flower-pot shaded the blossom. Earwigs will get into the blossoms if they are not trapped

and carefully watched. Thrips are also very troublesome, but each blossom can be tied up in a muslin bag to prevent its being injured by these lively pests of the Dahlia-grower.

The Pansy (*Viola tricolor*).

One of the most charming of garden flowers, and an undoubted native of Britain, is the Pansy; but what a difference between the tiny wildling of cultivated ground in England and the lovely flowers of our gardens! Shakespeare gives it its true English name of Pansy. Who does not know the remarks of poor demented Ophelia? "There's rosemary, that's for remembrance; pray love, remember: and there is pansies, that's for thoughts." Spenser writes of the "pretie pawnce," and Ben Jonson—"tuneful Ben"—also alludes to it as "The panzie this; O, that's for lovers' thoughts;" but the sweet flower so much in lovers' thoughts had not attained to a high state of excellence if we are to judge by the examples figured in the "Floricultural Cabinet," so late as the year 1832 and onwards. The improvement in the flower was, however, very rapid during the next quarter of a century, as the coloured plates of it from 1850 in "The Florist" abundantly testify. About that time the Belgian, or Fancy Pansy, was introduced. Previous to that we cultivated the Show Pansy, as it was termed, divided then, as it is now, into three sections, White-Ground, Yellow-Ground, and Selfs; and the old-fashioned florists for years would not look at a Fancy Pansy. Now, the Fancies, like the Japanese Chrysanthemums, have taken the lead as garden flowers. Fig. 37 represents a Fancy Pansy, and Fig. 38 a Rayed Viola. The two illustrations are given side by side, as amateurs frequently confuse Pansies with Violas.

CULTIVATION.—The Pansy is a flower requiring but little attention, even to grow it to perfection; but then the attention that it needs is not always bestowed upon it. As it is easy to cultivate, so also is it propagated without any difficulty. To obtain new kinds seed must be saved from the best varieties, and be sown in July. The plants will be strong enough to put out where they are to flower in October; the soil ought to be prepared if possible three months previously, by trenching the ground at least 15in. deep, if the nature of the soil will admit of such a depth. If the ground is heavy, cow-manure should be used; and a good dressing of it should be given. A layer may be placed in the bottom of the trench, and another about 5in. or 6in. below

the surface. Of course, if some good loam could be obtained, mixed with decayed manure and leaf-mould, a layer of this, 3in. or 4in. deep, over the surface, would be very desirable; but it cannot always be had, and most people have to put up with the ordinary soil of the garden. If the soil is heavy, some river-sand should be added to the surface and lightly forked in. I plant seedlings 1ft. apart, for in good soil they make rapid growth, producing flowers in great abundance.

Named varieties must be propagated by cuttings only. Some persons have an idea that by saving seed from a named variety

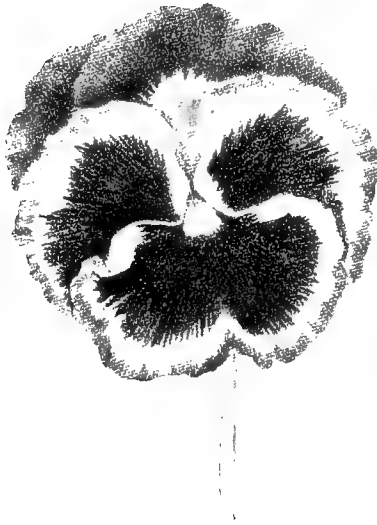


FIG. 37.—FANCY PANSY.



FIG. 38.—RAYED VIOLA.

of a Pansy or a Carnation, that the variety from which the seed has been saved will be reproduced. This is an error. It is very likely that some of them will resemble the parent; but, the largest proportion of them will not. It is advisable to cross-fertilise the best varieties; as, unless this is done, the results will not be so satisfactory. Cuttings strike very freely in a shady place, and they are better without glass in the form of hand-lights or frames. I find a place on the north side of a wall or fence, and insert the cuttings, some time in July or August, or even as late as September. The best cuttings are those taken from the centre of the plants. They are small,

slender growths (the thick, pithy, flowering growths are useless), and have generally plenty of rootlets formed or forming at their base. If they are carefully pulled out, a score or more of these growths may be obtained from one plant. Dibble these rooted slips out in rows, about 3in. asunder, in fine sandy soil, and in the shady position on the north side of a wall or building: no other artificial shading is necessary. They should be strong enough to plant out where they are to flower about the end of September or early in October; and the same treatment is necessary for named varieties as for the seedlings.

Pansies are quite hardy, but even a hardy plant will not pass well through the winter unless it is well established in the ground; and highly-bred Pansies may not be quite so hardy as the wild plant. After planting, and if the growths are long, it is better to peg them down, rather than to place sticks to the plants. The ground should be kept free from weeds, and the surface stirred occasionally if it becomes hardened by rains.

Wire worm is troublesome in new soil, and may be brought in with the loam; but it is seldom found in an old, cultivated garden. Another troublesome pest is the Leather Jacket, which burrows in the ground by day, and may be detected feeding at night. Slugs are also found feeding on the blossoms, rather than on the leaves. Growth goes on even in winter, when the weather is mild; and as the spring advances, it is of course more rapid. Flowers are freely produced, but it will be found that unless something is done, the successional blossoms rapidly deteriorate. This they will not do to a great extent, if the poor quality blossoms are cut off, and the ground is dressed with 2in. of a rich compost, say half manure and half loam. The growths should be pegged into this, and the plants will produce blossoms again of the best quality. It is astonishing how rapidly the roots of Pansies exhaust the soil to a considerable depth. A second dressing should be applied if the plants again show signs of distress. When Pansies are grown for exhibition, the flowers should be kept removed from the plants up to fourteen days of the date of exhibition, and the growths must not be crowded.

The Pansy succeeds so well in the open border that it might seem superfluous to grow it under glass; but it can be grown in ordinary garden-frames to a very high state of perfection. Indeed, the Council of the Royal Horticultural Society thought

so highly of this method of culture some twenty-five years ago, that prizes were offered by it for Pansies grown in flower-pots, and exhibited in April, and a few very beautiful specimens used to be exhibited. The plants must be kept as close as possible to the glass lights, and these should be used only to protect the plants from rough weather. The very earliest slips or cuttings should be used for the pot-plants. One or two plants may be potted into large "sixties," and when they have well filled these small pots with roots, they should be repotted into "thirty-twos" (6in.). A rich soil composed of three parts of good fibrous loam, one part of decayed cow-manure, and one part of leaf-mould, with a little sand added if necessary, must be used. When grown under glass, a species of aphid of a reddish colour attacks them, but it is easily destroyed by fumigating.

From good strong plants, if the weather be mild, a succession of blossoms may be had from Christmas onwards, and lovely large clean blossoms they are; but it must not be forgotten that slugs are the desperate enemies of Pansies in frames, and that they eat the blossoms rather than the leaves. They must be watched at night. It is a good plan before arranging the plants in the frames to dust the ground thickly with soot. I find this even more effectual than quicklime. The latter is no use after it has been wet: it will destroy the pests when first applied; but soot retains its effect for a long period, and is more likely to keep the voracious pests at bay.

VARIETIES.—The following is a list of the best Fancy Pansies. They are all of large size, good form, and of very rich and varied colours. There are, of course, many equally good, but new varieties are being added yearly, and those who would purchase a collection can easily obtain a catalogue from a trade grower, and therein will be found all the best varieties up to date, and described according to their colours: Agnes Mabel, Alexander Smith, Andrew Frater, Bernard Doulton, C. B. Renshaw, Cleopatra, Colonel M. R. G. Buchanan, Emmeline, George Stuart, Ladas, Marmion, Mrs. C. Lambie, Mrs. D. Johnstone, Mrs. R. G. Moir, Mrs. William Lockwood, Mysie Paul, Petunia, Stephanie, Tamworth Herald, Tamworth Yellow, Tom Walters, W. J. Pye, W. H. Clarke, and William Sydenham.

The Viola, or Tufted Pansy (*Viola cornuta*).

The beautiful garden-plants cultivated under the name of Violas may be said to be quite modern. They had their origin

something like forty years ago, at a time when the bedding-out of greenhouse-plants was the leading feature of most of the gardens in England. At that time the popularity of any new plant was assured if it was adapted for "bedding-out." Amongst other

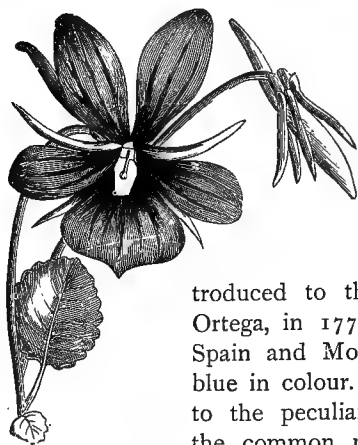


FIG. 39.—*VIOLA*
CORNUTA.

plants brought into prominence for that purpose was *Viola cornuta* (Horned Violet) (Fig. 39). This pretty plant had been grown in gardens for nearly a century. It was figured in the *Botanical Magazine* in 1805, Tab. 791, and Dr. Sims, the then editor, stated that the plant was introduced to the Royal Gardens, Kew, by Dr. Ortega, in 1776. It is stated to be a native of Spain and Mount Atlas. The flowers are pale blue in colour. The specific name is in allusion to the peculiar formation of the sepals; while the common name of "Tufted" has reference to the habit of the plants. This plant was grown by thousands as a bedding-plant, and it subsequently became cross-fertilised with the Show Pansies. The produce of this cross were grown as *Violas*. The hardier, more wiry constitution of *Viola cornuta* was transferred to the offspring of this cross, and although the form of the so-called *Violas* has been vastly improved, the constitutional vigour of *V. cornuta* is still there, and the plants resist winter's cold and summer's heat better than the Show or Fancy varieties of Pansies.

Another species used was *Viola lutea* (Yellow Mountain Violet). The flowers are bright yellow, and the plant is found on the higher mountain pastures of Britain. This plant never resisted the drought so well as the Horned Violet (*V. cornuta*), but it was used a good deal for bedding-out, and is probably the parent of the yellow forms of the Tufted Pansy.

CULTIVATION.—The culture of *Violas* and Pansies does not differ materially, except that better results are obtained with the *Viola*, and with considerably less trouble. This does not imply that it is not desirable to take pains with the culture of this charming, hardy, border flower. In good, deep garden loam, well-enriched with decayed manure, the *Viola* will give a

vigorous and sustained display of its beautiful blossoms, from early spring until the fall of the leaf in autumn, when frosty nights check the growth of the plants. Of course, during the period between early spring and late autumn, the plants require the careful hand of the gardener to keep up a good display of blossoms. There is nothing to do during the early months of the year, except to keep the plants free from weeds, and stir up the surface of the soil occasionally, as it is apt to become caked by rains, and not in a condition to promote a healthy, vigorous growth. The *Viola*, as well as the *Pansy*, must be kept moist at the roots. Few plants have such an immense mass of rootlets, spreading in all directions, and if dry weather sets in they soon extract the moisture from the surrounding soil. It is therefore very desirable, as soon as hot, dry weather sets in, to place a thin layer of decayed manure all over the surface of the beds, and to water freely. A good soaking is necessary, so that the water will go down to the rootlets. It will carry the fertilising properties of the manure with it, and will aid greatly in keeping up the blossom in fulness and quality all through the season; but it is not well to allow the plants to become overcrowded with growth and blossom. If, as sometimes happens, a brilliant display of blossom is wanted on a particular date—and this applies to *Pansies* as well as *Violas*—I advise picking off the blossoms about two weeks before the date, giving a surface-dressing, and pegging the shoots down into it. Even if the plants have become exhausted by a long period of plentiful blossom, they will start again if well supplied with water (if needed) like giants refreshed, and the blossoms will be abundant and of good quality.

There are now two sections of *Violas*. The early types had rays of colour, striking out from the centre of the blossom, but after a time seedlings were obtained of better form, and without rays, or, at least, the rays were inconspicuous, and from the point of view of the florist, the rayless varieties were the best, and this type of flower has been greatly improved in recent years.

Planting should be done in the autumn, in order to get a good display in spring, and they should be strong, well-established plants. Propagation should take place in July and August, in the same manner as advised for *Pansies*. Plant out permanently in September or October the same distance, viz., a foot between the plants. It will also be well to plant out a bed or

border of *Violas* in the spring. Seedlings may be treated in the same manner as named varieties. The *Viola* is still one of the best plants for bedding-out purposes, and lines or masses of colour, according to the taste of the owner, may be planted, and the effect is very good indeed.

VARIETIES.—The following is a selected list of the best varieties: Amy Barr, Blanche, Britannia, Charm, Councillor Waters, Devonshire Cream, Duchess of Fife, Florizel, Formidable, George Lord, Goldfinch, John Quarton, John Shires, Kitty Hay, Magnificent, Mary Stuart, Mrs. J. Donnelly, Mrs. R. Hare, Niphetos, Pembroke, Rover, Stephen, William Neil, and Wm. Haigs.

The Garden Tulip (*Tulipa Gesneriana*).

“The Tulip asketh a rich soil and the careful hand of the gardener.” This fine old garden flower has a history of its own both in Britain and on the Continent of Europe. Most gardeners have read of the Tulip mania in Holland, so long ago as the years 1634-37. It was nothing more than a speculation, which made an old writer exclaim, “Great is the folly of mankind.” Beckmann, in his interesting book, “The History of Inventions and Discoveries,” gives a full account of this gambling traffic, as he calls it. He says, “During the time of the Tulipomania a speculator often offered and paid large sums for a root which he never received, and never wished to receive. Another sold roots which he never possessed or delivered. Oft did a nobleman purchase of a chimney-sweep Tulips to the amount of two-thousand florins, and sell them at the same time to a farmer, and neither the nobleman, chimney-sweep, nor farmer had roots in their possession, or wished to possess them. Before the Tulip season was over more roots were sold, purchased, bespoke, and promised to be delivered, than in all probability was to be found in the gardens of Holland. And when *Semper Augustus* was not to be had, which happened twice, no variety, perhaps, was oftener purchased and sold.”

Persons who dealt in flowers in this way could not have any real love for them as objects of beauty, and a source of pure delight to the cultivator. Some of us are old enough to remember the time when bulbs of Tulips were sold at very high prices. As late as the year 1854, Mr. Groom, of Clapham Rise, published a catalogue of Tulips. Three varieties in his list were priced at one-hundred guineas per bulb. They were Miss Eliza

Seymour, Duchess of Cambridge, and Princess Mary of Cambridge. There were other varieties catalogued at the same time at fifty guineas, twenty-one guineas, and ten guineas, respectively. Probably Mr. Groom died about this time, as his entire collection of Tulips was sold by Messrs. Protheroe and Morris as they stood in the rows, seven bulbs in a row; but they realised poor prices, the highest price given for a row being under seven guineas. Mr. Groom was one of the leading cultivators. He prepared his Tulip beds of rather poor sandy soil, and his notion of good culture was to starve the roots so as to obtain purity in the cup—that is, the base of the petals.

The late Mr. Samuel Barlow, of Manchester, a leading northern cultivator, did not believe in starving his Tulips. He says "Purity and refinement are not achieved by starvation."

The Tulip will grow and flower well in ordinary garden soil which has been prepared by trenching it to the depth of 18in. or more, and working in during the process a fair proportion of decayed farmyard manure; but there should be about 6in. of good garden soil above the top layer of manure. It is very desirable that the soil should be prepared some time before the bulbs are inserted, so that it can be well-pulverised by exposure to the air. If the soil is trenched up in September it might be in good condition by the first week in November, which is a very good time for planting. The old-fashioned system of planting is a very good one. The bulbs were planted in beds about 4ft. wide, with an alley between the beds 15in. to 18in. wide. Each bed would contain seven rows of Tulips. The outer rows should be 3in. from the edge of the beds, and if spaces of 7in. be allowed between the rows that would exactly fill up the 4ft. width. The bulbs should be inserted 7in. apart, and about 5in. deep. If the ground is heavy, some sand ought to be added to it and dug in, for it is well known that a sandy soil suits the Tulip best. Although good results are obtained by planting the Tulip in ordinary soil, it is well to suggest that if time can be spared, and material is available, it is a good plan to dig out the ordinary soil to the depth of 6in. or 8in., and replace it with decayed fibrous loam well chopped up, and mixed with some coarse sand. In this virgin mould the very best results are attainable. The old florists also knew well to what height certain varieties would grow.

With seven rows in a bed, the centre row would be the fourth from either side, and the florist arranged his bulbs into first,

second, third, and fourth row varieties, according to their height, the tallest of course being in the centre of the bed. They were all planted, too, according to colour and class, and no labels were used. The fancier had a book, and the plan of the

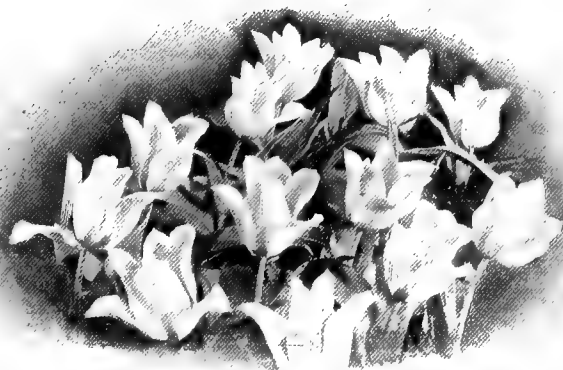


FIG. 40.—FLORISTS' TULIPS IN A BED.

bed was sketched in it, and every bulb planted was entered in the book according to its name and class.

There are three classes of Tulips: Bizarres, Bybloemens, and Roses. These are again divided for garden and exhibition purposes into Feathered and Flamed Tulips. The ground-colour in the Bizarres is a clear yellow, and in the Bybloemens and Roses a pure white. The flame and feathering on the Bizarres is red, chestnut red, or maroon; some have the markings so dark as to appear almost black, such as may be seen in Storer's William Lea, or Slater's Masterpiece. The red ground is prominent in Storer's Dr. Hardy, or Bowler's Everard; there is the chestnut feathering in Ashmole's Garibaldi. The Bybloemens have the colours of a deep rich purple or shades of purple, so dark in Jackson's David Jackson that the fanciers describe the feathering as black. Hepworth's Bessie is also a handsome variety, with beautiful purple-black feathering on a pure white ground. Other varieties are feathered and flamed with various shades of colour; in a few the purple almost verges into lilac.

The Roses, as they are termed, are also of many degrees of intensity, and very charming in the flamed and feathered state. As illustrations of the various shades of colour we have *Industry* (Lea), a bright carmine scarlet feather on the purest of white grounds. *Heroine* is a true Rose, generally finely-feathered on a very pure white. *Nanny Gibson* (Hepworth) has a brilliant scarlet feather on white, and is very lovely in this state. Another shade of colour (rosy-red on pure white ground, both flamed and feathered) is found in *Charmer*, *Mabel*, *Mrs. Lomax*, and *Pretty Jane*, raised by a florist named *Martin*. These are all one

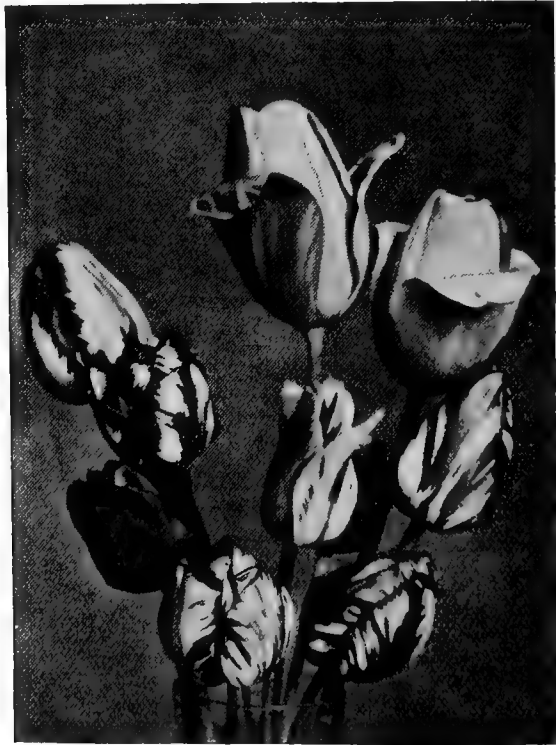


FIG. 41.—A GROUP OF FLORISTS' TULIPS.

variety, and it may be well to point out how this happens. Nearly all seedling Tulips flower first in what florists term the "breeder" state, that is, as self-coloured; and for some years it will continue

to flower as a Self, and it passes into the hands of various florists in this breeder state. But by-and-by the breeders will break into flamed or feathered flowers. Brown may have one, Jones another, and a third may be in the hands of Robinson. Each of these florists claim the right to name any variety that may break into the flamed or feathered condition in their hands; but they are all the same thing, varying slightly in the quality of the markings, and whoever happens to get the best break claims to have the finest strain. The same remarks apply to all the other classes. Again, a florist such as the Rev. F. D. Horner obtains all the best strains in existence in all the classes, and florists get to know of the superior quality of the Tulips grown by him, and they may obtain this strain, calling it "Horner's strain," probably because they know well that a fastidious florist will not grow a bad strain of any of his favourites. Besides the above-named Tulips (Figs. 40 and 41) there are the beautiful species and their varieties. These will be dealt with under "Hardy Bulbs and Tubers," Chapter X.

CULTURE.—The following is a short *résumé* of culture. The beds being prepared as already advised, proceed with the planting very early in November. The bulbs should be put 5in. into the ground, and as it is usually in a rather wet condition at this season, I place a little quite dry sand under the bulbs, and a little more over them. Some growers in the North do not plant until December, but that is too late for the South, as the young rootlets begin to raise the covering of the base of the bulbs early in November, and they are ready to push out immediately they are put into the ground. Some time in January, the plants will appear above ground, and although the Tulip is a perfectly hardy plant, the leaves are likely to be injured by intense frost. Fanciers have an arrangement of iron hoops bent over their beds, held together by string, and mats are placed over the plants in frosty weather. It is also an excellent practice to mulch the surface of the beds with decayed stable-manure. This very effectually keeps out the frost, if not too intense, and also enriches the soil. It is not absolutely necessary to cover the Tulips with mats in this way, but it is certainly desirable.

About the end of April the flower-buds would be considerably advanced, and to bring out the markings of the flowers, and retain the colours as long as possible, it is absolutely necessary that they should be shaded from the sun, and sheltered from

frost and heavy rain. Florists have a framework erected high enough to walk under it, and over this is the shading, which is rolled up or let down at pleasure. This method answers very well; but old frame-lights may be utilised for this purpose. The lights are supported on a framework, and the sides have some shading nailed on to the posts that support the lights; in bright sunshine, shading is also placed over the glass, and in this way most beautiful blossoms are obtained. One of the best northern growers has built a light glasshouse over his Tulip beds; it is freely ventilated, of course, and in the cooler climate of the extreme north of Yorkshire this plan answers admirably—the growth of the plants, and the wonderful purity of the blossoms surpass expectation.

When the Tulip blossoms fade, the seed-pods ought to be broken off, and in three or four weeks after blossoming the bulbs may be taken up and stored in a dry place. The florists consider it is time to lift the bulbs when the flower-stems can be bent without breaking.

VARIETIES.—The following is a list of the best Tulips prepared by that eminent grower, the late Mr. Samuel Barlow:

Feathered Bizarres.—Commander, Demosthenes, Dr. Dalton, Garibaldi, George Hayward, John Radcliffe, Sir Joseph Paxton, Sulphur, and Target.

Flamed Bizarres.—Ajax, Excelsior, Dr. Dalton (this and some others are found in both the feathered and flamed state), Dr. Hardy, Everard, Lord Delamere, Masterpiece, Orion, Sir Joseph Paxton, Surpass Polyphemus, Sulphur, William Lea, and William Wilson.

Feathered Byblæmens.—Adonis, Alice Gray, Bessie, David Jackson, Friar Tuck, Mrs. Cooper, Nulli Secundus, Nimbus, Talisman, and William Bentley.

Flamed Byblæmens.—Adonis, Attraction, Bacchus, Carbuncle, Duchess of Sutherland, David Jackson, Friar Tuck, John Peacock, and Talisman (this variety is best in the flamed state).

Feathered Roses.—Annie McGregor, Charmer, Mabel, Mrs. Lomax, and Pretty Jane (these four are the same), Heroine, Industry, Lady Grosvenor, Lady Wilton, Madame St. Arnaud, Modesty, and Nanny Gibson.

Flamed Roses.—Adair, Annie McGregor, Lady Sefton, Mrs. Barlow, Triomphe Royal, and Sarah Headly.

Breeders' Bizarres.—Ariosto, Dr. Hardy, Excelsior, Horatio, Orion, and Sir J. Paxton.

Byblæmens.—Alice Gray, Ashmole's 112, David Jackson, Glory of Stakehill, Martin's 117, Miss Hardy, and Talisman.

Roses.—Annie McGregor, Lady Grosvenor, Lady May, Mabel, Mrs. Barlow, and Nanny Gibson.

The *Gladiolus* (*Gladiolus gandavensis*).

There are very numerous species of this fine genus of Cape plants in cultivation; but, treating it as a florists' flower, we can deal only with the garden varieties, which have been obtained by careful cross-fertilisation during the last fifty years by amateurs and others. The Hon. and Rev. Dean Herbert began the work of hybridising more than sixty years ago; but he was more of a botanist than a florist, and crossed numerous species which had been recently introduced from the Cape, but he did not follow up the work so as to obtain good forms, and thus bring the plant into the family of garden favourites. A French gardener of note, Mons. Souchet, gardener to the Emperor Napoleon at Fontainebleau, near Paris, was the first to make a decided florists' flower of the *Gladiolus*. He introduced many new varieties yearly through one or two of the Paris seedsmen, the flowers being of admirable form and substance. Messrs. Kelway, of Langport, still further improved it, and now there are hundreds of beautiful varieties in cultivation (Fig. 42).

CULTIVATION.—The *Gladiolus* is very easily propagated from seed, and the flowers can be cross-fertilised so readily that any amateur can do it. This is done when the plants are in flower in August, and the seed ripens about the end of September. As soon as the pods open they should be gathered, and laid out to dry in an airy room. The seed should be sown in pots or pans from the middle to the end of March. It will germinate freely in a slightly heated hot-bed. If the seeds are sown thinly the plants may be left in the receptacles in which they were sown. Bulbs, or corms, from the size of a pea to that of a hazel-nut, will be formed during the growing season. These small bulbs, if planted out in the open garden in rich, light soil in March, will give strong flowering-plants the same season, so that flower-spikes are obtained within two years of cross-fertilising the flowers. The *Gladiolus* is also propagated from the small bulblets produced at the base of the corms. A dozen or more of these may be produced from one bulb, and they soon grow into a flowering size.

In order to grow this handsome garden favourite well, the ground requires preparation, and a light sandy soil is best. If the soil is heavy, it must be well drained, and some road- or river-sand spread thickly over the surface, and lightly forked in. At one time I grew several thousands of the finer Gladioli varieties (seedlings and the best French sorts to name),



FIG. 42.—A GROUP OF FLORISTS' GLADIOLI.

and the soil was always prepared by trenching deeply the previous autumn. I mixed up some cow- and stable-manure in equal proportions; this was turned over two or three times, until the violent heat had abated, and the manure was half decayed. Two layers of this were worked in during the process of trenching, one layer at the depth of 18in., and another at 9in. This would be the maximum depth. Sometimes the greatest depth

would be 15in., and the lesser 6in. I liked to have the ground prepared not later than October.

During winter and early spring, when the surface is dry, I lightly fork it over. By the first week in March the ground is usually in good condition to plant out the first lot of corms. Drills as for Peas, 14in. apart, are drawn, and the bulbs, or corms, planted from 8in. to 12in. asunder, according to their size. The base of the bulb is placed about 4in. below the surface of the ground, some dry, clean, river- or silver-sand is put under and over each, and the drill filled in again. The ground is often in a wet condition when the time arrives for planting-out; if this is the case, I still draw the drills, and use dry sand; but the drill is filled up with some dry soil, usually siftings from the potting-shed. This gives the corms a good chance to start.

A fresh lot of corms should be planted every two weeks until the end of May, and this will give a succession of blossom until the end of the season. The plants soon appear above ground if the weather is favourable, and as soon as ever the rows of plants are discernible the Dutch hoe must be run through them to lighten the ground and destroy weeds. I use the hoe even if no weeds are to be seen. When the plants show that the flower-spikes are developing, sticks should be put to them to prevent their toppling over. When dry weather sets in, water must be applied freely, and the surface mulched with well-decayed stable-manure to prevent evaporation. The object is to obtain spikes of the greatest length possible and flowers of the highest quality.

Gladioli are exceedingly well adapted for cutting to place in rooms, if the spike is cut when the first four or six blossoms have opened; the remainder of the flowers will open in the house. I have cut scores of spikes, and placed them in bottles of water, arranging them in the greenhouse or conservatory. The bottles are kept out of sight, behind plants with green foliage, but which do not happen to be in flower. Gladioli have the best effect if their own foliage is used.

A few of the very choicest varieties must also be selected to save seed from, and they must be cross-fertilised. This is easily done. The seed-bearing parent must be selected, and before the flowers are half open the anthers pulled off with the fingers. When the flowers are fully expanded, the pollen from some superior variety should be taken when the flowers are also fully developed, and the stigma of the seed-bearer touched. This

should be done on successive days, until the entire spike has been cross-fertilised.

I have tried growing the *Gladiolus* in flower-pots, but do not recommend this method, as it is rather troublesome, and not very satisfactory as to results. I have had considerable experience in purchasing new varieties of *Gladiolus*, and had always to make up my mind for some losses. The plants would sometimes die off in a manner not to be accounted for, and sometimes when the blossoms were just on the point of opening. In the year 1875, quite half of a collection of *Gladiolus* of considerable value died off. It is very annoying to lose valuable plants in this way; but it is owing to a considerable extent to insufficiently decayed manure coming into contact with the roots; and as seedlings—at least to the extent of fifty per cent.—are as good as the parents, and a hundred or more plants can be obtained from one spike, it seems foolishness to spend money on expensive named varieties. It would not serve any useful purpose to give a long list of named varieties; this must be left for the "Appendix."

Any good seedsman could supply a dozen or more of the best sorts in the season. I advise amateurs to get a dozen of the best, and raise seedlings from them. The seedlings, after flowering for two or three seasons, have a tendency, as well as the purchased named varieties, to degenerate.

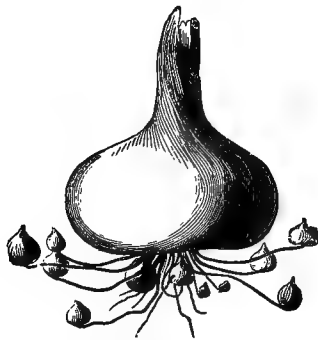


FIG. 43.—GLADIOLUS CORM, SHOWING METHOD OF INCREASE.

The leaves of the *Gladiolus* remain green till very late in the autumn, but they should be lifted from the middle to the end of October. As they are forked out of the ground, cut the stalk off close to the crown, shake off the

adherent soil, saving the small bulblets (Fig. 43), or "spawn," clustering round the base of the parent corm, spread the corms out to dry in an airy place, and when well dried, store in boxes or bags until planting time; but they must not be exposed to frost.

The Royal Horticultural Society, the Crystal Palace Company, and other leading societies, gave me a score or more first class certificates for my seedling *Gladioli*; but they degenerated under

my own care, and I never thought it desirable to introduce them to the public, and all have passed out of existence. In some soils the conditions seem more favourable. Messrs. Burrell, of Cambridge, and Messrs. Kelway, of Langport, grow the *Gladiolus* successfully, and both firms seem able to place their seedlings on the market. At any rate, careful cultivation is necessary to ensure success.

The Ranunculus (*Ranunculus asiaticus*).

A charming garden flower, and one of the old-time favourites. When Parkinson published "The Garden of Pleasant Flowers," in 1629, he mentions only one double variety, which he terms



FIG. 44.—RANUNCULUSES IN BED.

the "double red Crowfoot of Asia." When Rea published his "Flora," in 1676, the Asiatic *Ranunculus* had become a general favourite. Parkinson's double red stands at the top of Rea's list of named varieties. After describing this old variety, Rea adds, "There are now several other nobler sorts of *Ranunculus* of Asia, with gallant double flowers, much excelling this old kind described, &c., &c." Scarlet and yellow were at this time the prevailing colours; and some scarlet with yellow stripes. Succeeding generations of gardeners improved the form of the *Ranunculus*, by raising seedlings, and not only so, but the rich and varied colours obtained were truly charming. These were

white, yellow, maroon, scarlet, crimson, and olive, with other flowers edged, striped, spotted, and mottled; and here the greatest improvement obtained in the *Ranunculus* was by a clergyman, the Rev. Joseph Tyso, of Wallingford, in Berkshire. He effected quite a revolution in this flower, obtaining not only the most varied shades of colour, but also perfection of form.

CULTIVATION.—Like most florists' flowers, the *Ranunculus* is easily raised from seeds, which, of course, must be saved from the very best varieties. The flowers intended to bear seed must be fertilised, and also supported by small sticks. When the seed is ripe, it should be gathered and dried in an airy room. Mr. Tyso sowed his seed in October or January, and placed the seed-pans in a garden-frame; under favourable conditions it germinated in four or five weeks. Air should be admitted freely to the frames, and early in May the seed-pans or boxes must be placed out in the open garden, where they can be carefully watered until the leaves decay. About the middle of July the small seedling tubers must be taken out of the soil, and dried in an airy room, not in the sun. After being dried they may be placed in a box in dry sand. They should be planted in the first week of March following, and they will flower most profusely the following season in June, the second season after sowing the seed. The seed should be sown thinly and evenly, and be just covered with soil.

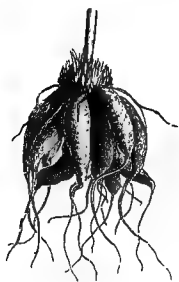


FIG. 45.—RANUNCULUS ROOT.

Ranunculus roots can be obtained from any seedsman; they are usually priced at a cheap rate in the bulb catalogues—a hundred tubers can be obtained for three or four shillings. As I wrote twenty years ago, "There is no garden so small but might have space for a small bed (Fig. 44), or so large but that this modest flower might charm some quiet nook with its presence." Many persons purchase a stock of tubers, but fail to grow them

owing to careless planting or planting in unsuitable soil. The tubers are of small size, and do not succeed unless they are planted at an uniform depth. A good medium clayey loam is suitable, and the tubers should be planted early in March, when the soil is in good working condition. Drills should be drawn $1\frac{1}{2}$ in. deep and 4 in. apart. Some fine sand should be sprinkled in the drills, and the roots (Fig. 45) pressed gently into the

soil, about 2in. apart, and some sand placed over their crowns. The drills should be filled with fine sandy soil. As the leaves show above ground they will lift the soil with them, and as this is also loosened by the action of frost, it is a good plan to go over the bed and gently press the tubers into the ground with the fingers. They must be kept clear of weeds, and as soon as dry weather sets in, the surface of the ground may be mulched with decayed manure, and water supplied between the rows, taking care not to wet the leaves. Ranunculuses require no other attention. The old florists used to fix an awning over the beds to protect the blossoms from rain and too much sunshine. Water must be withheld as soon as the flowers open. When flowers and leaves decay, the tubers should be taken up and stored in a dry place.

The florist's standard in this, as in all other flowers, is smoothness and breadth of petal. A perfect flower would represent half a globe, not less than 2in. in diameter at the base. The petals should be sufficient to quite fill up the centre, and whether there are two colours in the flower or one only, they must be clear and distinct.

The Polyanthus (*Primula acaulis*).

Like the Auricula, the Polyanthus winds itself round the affections of those who cultivate it. Sixty or seventy years ago the Polyanthus was esteemed as a florists' flower, and many beautiful varieties were in cultivation. The gardeners of that day worked up to a standard of excellence of their own, and grew only such kinds as are now known as Laced Polyanthus, though this term was then unknown.

Polyanthuses were very carefully cultivated as show flowers, and some of the varieties have come down to us, evidencing that they must have possessed considerable vigour of constitution. Some of them are still grown, and I have before me a list of the very best varieties which were grown about 1836 as exhibition flowers. One of them, Burnard's Formosa, was much esteemed, and a coloured plate of it was given in 1834, although I have never seen a truss with anything like such good blossoms. Other varieties were George the Fourth, Pearson's Alexander (this fine variety was raised by the grandfather of the Brothers Pearson, of Chilwell, Notts.), Invincible, Prince Regent, Lord Crewe, Bang Europe, Princess, Countess, Lord John Russell, Commander-in-Chief, Lord Nelson, Othello, Beauty of Over, and Mary Ann.

Nearly all of them are now out of cultivation; but a few of the best still exhibited in the north are George the Fourth, Alexander, Cheshire Favourite, Exile, William the Fourth, Formosa, Lancer, and John Bright.

CULTIVATION.—This type of Polyanthus can be easily raised from seed, which should be sown in March in 6in. pots or seed-pans, in good sandy loam and leaf-mould. It will germinate freely in two or three weeks in a gentle hot-bed. The seed may also be sown in July, when it is gathered; but at that time it is better to put the seed-pans in a shaded, cold frame. To obtain the best results, cross-fertilisation should be attended to; and good parents must be selected, with all the best properties. They should also be very vigorous in constitution. Buck's George the Fourth is one of the most vigorous, and is generally well up in the properties. The parents ought also to possess well-formed flower-trusses, supported on stout flower-stems, about 5in. or 6in. in length. The "pip," or corolla, should be large, quite round, and smooth on the edges. The tube or throat of the corolla should be yellow, round, and well filled with anthers, and the ground colour of a rich dark red or a dark maroon. The centre ought to be a good yellow, and the margin of the same colour as the centre. The margin of the corolla is sometimes of a paler yellow than the centre, but this, in the eyes of the fancier, is a fault. The colours must be alike. The flowers should not be pin-eyed—that is, the stigma protruding from the eye, with the anthers down in the tube. The stigma should be down in the tube, with the anthers in the mouth of it. The anthers must be removed before the pollen is scattered, and the stigma can be dusted with some foreign pollen.

The seed ripens in August, and ought to be sown as soon as possible, or it may be kept until the following spring; any time between February and April will be found suitable. A slightly-shaded position should be chosen for the plants; where Primroses grow well is also suitable for the Polyanthus, but the fancier delights in having his choice Polyanthuses grown and flowered in pots. They can be potted up in July, August, or September in good loam, with the addition of a fourth part decayed manure. The best position for them is on the north side of a wall or fence, where they get a little of the afternoon sun. The plants must be well attended to as regards watering, and the leaves should be kept free from red spider, which is really their desperate enemy

in the south. In the colder climate and moist atmosphere of some northern districts the pest is absent.

Exhibitors remove all the trusses of blossom but one, which is shown in a finely-developed condition. One of the best of the northern cultivators of this choice favourite grows one set of plants in his garden in a good position planted out for one season, and pots them up the next, so that he has one small collection in pots and another planted out. Five-inch pots are suitable, and one crown only should be planted in each.

The fancy Polyantheses have been used as exhibition plants in recent years in the south of England; indeed, the Laced varieties, as they are termed, have been excluded, owing to the difficulty of obtaining good plants. They were of such poor quality that the committee thought it best to omit them from the schedule of the National Society.

The rich and varied colours of the border Polyantheses have made them general favourites. Their culture is simpler, as they are grown out-of-doors all the time, and are only brought under glass for a few days before the exhibition, and potted up for a week or so. They like rich, deep soil to grow in, and if it is inclined to be clayey so much the better.

The Hollyhock (*Althæa rosea*).

In this we have one of the stateliest of garden flowers, and one, too, that has long been known to cultivation in this country, for it had taken on considerable variety of colour in Parkinson's time—1629. Parkinson says: "The flowers were of divers colours, both single and double, as pure white and pale blush, almost like a white, and more blush, fresh and lively, of a rose colour; scarlet, and a deeper red like crimson, and dark red like black blood." Parkinson adds: "They will reasonably well abide the winter." This remark shows that our old author had an intimate knowledge of the plants he wrote about, for in severe winters they suffer to a certain extent. Seedlings that have not flowered generally pass through the winter very well, but named varieties will not be quite safe in the open garden. Like most flowers of this class, which have been brought to a high state of perfection, the work has been accomplished by the untiring energy of individual florists, who have been enthusiastic in their efforts to improve the plants. Mr. Charles Baron, a shoemaker of Walden, produced some very beautiful quite double flowers about fifty years ago. Messrs. Paul, of Cheshunt, carried

on the work so well begun by Mr. Baron. Chater, of Saffron Walden, also produced some very fine varieties. Mr. John Laing, then at Dysart, now of the firm of John Laing and Sons, about forty years ago crossed the English varieties with high very double centres, and scarcely any guard-petals to the flowers, with the Scotch varieties, which had smaller centres and immense guard-petals. The result of this experiment was a considerable improvement on existing sorts.

Soon after these great improvements, the Hollyhock disease appeared, a fungoid growth (*Puccinia malvacearum*), which fastens upon the under-sides of the leaves, and quite destroys the softer part, leaving the naked venation, which is unsightly enough. There does not seem to be any cure for it. In certain positions in the garden no other flower is so effective as the Hollyhock, but it has not been so popular in recent years as it used to be, probably because of the difficulty in cultivating the plants owing to the disease. If a clean stock of Hollyhock plants can be obtained, say, in the autumn, they should be wintered in frames, and the pots plunged to the rims in cocoa-fibre or similar material. They are usually wintered in small-sized flower-pots, and in the spring repotted in 5in. and 6in. size. In April they may be planted out where they are to flower. The Hollyhock is a very gross-feeding plant, and requires a rich, deep soil. The ground ought always to be well-trenched and manured during the winter, and it is usually in good condition at planting time in the spring. Every practical gardener knows the importance of keeping the soil in good condition by trenching in the first place, and forking it over when dry enough at intervals.

It is a good thing when putting out the plants to have at hand a barrow-load of good prepared compost, such as is used in the potting-shed; a little of it should be placed around the ball of the roots, as the plants are turned out of the pots; this gives them a good start. A stout stick, standing some 6ft. out of the ground, will be required, and it is best to put the sticks into the ground at once and plant the Hollyhocks up to them, fastening the stems to the sticks at the same time, in order that they may be safe. The plants soon start into rapid growth, and must be fastened to the sticks as growth progresses. As soon as dry weather sets in, the plants should be freely watered, and some decayed manure placed around the base to prevent evaporation.

The Hollyhock fancier removes the lateral growths, so that the centre spike may be of splendid quality. These lateral growths are furnished both with eyes containing leaf-buds, and with flower-buds. The leaf-buds, if cut out and inserted in small pots in sandy soil, will produce nice young plants. They should be treated much as vine eyes are. The small pots should be plunged in a spent hot-bed, when the bud will, in a week or ten days, appear out of the soil. Great care must be taken in watering them at this stage, as they have considerable tendency to rot off; but as the plants advance in growth and form roots, they should be potted on into large "sixties," and in these they will pass the winter, but must be potted on in the early spring months.

Hollyhocks are also propagated in the spring by root-grafting, and by cuttings from growths obtained from the old stools. To obtain these the old plants should be lifted out of the ground in October, and planted in flower-pots from 6in. to 8in. in diameter; there is no need to over-pot them. The plants may either be wintered in a garden-frame or in a cool greenhouse, and in February or March the cuttings will be ready. Each one should be taken with a sharp knife close to the main stem of the plant, and potted in "thumbs" in sandy soil. If the soil is moist, and the cuttings are placed in the propagating-frame of a forcing-house, they will require little or no water until roots are formed, and an over-supply of water might cause most of them to rot off at the base. They will soon start into growth if they do well, and must, of course, be inured to a more airy place as soon as possible.

Root-grafting is merely the process of tying the shoot to a bit of Hollyhock root, after cutting the growth and the root much in the same way as ordinary whip-grafting of fruit-trees. Growths should be planted in small flower-pots, deep enough to leave the point of union just above the surface. These spring-propagated plants will flower rather later than those struck from eyes or in any other way in the autumn.

Propagation from seed is much the easiest way to raise a stock of plants, and, of course, it is always best to save the seed from the very best varieties. Such plants should also be cross-fertilised, for if this is not done the seedlings produce flowers differing very little from the parent plant, most of them inferior in quality, but some equally good, and very few of them better. If the seed is sown soon after it is gathered and dried, and the

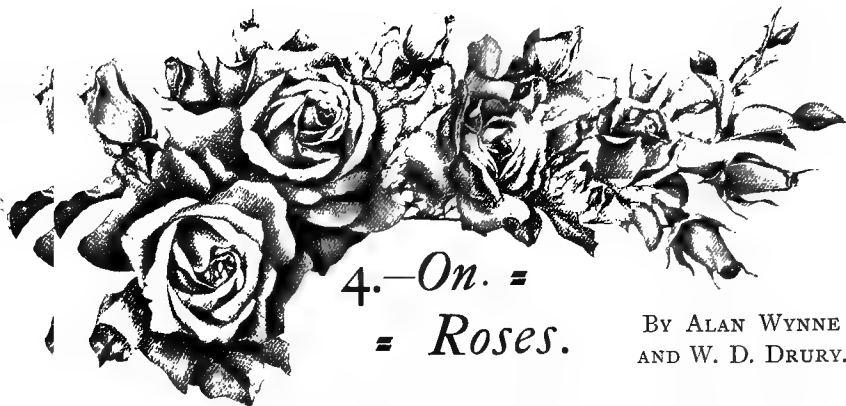
plants are preserved through the winter in garden-frames, they will flower strongly the following season; but if the seed is obtained during the winter, it is as well to sow it in May or June, planting the seedlings, when strong enough, where they are to flower. Seedlings when planted out require exactly the same treatment as the named varieties.

In hot, dry seasons, the leaves of Hollyhocks become much damaged by red spider, which attacks the under-sides of the leaves. The best way to destroy it is to syringe freely, directing the water to the under-sides of the leaves. This may be done frequently by the use of clean rain-water, and the mechanical action of the water will dislodge the pest. Tobacco-water effectually destroys it.

I might give a list of names of the best Hollyhocks, but most of the named sorts of a few years back seem to have gone out of cultivation. In the "Appendix," however, some of the best and most recent varieties are enumerated.



VIOLA TRICOLOR.



4.—*On.* =
= *Roses.*

BY ALAN WYNNE
AND W. D. DRURY.

IN the whole of the Floral World there is no plant so widely grown and so much admired as the Rose, which justly merits the title of "Queen of Flowers" bestowed upon it. No garden is complete without it, and its character is so accommodating that in hot or cold positions, and in all sorts of soils, some of the many species and varieties will thrive and produce fragrant and beautiful flowers. Quite a mass of literature has been published on this favourite flower; but here it is only intended to deal with the most prominent and useful kinds, describing, concisely, their culture, and the purposes for which they are most suitable.

CULTIVATION OUTSIDE.—Propagation is effected by means of seeds, cuttings, and budding; while, occasionally, grafting is practised; but the first-named methods are the best and most trustworthy.

Seeds.—Not only are stocks raised from seed, but likewise many of the hardy and common kinds, like *Rosa rugosa*. New varieties, in many instances, have originated from seedlings, and by careful hybridising much more will probably be done to introduce further sterling sorts. Birds are particularly fond of the hips, and as these must be quite ripe to obtain good seed, it will, in some districts, be necessary to cover the bushes with nets to protect them. Immediately the seeds are ripe they should be sown in pans or boxes that are well-drained and filled with a light, rich, sandy soil, covering them lightly with compost, giving a good watering, and placing the pans or boxes in a gentle heat. At one time germination will quickly

follow ; at another it may be months before it takes place, and therefore in such cases it is advisable not to be in any hurry to throw away the contents of the boxes. In the spring, the seedlings may either be planted out in nursery-beds, about 12in. apart, or potted separately into "sixties," and afterwards potted on as often as may prove necessary, to be finally planted out in October.

Cuttings.—All Roses root freely from cuttings if put in at the proper season, and the most certain and best time is when the wood is about half-ripened. Young wood of this description, about 5in. or 6in. in length, and with only the lowest leaf removed, put in firm, sandy soil, 2in. or 3in. deep, in a close frame or hand-light, and kept shaded from the sun, will root very quickly, and make nice plants before winter. Another mode is to put the cuttings in a house or frame with a nice bottom-heat, keeping them moist and shaded. These form roots more rapidly than those put in a cold close frame or hand-light. When the rooting process is completed air should be admitted and gradually increased until the plants will bear full exposure. If the plants are wanted for forcing purposes, they should be potted, and grown on vigorously for a year or so ; their strength will thus be increased, and a moderate supply of fine flowers will be produced. Another method is to put in cuttings in October, or immediately after all the foliage has fallen, placing them in firm, sandy soil, in a shady position, and covering with a frame or hand-light. These cuttings may be 6in. or 8in. long, and inserted about half their length, and, unless the winter is exceptionally severe, a good proportion will grow and form roots in the following spring.

Stocks.—Very much in favour of the Rose on its own roots could be said, as, for instance, the absence of suckers, and the growth from below the surface after all wood above the soil has been killed by a severe winter ; but as the process is too slow in many cases, and not always the best in others, a consideration of what really are the best stocks may be useful. Where vigour is required there is no question that the seedling Briar, or common Dog Rose, is the best, and many nurserymen now largely employ this stock, alike for standard, half-standard, climbing, and bush Roses. In the winter months, men collect stout, vigorous Briars, of suitable growth, from the hedgerows, and sell the stocks thus obtained to nurserymen. These are planted in good ground, and budded the following season. As

a rule, those stocks with the largest thorns and hooked downwards are the best, making the most vigorous growth, and bearing the finest flowers; and further, they have the longest life. Some of the Briar stocks are covered with a multitude of short, sharp prickles; these are seldom satisfactory for many years, and do not produce good flowers, or very many in quantity.

For dwarf plants, to be grown in beds out in the open, or in pots or beds under glass, there is considerable difference of opinion as to whether the Briar or the Manetti is the better stock. After many years' trials of the two kinds, both under glass and outside, it has been forced upon us that the Briar is the better, producing more vigorous and floriferous plants, as well as cleaner and finer flowers than plants similar in age and treatment worked upon the Manetti. In winters of extraordinary severity the Briar is much hardier, and is rarely killed outright, while whole beds on the Manetti have been absolutely destroyed. No doubt some few varieties do succeed better on the Manetti, but, as a general rule, the Briar, or common Dog Rose, particularly if seedling Briars, is the best stock for Roses generally, in whatever form they may be grown and cultivated.

Budding.—This interesting operation should be performed at the end of June, or as early in July as possible, when the bark will lift readily, or “run” from the wood. A very good test is to try if the prickles will break off freely without pulling away any of the bark; if so, the bark, as a rule, will be raised easily from the wood. The same rule also applies to the wood and bark of the Rose from which the bud is taken. The bud should be plump, and the wood fairly hard and mature. With a sharp knife cut out the shoot, with about $\frac{1}{2}$ in. of bark above and below the bud (Fig. 46, A), and not quite half-way through; then gently detach or draw out the wood from the bark (Fig. 46, B), and insert at once on the stock in a T-shaped cut under the bark, tying it firmly with raffia or matting to bind the bark of the stock over that of the bud. Showery weather is the best for all budding operations, as not only is there a full flow of sap, feeding the bud and keeping it plump, but the shade more or less present in such weather is

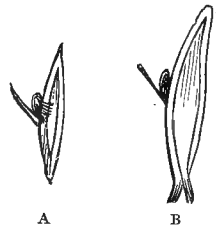


FIG. 46.—A, BUD WITH WOOD INTACT; B, BUD WITH WOOD REMOVED.

far more favourable to a union than hot, dry weather and blazing sun-heat. If the buds begin to grow and form shoots, the ties should be loosened to allow of the natural swelling that is taking place; but if the bud does not start, the ties need not be interfered with.

Other methods of propagation are by layers, by division, and by suckers, but neither of these can be recommended.

SOIL.—Although the Rose will grow practically everywhere, good drainage is essential to get really healthy plants and the best results; therefore, if the soil is not porous, or is water-logged, the defects should be remedied by the addition of sand, road-scrapings, or similar material, while drains ought to be put in to carry away any excess of water at the roots. A good, rich, and rather heavy loamy soil is excellent for all classes of Roses, but, unfortunately, such ground is far from being always available; consequently, the best use must be made of the soil at hand. If the soil is naturally sandy or gravelly, and quickly parts with moisture, the addition of clay or marl, and manuring with cow-dung, will prove highly beneficial. On the other hand, if it is very heavy and tenacious, strawy-manure and other ingredients that will make the soil more open in texture is advisable, trenching the ground 2ft. deep when adding the above. This should be done some little time before planting, viz., in August or September, and the planting should be completed by the middle or end of October. If Roses are planted at the time mentioned, they root at once, and become semi-established, bearing a good crop of fine flowers the following year; the only exception is in very cold exposed positions or situations. Tea and Hybrid Tea Roses should not be planted in October, but at the end of February. If planted at the first-named season, and a hard winter follows, they would most probably succumb to the frost, and the cost and labour of planting would be wasted. If the soil is good, and has been manured well some time prior to planting, no manure should be placed with the soil that comes in direct contact with the roots; but if the ground is hungry and poor, and has not been enriched for some time, a little thoroughly-decayed manure mixed with the soil is beneficial. On no account should raw fresh manure be mixed therewith when planting, or come into contact with roots, as it would act like poison to them. If the planting is done in the autumn or early spring, a mulch of strawy-manure is always advisable, as it acts as a protection against frost in winter and drought in

summer; it also acts as a gentle fertiliser, and encourages the roots to keep near the surface.

MANURES.—The question of manures is a somewhat vexed one, but all good growers acknowledge that one must be guided by the soil and the situation. On light soils of all kinds it will be found that basic slag, at the rate of 2oz. to the square yard, is not only fertilizing, but also renders the soil denser and more holding in character. The effect is not so apparent in the first as in the second year, and for that reason it is advisable to apply a dressing immediately the planting is done. Another very fine manure for Roses on both heavy and light soils is 2oz. of superphosphate to each square yard, applied at the end of March. This manure produces a sturdy, floriferous growth, with much substance in the flowers. If the soil is very light, muriate of potash may be added, at the rate of $\frac{1}{2}$ oz. to each 2oz. of superphosphate. On sandy soils resting on gravel, kainit is excellent if applied at the end of April or early in May, at the rate of 2oz. to 3oz. per square yard; this manure not only fertilises, but also retains moisture in the soil all through the summer months. On heavy soils few manures are equal to a liberal application of fine bone-meal, say at the rate of 3oz. to each square yard, and very lightly pricking this in with a fork early in April, or immediately after the Roses have all been pruned.

Farmyard manure is well known as a complete plant-food, especially if it is from different kinds of animals, and is all mixed together in a heap, where it is not exposed to the action of the weather. A mulch of this applied about 3in. thick just after pruning is of great value, not only for the food supplied, but also for conserving moisture during the hot summer months. Liquid manure in a diluted form is one of the finest stimulants to Roses, especially for the production of exhibition flowers, but sewage is not so beneficial, being apt to induce mildew and other evils. A good pure guano (using 1oz. to each square yard of surface) is also of immense service in developing fine blossoms for exhibition or in giving a great crop; but, like all concentrated manures, it must be used with caution, and not allowed to fall on the shoots or foliage, or burning will follow.

ARRANGEMENT.—Although Roses are such universal favourites, and excite more admiration than any other hardy flower, we frequently see them planted with an utter disregard to

effect or suitable position. One of the commonest mistakes is planting Roses in beds mixed with trees or shrubs; in most cases the more delicate Rose simply drags out a miserable existence. The old vigorous climbing Roses do succeed admirably amongst shrubs, but to expect Hybrid Perpetuals, Teas, and some of the dwarf-growing ones to answer is not quite reasonable.

Another mistake is overcrowding both dwarfs and standards, an error frequently fallen into by amateurs. They may appear to have plenty of space at the time of planting, but in the course of a year or so it is found that the growth is very congested and interlaced, when it is impossible for it to get properly matured; and if a hard winter follows, the major part of the plants are killed. Insect pests and fungoid attacks are also encouraged by thick planting, and are, moreover, extremely difficult to eradicate under such conditions.

In many gardens there is a border with a background consisting of a wall, fence, or living hedge, and, providing the border is of fair width, say 6ft. to 10ft., nothing could be better for producing a fine effect. If a wall is at the back, fruit-trees can be grown thereon in the usual manner, and about 3ft. from the wall can be planted climbing Roses, trained up rustic stakes, at a distance of 10ft. to 15ft. apart, selecting such varieties as Crimson Rambler, Fortune's Yellow (Syn. Beauty of Glazenwood), the Dawson Rose, a vigorous variety bearing great bunches of pink flowers, Alister Stella Gray, a charming yellow variety and an abundant blossomer, and Thalia, a lovely white Rose. All these do famously on poles or long stakes. If more varieties are required, almost any of the climbing sorts will answer. Between these climbing Roses tall standards may be planted, and if these have somewhat weeping heads, they will present a lovely appearance when in blossom. Most of the moderate-growing climbing varieties lend themselves admirably to this method of culture, and flower profusely. The back row being thus composed of tall plants, the next row may be made of half-standards and the more vigorous-growing varieties in bush form, planting them alternately at a distance of 4ft. apart, with a judicious arrangement as to colour, and selecting those that are well known to be free-flowering amongst Hybrid Perpetuals, Hybrid Teas, and strong-growing Teas. The front of the border can be filled with a good selection of dwarf Teas and Hybrid Perpetuals, and

if, as stated, the colours of the flowers are nicely blended, such a border will prove one of the entrancing features of the garden, affording a continuous succession of flowers from early summer until late autumn; in fact, Roses will be to the fore until the end of October, or early in November in many seasons.

Where a large border similar to the above is out of the question, and beds on grass have to be relied upon, there is nearly always the risk of overcrowding, because, as the space is so limited, an attempt is usually made to get in as many fine varieties as possible, and thus overdo it. In every such case it is advisable to put in the plants not closer than 3ft. apart each way, allowing each 18in. from the side of the bed or verge. Unless the varieties are very vigorous, this will not make a very crowded bed.

Magnificent effects are produced by planting strong-growing sorts like Gloire de Dijon, Mrs. Paul, Cheshunt Hybrid, Climbing Souvenir de la Malmaison, W. A. Richardson, Celine Forestier, Crimson Rambler, and many others. If these are allowed to make long shoots, and in the spring the beds are liberally manured, and the shoots pegged down their full length or nearly so, they will throw out growths at almost every eye the whole length of the stems, and produce a really splendid mass of colour. The beds may be all of one colour, which seems most popular in many gardens, or they can be arranged to afford a combination of colour. In the latter case care must be exercised in pegging down the shoots, so that when in flower the colours produce the desired effect. A little carelessness in the pegging-down of the shoots will mar what would otherwise be a really glorious appearance when in full blossom.

Arches or arcades of Roses in gardens have a charm that has found more favour in the past than at present. The covering of arbours with Roses was far commoner years ago, and the plan might very well be adopted again now. In the hot summer months these Rose-covered arches or arbours are delightful, and one of the most frequented parts of the garden. That capital variety, Crimson Rambler, is a gem for such positions, as it revels in places where the air can play freely all round it. Aimée Vibert and Reve d'Or are also excellent arch Roses, and there are many others.

In case any of the varieties of Teas are thought to be tender, and unable to stand the rigour of our winters, common bracken

fern tied in the heads of standards early in winter, and removed in spring, will afford the needed protection. With dwarfs it should be thrown lightly on the plants, but removed in mild weather, if it is seen that growth is commencing prematurely.

CULTIVATION UNDER GLASS.—The forcing or cultivation of Roses under glass for market is now become an important industry, and in most large establishments they are grown more or less extensively either in pots or in prepared borders. In the latter case they are usually trained up over the roof. By the aid of good, light, well-heated houses, and a sufficiently large stock of plants, it is by no means difficult to have choice Tea and Hybrid Tea Roses all through the winter months. Hybrid Perpetuals are very much more difficult to get in flowering condition in mid-winter, and it is seldom worth the trouble to try to obtain blossom from them before the beginning of March.

When purchasing Roses in pots with a view to forcing, it is always the more economical and satisfactory plan to buy strong plants early in September. If the pots they are in are full of roots, they can be potted on at once into a little larger size. In fact, it is always best to do any repotting in the early autumn: the plants not only take possession of the new compost at once, but start much stronger and more freely into growth than is the case with plants potted immediately before forcing is commenced, and more and finer flowers are produced. A very suitable compost is three parts good fibrous loam and one part well-decayed manure, with a 6in. pot-full of bone-meal added to each barrow-load of compost. The drainage must be free and open, and the soil made fairly firm when potting: if rammed too hard the growth is somewhat stunted, and if potted too loosely the evil is just as much the other way; therefore, the happy medium should be aimed at. In bright weather a syringing overhead will be of considerable benefit in assisting root-action after potting. Watering, again, plays a very important part in Rose-growing: care must always be taken to not over-water the plants; at the same time they must not be allowed to suffer for want of moisture. Neglect or carelessness in these matters is sure to end in failure.

In starting to force the Rose, the temperature should not be more than 50deg. to commence with, falling 5deg. at night. As growth is made, the temperature should be gradually raised to

about 65deg. or so, ventilating when the wind and weather are favourable. Weak liquid manure is beneficial once or twice a week during the period of growth, and all very weak or useless wood is best cut clean out, thus throwing more energy into the strong flowering shoots.

The pruning of Tea Roses inside differs from that of the same varieties grown outside; the former should not be severely pruned or cut back hard, but all strong, vigorous growths left nearly their full length, and all weak wood entirely cut out. If the growth is regulated while growing, very little pruning, however, will be necessary, beyond the shortening back of strong shoots. When the plants are grown in pots, they should be placed outside in May, and very carefully watered and otherwise looked after; the wood will thus be thoroughly matured, and, when required for forcing again, such trees will respond by making a healthy and strong start into growth, followed by a profusion of large and beautifully-formed flowers.

Tea Roses (*Rosa indica odorata*).

These richly-scented and lovely flowers are justly appreciated wherever grown, and, fortunately, are more fully understood, and more extensively planted, than they have been in the not very distant past. They were first introduced from China in 1810, and termed Tea Roses, by reason of their tea scent. For convenience, the class may be divided into two sections, Dwarf and Climbing, the Hybrid Tea class being dealt with under a separate heading.

Taking the Dwarf section first, we have some glorious varieties for either planting in beds or forcing under glass. When planted in beds, pruning should be hard, *i.e.*, the young shoots ought to be cut down nearly to their base about the end of March or early in April, and the beds mulched with some good farmyard manure. No further attention will be necessary beyond keeping down insect and fungoid pests, and the removal of decayed flowers. Attention to these points will ensure a continuance of blossom from early in June to the end of October. Early in November, the centre of the plants ought to be covered with cocoa-nut fibre to the depth of 6in. The material will serve to protect the heart from injury, by frost, though all growths above the covering material may be killed. This protecting material should not be removed until the time arrives for pruning, as late frosts of sufficient severity may

come that would seriously cripple, if not kill, the parts that had been protected all the winter.

If very fine flowers for exhibition are required, the buds must be thinned to one flower on each shoot, and all very weak wood cut out. Extra fine blossoms are thus obtained, but if quantity of flower is desired, there is no necessity to thin the buds.

In the following list of varieties, a brief description of the merits of each is noted, not only as regards the colour of the flower, but also as to habit, suitability for bedding, and other pur-



FIG. 47.—ROSE CATHERINE MERMET.

poses. *Alba Rosea* (Syn. *Madame Bravy*), flowers white, with pink centre; moderate vigour. *Andre Schwartz*, red; the plant forces well, and is very vigorous. *Anna Olivier*, beautiful flesh colour; fine habit; excellent for beds or exhibition. *Bridesmaid*, deep

pink ; a magnificent variety for all purposes ; very vigorous. Catherine Mermet (Fig. 47), soft rose ; one of the very best ; a free and strong grower. Comtesse de Nadaillac, flesh colour, blended with apricot-yellow ; large and fine form, and sturdy growth. Devoniensis, white, shaded with yellow ; fine form, and suitable for all purposes. Dr. Grill, rose, shaded with bronze ; a splendid variety for bedding. Elise Fugier, lemon-white ; very pretty ; good for forcing, bedding, and exhibition. Ernest Metz, salmon-pink ; a grand flower, and the plant of good habit. Ethel Brownlow, salmon-pink ; vigorous grower, and very floriferous. Etoile de Lyon, sulphur-yellow ; excellent for beds or pots. François Dubreuil ; this is considered the best crimson Tea in cultivation. Francisca Kruger, bronzy-yellow ; a very fine variety for either indoors or outside. Golden Gate, pale orange ; good form ; effective for beds. Hon.

Edith Gifford, white, tinted with pink ; splendid variety in all respects. Innocente Pirola, light fawn ; beautiful flower ; of vigorous habit. Jean Ducher, yellow ; large blossoms of good shape ; fine for beds or forcing. Madame Hoste, pale lemon ; remarkably free flowering, and of good habit. Marie Van Houtte (Fig. 48), yellowish-white, tinted with rose ; a large and lovely variety ; vigorous. Niphetos (Fig. 49), a splendid white of fine form ; it forces well, and is one of the best for growing under glass. Perle des Jardins, canary-yellow ; a very fine flower, of sturdy habit. Souvenir de S. A. Prince, pure white ; a large, massive flower, and an excellent grower. White Perle, white ; very floriferous, and excellent for bedding.



FIG. 48.—ROSE MARIE VAN HOUTTE.

Climbing Tea Roses.

In every garden these are almost always found in some form or other; their suitability for training against walls, up pillars, over arches, and also up the roofs of glass-houses, and for other purposes, has given them a position from which it is improbable that they will ever be displaced. Occasionally complaints are heard that climbing Tea Roses which have been planted against the walls of a house refuse to grow. In the majority of instances this is caused by the projecting eaves of the house throwing off all moisture, the roots thus becoming almost dust-dry. In such cases copious supplies of water should be

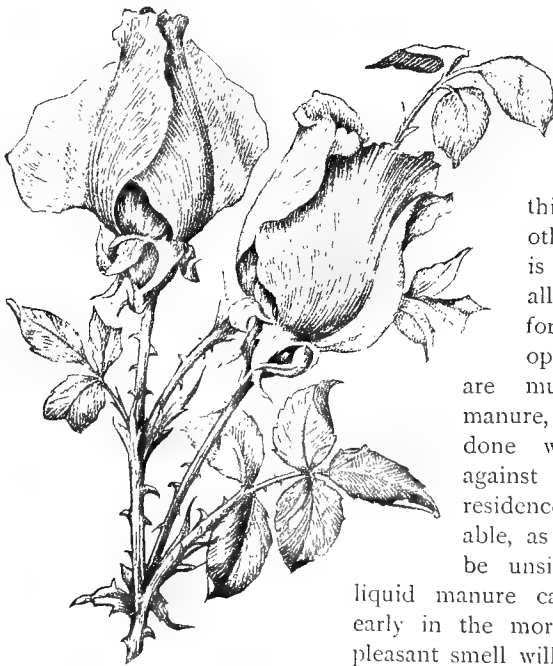


FIG. 49.—ROSE NIPHETOS.

given during the summer months, until the roots have extended sufficiently wide to be able to dispense with this assistance. Another cause of failure is the exhaustion of all plant-food available for the roots. In the open beds the plants are mulched with rich manure, but this is rarely done with trees trained against the walls of a residence, nor is it desirable, as the manure would be unsightly; but diluted liquid manure can be given freely early in the morning, and any unpleasant smell will have passed away before the family are about. A very good manure, devoid of all objectionable smell, is 20z. of superphosphate, 20z. of fine bone-meal, and 10z. of nitrate of soda, applied early in May, to each square yard; this will act beneficially on both growth and flowers.

With climbing Tea Roses, hard pruning is not advisable; all the strong, vigorous shoots should be allowed to remain nearly

their full length, and if bent in the form of an arch every bud will start into growth, and produce one or more flowers. All weak wood should be cut out, and any congestion of growth prevented by so arranging the wood that each shoot has room for proper development.

The varieties enumerated here are a few of the best, and are practically sure to give satisfaction wherever planted. Belle Lyonnaise (Fig. 50), deep lemon; a free and vigorous grower. Climbing Devoniensis, white; a very strong grower; excellent. Climbing Niphetos, pure white; a rampant grower; a great acquisition. Dr. Rouges, deep red; pretty in the bud state; of vigorous habit. Gloire de Dijon, yellow, shaded with copper; an old favourite, and still one of the best. Henriette de Beauvau, yellow; very floriferous, and of free habit. Madame Berard (Fig. 51), pale salmon; a grand late season variety. Monsieur Desir, crimson-red; well worthy of a place for its colour; vigorous.



FIG. 50.—ROSE BELLE LYONNAISE.

Hybrid Tea-scented Roses.

This section might be termed a new one. It has been evolved by crossing the Tea and Hybrid Perpetual Roses, and a magnificent and valuable class has resulted. In some cases the progeny have a preponderance of Tea character and perfume, and in others the Hybrid Perpetual parentage is more marked; but in all the varieties there is considerable merit, the majority being hardy, robust, and floriferous. Planting may be done in October, as already advised, but it is safer to defer it until February, and the trees should be mulched to promote good health and vigour. Pruning will depend to some extent on the

variety. For instance, Cheshunt Hybrid, being a climber, should not be pruned much, but be treated as climbers usually are; while such a variety as La France (now classed in this section) may be cut back rather severely if very large blossoms are desired.



FIG. 51.—ROSE MADAME BERARD.

Some of the finest bedding Roses are included in this class, and though some of the varieties have loose open flowers when fully expanded, they are so handsome in the bud state, and produce such a great quantity of flowers, that the beds are really

a very attractive feature in the garden. If planted in separate or mixed beds, 2ft. each way between the plants will prove a suitable distance, taking care to have the tallest-growing varieties in the centre of the bed, and the dwarfer ones at the margins. This not only makes it easier to get at the plants, but also shows off their beauty better than if a tall plant is growing in front of a dwarf one.

There are a comparatively large number of varieties, and the following are a few that can be strongly recommended: Belle Siebriecht (Syn. Mrs. W. J. Grant), rosy-pink; fine form; hardy and free. Camoens, clear rose; fine for beds, or useful as a bush. Captain Christy, flesh colour; very large, hardy, vigorous, and a good bedder. Caroline Testout, rosy-salmon; of fine form; large and floriferous. Cheshunt Hybrid, cherry-carmine; climbing; excellent for screens or pillars. Climbing Captain Christy; a very vigorous and hardy form of Captain Christy. Climbing Kaiserin Augusta Victoria, white; a splendid variety that promises to be a great acquisition to the climbing



FIG. 52.—ROSE LA FRANCE.

Roses. Danmark and Duchess of Albany are two distinct forms of La France, the former being remarkably dwarf, and the latter darker in colour. Grace Darling, white, shaded with rose; a magnificent variety for bedding, and very floriferous. Grand Duc de Luxemburg, bright pink; this is another fine Rose for bedding, being free, hardy, and vigorous. Kaiserin Augusta Victoria, white; a splendid flower; free and good. La France (Fig. 52),

soft pink ; a well known and indispensable favourite. Madame Pernet Ducher, yellow, tinged with a darker shade ; this variety will become popular for bedding ; vigorous habit. Marquise de Salisbury, red semi-double flowers ; a useful bedding variety. Reine Marie Henriette, deep carmine, buds long, pointed, and handsome ; a valuable climbing variety. Souvenir de Madame Eugene Verdier and Souvenir de Madame Carnot are two creamy-white flowered varieties of exceptional merit, and worthy of a place in every garden, being vigorous, hardy, and free-flowering.

Exhibition Roses.

With Roses for exhibition a good soil suitable for the growth of the plants in a vigorous state is essential ; if the land is naturally unsuitable it must be improved. A good sound loamy soil, rather heavy in character, is admirable, if well drained, for all classes ; but for Teas the soil may with advantage be made somewhat lighter. Again, the situation ought to be quite open, and fully exposed to the benefits of solar influences. It should be also far enough away from large forest trees to prevent shading, or robbery of plant-food by the roots of such. If planted within reach of these, their roots take possession of the bed or soil prepared for the Roses, and rapidly absorb the elements of plant-food to the detriment of the Roses, while any manures applied afterwards are simply wasted, as the roots of the trees quickly seize it, and aggravate the evil.

There are various opinions as to the best stocks for the production of exhibition Roses ; the general one seems decidedly in favour of the seedling briar for all sections. The Manetti is very suitable for a few varieties, as for instance, vigorous-growing sorts in the Hybrid Perpetual section, and also for a few of the Hybrid Teas. In the former section may be included the following, as succeeding well on the Manetti when budded below the ground level : Abel Carriere, Annie Wood, Baroness Rothschild, Beauty of Waltham, Centifolia Rosea, Countess of Rosebery, Duchess de Morny, Duke of Connaught, Etienne Levet, François Michelon, John Hopper, Madame Victor Verdier, Pride of Waltham, Senateur Vaisse, Ulrich Brunner, and Violette Bowyer. Amongst Hybrid Teas that answer on the Manetti are : Camoens, Captain Christy, Cheshunt Hybrid, Clara Watson, Grace Darling, La France, and Viscountess Folkestone. Most of the Rose specialists in the trade sell the varieties on the

particular stock on which they succeed best, experience having taught them which varieties require a particular stock.

To have flowers up to exhibition form young plants are essential. These should be free in growth, clean, and judiciously fed when the buds are formed, to give size of flower and petal, with good substance and perfect colour. Diluted liquid manure from the farm-yard, or 10z. of good guano dissolved in 1gall. of water, has an immediate beneficial influence. Should the weather be showery, 10z. of guano and 10z. of superphosphate, applied to each square yard, will quickly give assistance to the plants. 10z. of sulphate of ammonia dissolved in 2galls. of water aids materially in giving a good colour to the foliage and flower; but over-feeding must be avoided. Once a week will be often enough to apply any one of the above manures, which should be varied weekly. The early thinning of the buds is also of much importance. All buds, except one on each shoot, should be removed, retaining only the finest. It is a waste of energy and power to allow the flower-buds to swell to say half their normal size, and then cut away the surplus ones. To some extent it must reduce in quality the bud left; it may be only a little, but when competition is close a very slight superiority in size and colour will give the winning points.

All the most successful exhibitors pay the strictest attention to detail in culture and management, and also exercise good taste in the arrangement of colour, &c., when staging the blossoms. A flower to be fit for exhibition should possess size, perfect form, rich colour, and be quite fresh. A flower that is somewhat stale in colour, has damaged petals, or an open eye, is a great source of weakness in any stand. A few such in a really good collection mar its appearance, and greatly minimise the exhibitor's chance of winning a prize. Much again depends upon the time of cutting the flowers for exhibition. The early morning is by far the best time, as the flowers are then fresh, moist, and keep their shape and beauty considerably longer than if cut in the middle or afternoon of the day, as the petals are then liable to expand, and the flower often becomes loose after cutting. An excellent plan, adopted by many growers and exhibitors to keep the flowers fresh and good in form, is, immediately they are cut, to tie a soft piece of worsted or wool carefully round the flower-bud. This band or tie should not be tight, but simply passed once, or perhaps twice, round to keep the petals together and prevent further expansion

of the flower. Such ties remain until the last moment before leaving the exhibit for the judges. If tied with a loop, a large stand can be cleared of the ties in a few minutes. It need scarcely be stated that the flowers should have their stems placed in water at once after cutting, and be kept as cool as possible; and when at the exhibition tent or hall the coolest spot available should be chosen to give the final touches up. Good taste in the arrangement of the colours and the setting up of the flowers always carries weight with the judges, and if the stand cannot be covered with nice green moss, it should be painted a pleasing green; but moss always is best if clean, fresh, and green. If the flowers are cut with long stems and good foliage, they appear to much greater advantage than if dumped down close to the stand. When raised a few inches the size and symmetry of the flower are fully seen and appreciated by the judges, whereas a flower close to the board has much of its beauty and form hidden.

The undermentioned varieties are excellent for exhibition, and are those most frequently seen in prize-winning stands.

HYBRID PERPETUALS.

- | | |
|--|---|
| Alfred Colomb (Syn. Marshal P. Wilder), rich carmine-red. | Fisher Holmes, bright scarlet. |
| A. K. Williams, bright reddish-crimson. | François Michelin, silvery-rose. |
| Abel Carriere, deep dark maroon. | General Jacqueminot, brilliant velvety-red. |
| Baroness Rothschild, light pink or flesh colour (Fig. 53). | Gustave Piganeau, rosy-crimson. |
| Beauty of Waltham, rich rosy-crimson. | Her Majesty, flesh colour; a shy bloomer. |
| Captain Hayward, bright carmine-crimson. | Jeannie Dickson, rosy-pink. |
| Camille Bernardin, light crimson. | John Hopper, rich rosy-crimson. |
| Charles Darwin, rich bronzy-crimson. | Le Havre, vermilion-red. |
| Charles Lefebvre, brilliant red, shaded with purple. | Madame Eugene Verdier, light silvery-rose. |
| Comte de Raimbaud, splendid crimson. | Madame Gabriel Luizet, silvery-pink. |
| Comtesse d'Oxford, fine carmine-red. | Marchioness of Dufferin, rosy-pink. |
| Countess of Rosebery, soft carmine-rose. | Marchioness of Londonderry, ivory-white. |
| Dr. Andry, bright red. | Marie Baumann, crimson-red. |
| Dr. Hogg, deep violet. | Mrs. John Laing, beautiful soft pink. |
| Duchess de Morny, silvery-rose. | Margaret Dickson, splendid white. |
| Duke of Connaught, rich velvety-crimson. | Paul Neron, deep rose; immense size. |
| Duke of Edinburgh, brilliant vermilion. | Prince Camille de Rohan, dark crimson-maroon. |
| Duke of Teck, light crimson. | Senateur Vaisse, deep red. |
| Duke of Wellington, vivid crimson. | Star of Waltham, rich carmine. |
| Dupuy Jamain, rich cherry-rose. | Suzanne M. Rodocanachi, silvery-rose. |
| Earl of Dufferin, velvety crimson. | Ulrich Brunner, cherry-crimson. |
| Etienne Levet, pale carmine-red. | Victor Hugo, crimson red. |
| E. Y. Teas, rosy-crimson. | Victor Verdier, cherry-rose. |
| | Violette Bowyer, white; a fine variety. |
| | White Baroness, pure white. |

HYBRID TEA-SCENTED ROSES.

| | |
|---|---|
| Belle Siebriecht (Syn. Mrs. W. J. Grant), rich rosy-pink. | La France, silvery-rose (Fig. 52). |
| Captain Christy, light salmon-flesh. | Madame J. Finger, creamy-white. |
| Caroline Testout, lovely rosy-salmon. | Marquis Litta, rosy-carmine. |
| Kaiserin Augusta Victoria, white; a splendid acquisition. | Mrs. C. Whitney, deep pink. |
| Lady Mary Fitzwilliam, rosy-pink; a rather weak grower. | Pink Rover, beautiful pale pink. |
| | Souvenir de President Carnot, creamy-white. |
| | Viscountess Folkestone, silvery-pink. |

TEA ROSES FOR EXHIBITION.

| | |
|--|---|
| Bridesmaid, pink; an improved Catherine Mermet. | Jean Ducher, pale salmon. |
| Caroline Kuster (Noisette), lemon-yellow. | Jules Finger, silvery-rose. |
| Catherine Mermet, pale flesh colour; one of the very best (Fig. 47). | Madame Cousin, rosy-purple. |
| Cleopatra, pale pink. | Madame Hoste, creamy-white. |
| Comtesse de Nadaillac, rich flesh colour. | Maman Cochet, pink, shaded with yellow. |
| Devoniensis, white, faintly tinged with yellow. | Marie Van Houtte, creamy-white (Fig. 48). |
| Elise Fugier, lemon-white. | Muriel Grahame, pale cream, flushed with rose. |
| Ernest Metz, salmon-pink. | Niphetos, beautiful white (Fig. 49). |
| Ethel Brownlow, salmon-pink. | Perle des Jardins, rich straw colour. |
| Etoile de Lyon, sulphur-yellow. | Souvenir de Gabrielle Drevet, whitish-salmon. |
| Francisca Kruger, bronzy-yellow. | Souvenir d'un Ami, salmon-rose. |
| Hon. Edith Gifford, white, lightly tinged with rose. | Souvenir de S. A. Prince, grand pure white. |
| Innocente Pirola, pale fawn. | The Bride, a white sport from Catherine Mermet. |

Banksian Roses (*Rosa Banksia*).

These distinct Roses were introduced from China early in this century, and named after Lady Banks. As a class they are strong-growing, but not quite hardy in the north. They are semi-evergreen in mild winters.

Good plants of Banksian Roses are always much admired, but unless the situation is warm, and the soil well drained, they are not a success. Given these conditions, however, and planted in March, they will make rapid growth, and in three or four years prove all that could be desired. The Yellow or Lutea variety is the most free blossoming, and is probably much the best of the few varieties known. The White or Alba variety is equally as free and vigorous as the Yellow one, but it seldom, if ever, blossoms so profusely. Very little pruning is necessary; the weak wood, exhausted flowering shoots, and any unripened wood are all that need be removed. When once the plants are established, liquid manure, diluted, given during dry weather, is beneficial, taking care to thoroughly saturate the soil for some considerable depth and width, as mere driblets do more harm than good.

Hybrid Perpetual Roses.

There is no record of the origin of this class, but it seems certain that it originated by hybridising several species or strains, followed by careful selection. The name "Perpetual" was given because of their blossoming all through the summer.

Opinions differ, and probably will continue to differ, as to the best form in which to grow these brilliant Roses—standards, half-standards, or bush. All have strong advocates, and grow high-class flowers. The half-standard is perhaps the best for general purposes, being easy to examine, vigorous, and sufficiently high to prevent splashing of the blossoms by heavy storms. Some of the varieties are excellent for growing in bush form, and if planted widely apart, the long shoots, instead of being cut or pruned hard, may be left almost their full length,



FIG. 53.—ROSE BARONESS ROTHSCHILD.

and pegged down to the soil. In this way a mass of flower is obtained, and although the blossoms are not of exhibition form, they are first-rate for garden decoration or cutting. Standards and half-standards must be rather severely pruned, not only to keep the heads within reasonable bounds, but also to ensure really fine blossoms. In the first place, all weak wood or shoots that cross each other or grow towards the centre ought to be cut out: such wood obstructs light and makes the head a tangled mass. Two or more buds may be left at the base of each shoot when pruning,

according to variety, as, for instance, weak-growing ones should be cut in hard to cause them to grow more vigorously, but very strong growers may with advantage be left longer, and

pruned to the first bold bud nearest the base of each shoot. With bushes, the shoots, if desired, can be left their full length and pegged down as mentioned above, or pruned in much the same manner as advised for Tea Roses.

All the best trade growers of Roses work the varieties on the stocks most suited to each, and therefore that question is settled for the purchaser when he buys his stock; and as the varieties are so very numerous, only a few comparatively of those



FIG. 54.—ROSE CLÉO.

(From a Photograph by Richmond & Peto, Lustleigh, S. Devon.)

of known merit are named here, and, unless otherwise noted, are all of vigorous growth. A more extended list is to be found in the "Appendix."

Abel Carriere, deep maroon; large, and of good form. Alfred Colomb, carmine-red; a grand old variety, of perfect form. A. K. Williams, rich light crimson; one of the finest of this class. Baroness Rothschild (Fig. 53), rosy-pink; a large flower, freely produced. Charles Gater, crimson-rose; large; flowers very freely. Charles Lefebvre, bright red, shaded with purple;

a splendid old variety. Clio, flesh colour, shaded with pink; flowers large and abundantly produced (Fig. 54). Comtesse de Paris, soft rose, shading to white; of fine form and pretty. Comte Raimbaud, shining crimson; beautiful shape; excellent. Dr. Andry, bright red; of good shape; very floriferous. Duc d'Orleans, deep crimson; of good form; a promising new variety. Duchess de Morny, light rose; grand



FIG. 55.—ROSE GENERAL JACQUEMINOT.

form; an excellent old Rose. Duke of Connaught, velvety-crimson; perfect shape. Duke of Edinburgh, fine deep vermilion; an indispensable old variety. Duke of Teck, light-crimson; a large globular flower, of perfect shape. Emily Laxton, cherry-rose; very charming in the bud state. Fisher Holmes, deep scarlet; large, and of perfect shape. General Jacqueminot (Fig. 55), deep velvety-red; one of the best old varieties. Glory of Cheshunt, crimson; a splendid bedding Rose. Her Majesty, flesh colour; very large and fine; it is best on the Briar stock. John

Hopper, rosy-crimson, large; very free-flowering. Lady Sheffield, rosy-pink; a well-shaped and handsome variety. Madame Eugene Verdier, silvery-rose; perfect shape; a first-rate sort. Madame Hippolyte Jamain, white, tinged with pink; large and pretty. Madame Lacharme, pure white; pretty, and an abundant blossomer. Madame Norman Neruda, cherry-carmine; perfect shape, and nicely scented. Marchioness of Dufferin, rosy-pink; excellent form. Margaret Dickson, white;

a grand and well-shaped flower. Marie Baumann, crimson ; a splendidly-formed flower. Mrs. John Laing, soft pink ; a pleasing and beautiful Rose. Paul's Early Blush, blush-white, of good form, and a profuse blossomer (Fig. 56). Paul Neron,



FIG. 56.—ROSE PAUL'S EARLY BLUSH.

(From a Photograph by Richmond & Peto, Lustleigh, S. Devon.)

deep rose ; of good form ; one of the largest Roses. Pride of Reigate, crimson, with white stripes ; the H.P. striped form. Pierre Notting, intense dark red ; large, and of good form. Princess Mary of Cambridge, pale rose ; large, and

very free. Reynolds Hole (Fig. 57), deep maroon, flushed scarlet; very dark and distinct. Senateur Vaisse, bright red;



FIG. 57.—ROSE REYNOLDS HOLE.

an old Rose, difficult to excel. Ulrich Brunner, cherry-crimson; a magnificent flower, and very vigorous. Violette Bouyer, white; large globular flowers; free and good. Xavier Olibo, velvety-crimson; of good form, and a moderate grower.

Noisette Roses (*Rosa indica* *Noisettiana*).

The country of which *Rosa indica* is a native does not appear to be known, but *R. i. Noisettiana* is probably the result of crossing *R. indica* with *R. moschata*. Introduced into Europe from America by Mons. P. Noisette about 1820. The majority of the varieties have a delicious perfume, somewhat similar to that of the Tea Roses. The plants are nearly evergreen, and produce their flowers in clusters.

In this class are included some of our finest Roses, and some of the varieties are found in almost every garden of extent, flowering continuously in many instances all through the summer and autumn months. A few of the best known, like Maréchal Niel and W. Allen Richardson (Fig. 58), are sometimes termed unsatisfactory, but if the soil or border is well prepared, as already advised, and the plants are given a few good saturations at the roots during the summer, when planted against walls, they will, in the majority of instances, grow and flower profusely. None of these varieties should be severely pruned—merely taking out, in fact, the weak wood and exhausted pieces, and

training in the shoots nearly their full length. If pruned hard, although the growth may, and probably will, be rampant, flowers will be conspicuous by their small quantity. A few varieties answer well as standards, the heads being trained in a weeping or umbrella form. These are mentioned as making good standards; all the others should be trained against a wall or pillars: Adelina V. Morel, yellow; small, and produced in bunches; best as a



FIG. 58.—ROSE WILLIAM ALLEN RICHARDSON.

standard. Aimée Vibert, white; a perpetual blossoming variety; it makes a good screen. Celine Forestier, deep sulphur-yellow; splendid in all forms. Duchess of Mecklenberg, light yellow; flowers in large bunches. Lamarque, pure white; a grand Rose on a warm wall; tender otherwise. L'Idéal, yellow, shaded with bronze; beautiful; a good habit. Madame Pierre Cochet, apricot; a very pretty variety. Maréchal Niel (Fig. 59),



FIG. 59.—ROSE MARÉCHAL NIEL.

golden-yellow; this variety needs no recommendation. Rêve d'Or, deep yellow; a grand and hardy variety. W. Allen Richardson, deep orange; now a well-known favourite.

Bourbon Roses (*Rosa indica bourboniana*).

These Roses are very sweet-scented, and are remarkable for the second crop of flowers being the best. They are supposed to have resulted from a cross between *R. indica* and *R. gallica*, and are a remarkably free section of the Monthly Roses. Introduced from the Isle of Bourbon about 1825.

This is a pretty class, and if not pruned severely, the plants will flower most abundantly in the autumn. The following varieties can be recommended: Armosa, pink; this makes a bold effect if planted in a mass. Climbing Souvenir de la Malmaison, light flesh colour; very fine and free. Madame Isaac Pereire, light carmine; very pretty and a free grower. Mrs. Paul, rosy-peach colour; an excellent and beautiful variety; good grower. Souvenir de la Malmaison, flesh colour; large; a well-known popular variety.

Rosa Polyantha hybrida.

This belongs to the *Rosa multiflora* group, some sections of which are very dwarf, as in the present case, while others are tall climbers, as in the case of Crimson Rambler. The flowers are always small, and produced very continuously in large clusters.

These lovely little Roses are not so well known as they should be, or they would undoubtedly be widely planted or grown in pots, as they succeed admirably both under glass and outside, and their large trusses of small, graceful blossoms are very useful indeed where cut flowers are wanted. If in pots, a compost of four-fifths fibrous, rich loam and one part decayed manure, with a little bone-meal added, will grow them well; and if forced gradually—not given too much heat at first—and kept close to the glass, it is astonishing how admirably they grow and flower. Immediately a shoot has done flowering, whether inside or outside, it should be cut down nearly to its base; fresh growth will then be made, and another crop of flowers very shortly produced. In fact, by this plan several crops of blossom will be secured from the plants during the season. Another advantage the Roses of this section possess is their dwarf habit, 1ft. to 18in. being the average height of the plants when in flower, which renders them suitable for margins

of borders, or for planting by the sides of paths, where the flowers can be gathered easily. Generous treatment in manuring is greatly appreciated by these plants when once well established, though care must be taken not to overdo it by using either liquid or solid manure in a too powerful application.

All the following are charming varieties: Anna Marie de Montravel, white, sweetly-scented flowers, borne in large clusters. Blanche Rebatel, crimson, with white centre; very attractive. Camille de Rochetaille, pure white; lovely; an abundant blossomer. Clothilde Soupert, white, with pink centre; one of the very best. Etoile d'Or, lemon-yellow; distinct and pretty. Filius Straussheim, cream, changing to orange; free flowering. Georges Pernet, rosy-peach; fine for forcing or outside planting. Gloire des Polyantha, rose, shaded with white; a lovely variety; one of the best. Mignonette, rosy-pink; a really charming variety for all purposes. Paquerette, pure white; this is another very fine variety. Perle d'Or, yellow, shading to orange; a pretty variety.

Provence Roses (*Rosa centifolia*).

Probably one of the oldest class of Roses, and found in quantity in many gardens, where they make a good display in June and July. Introduced about 1596. The term "Cabbage Rose" is applied because of the supposed similarity of form the petals of the flowers bear to the leaves of the cabbage.

All the Provence Roses are more or less fragrant, and being so easy to grow, they succeed almost everywhere, and always appear to advantage in shrubberies or large beds. Nearly all give the best results, if pruned rather severely, and not permitted to become overcrowded. Although these varieties succeed planted amongst other shrubs in a struggle for existence, they respond freely to good treatment. The well-known Cabbage Rose, and also Cristata, White Provence, and Maiden's Blush are about the best varieties of this class, followed by the smaller-flowered forms of the same type, such as White de Meaux, De Meaux, Spong, and Moss de Meaux, all the above ranging from white to rosy-pink in colour. The old York and Lancaster Rose represents the striped form of Provence Roses, of which there are a fair number of varieties, Camayoux, Rosa Mundi, Commandant Beaurepaire, Mecene, and Perle des Panaches being amongst the best.

Moss Roses (*Rosa centifolia muscosa*).

The Moss Rose is considered to be a descendant from the Provence Rose, and its treatment or culture is much the same; and when it is remembered how sweetly-scented and charming it is, one wonders why it is not more widely grown and better cultivated. In its lovely mossy buds, this section possesses an attraction found in no other. The colours vary from pure white to deep crimson, and the following varieties, with their colours, are good ones, and practically sure to afford satisfaction if planted: Angelique Quetier, lilac rose; Baron de Wassenaer, bright red; Blanche Moreau, pure white; excellent—that well-known authority, Mr. George Paul, recommends this variety for a hedge, in his catalogue; Celina, deep crimson; fine; Cristata, shining rose; Gloire des Mousseuses, blush; extra good; Laneii, rosy-crimson; Muscosa Japonica, crimson; very heavily mossed buds; Œillet Panache, white, striped with red; this is considered to be one of the best striped varieties.

Evergreen Roses (*Rosa sempervirens*).

Though not quite evergreen, these retain their foliage most of the winter. All the varieties are admirably adapted for planting against fences, pillars, in wild gardens, and similar places, as they grow rampantly, and flower in the most profuse manner if the young wood is not cut back, but left its full length, and all the weak, exhausted wood occasionally cut out. Amongst the varieties the following are excellent, viz.: Russelliana, crimson; Flora, rose; and Félicité Perpetué, white. If these are planted in masses they produce a charming effect when in blossom.

Ayrshire Roses (*Rosa arvensis*).

A native species found nearly all over Europe. The plants are of quick growth, and the shoots long, thin, and graceful. In the wild garden these are invaluable, as they will climb banks, run up or over trees, arches, &c., scarcely needing any attention, while being so very hardy they will thrive in the coldest districts. Tastes differ, fortunately, but all will admire the following varieties: Splendens, white, tinted with red, semi-double; Arvensis; Bennett's Seedling, white, tinged with pink, one of the best; and Ruga, pale pink colour.

Boursault Roses (*Rosa alpina*).

An Alpine species, quite hardy in the coldest districts of Britain. Remarkable for its strong growth and smooth wood.

This is another remarkably hardy section, and, like the Ayrshire Roses, will grow anywhere and everywhere; and if all the weak and spent wood is cut out immediately after the flowering period is over, the long, strong growths will become well-ripened, and bear immense bunches of lovely semi-double red or crimson flowers. The following are the best and most useful varieties: Gracilis (the best of all), Elegans, and Amadis.

Sweet Briars (*Rosa rubiginosa*).

A native species often found wild where the soil is sandy. The foliage is pleasantly scented.

In these, again, we have charming Roses for the wilder portions of the garden, as witness Janet's Pride, with its lovely crimson flowers, borne in great abundance; and also the Double Scarlet and Double White. Not only will these varieties grow freely anywhere, but they are most attractive when in flower and fruit.

Lord Penzance Hybrid Sweet Briars.

Raised by Lord Penzance from Sweet Briars, hybridised and selected. The flowers are semi-double, and of various pretty shades, with the sweet-scented foliage of the Sweet Briar. They have of late years become very popular, alike for their beautiful flowers, handsome berries, and for their value for clumps, arches hedges, and nearly all other purposes, as they can be employed with a certainty of their hardiness and success. Amongst the score or so varieties, the following are specially pretty and useful: Lady Penzance, delicate bronze; Lord Penzance, a shade of lemon; Julie Mannering, pink; Lucy Ashton, white, tinged with pink. Rose Bradwardine, Lucy Bertram, Anne of Gierstein, and Amy Robsart are all rose-coloured varieties; and Jeannie Deans is a pretty rosy-crimson. All of the above are worthy of a place in every garden.

Austrian Briars (*Rosa lutea*).

These consist of selections from a Rose found growing wild in some parts of Europe. The flowers are usually nearly single, and freely produced on pretty prickly shoots.

When planted out in an open sunny position, and not pruned much, these Roses are early blossoming and very attractive. The Austrian Yellow (Fig. 60) and Austrian Copper are perhaps the

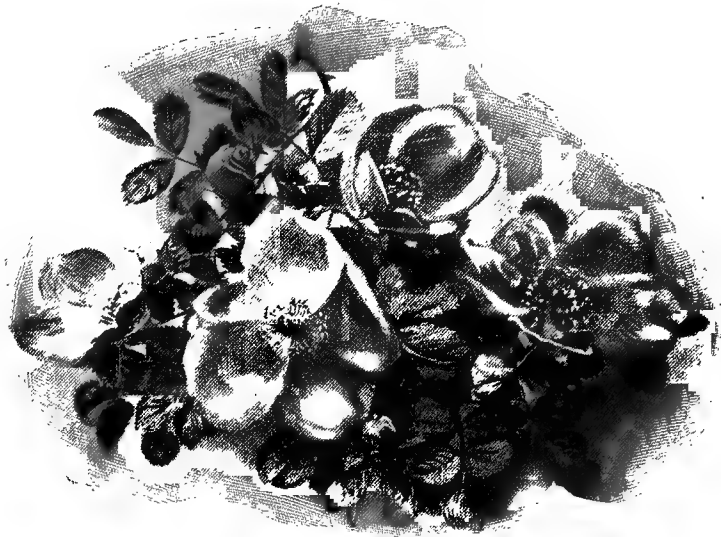


FIG. 60.—ROSE AUSTRIAN YELLOW.

best known, but the variety known as Persian Yellow is much the best, the flowers being very distinct and of the deepest yellow colour. Harrisonii is not so vigorous as the last-named, but it is a pretty sulphur-yellow, with double flowers, and forms a pretty bush.

Rambler Roses.

This is a tall-growing section of *Rosa multiflora*. The best variety (Crimson Rambler) is stated to have been introduced from Japan about 1890. The plants are very vigorous, and bear an abundance of small flowers in clusters.

That splendid variety Turner's Crimson Rambler deserves almost a class for itself, for its great beauty and usefulness. Not only does it force well and blossom most freely in small pots, but it is probably the best Rose in cultivation for planting against pillars or arches. It is not so well suited for planting against a wall, never growing or flowering so freely as when the air can play all round it. Nearly every piece of young wood

will contribute its quota of blossoms, and the best mode of treating this variety is to prune immediately after flowering, cutting away exhausted or congested wood, and keeping the growth clean and free from insect or fungoid attacks. Anglaia (yellow), Thalia (white), and Euphrosyne (pink) are sometimes known as Rambler varieties, but, though very effective and good growers, they are not equal to Crimson Rambler.



FIG. 61.—*ROSA SPINOSISSIMA*.

Scotch Roses (*Rosa spinosissima*).

These are probably the most prickly of all the Rose family. They are very hardy, and produce a mass of pretty flowers during the summer months, and are excellent for planting on the margins of plantations and shrubberies and in the wild garden (Fig. 61). In such positions they seem quite happy, and will grow

and flower profusely for years, if liberally manured annually, and the old wood is cut out when becoming congested. There are probably not more than six or eight distinct varieties, the Double White and Double Yellow being the best and most enduring in flower.

The above about covers the field so far as varieties are concerned, with the exception of the Japanese Roses (*R. rugosa*), which are dealt with under "Trees and Shrubs." There are, however, the pests to be considered, and as these are very numerous, requiring for purposes of actual identification more entomological knowledge than is possessed by the average gardener, this portion of the subject has been treated by my collaborator, Mr. W. D. Drury.

Insect and other Enemies.

Few plants have a more unenviable reputation for harbouring pests than the Rose; indeed, when we come to consider the host of insects which live upon it, we wonder that such good results are obtained in those gardens where the owners are able to devote little attention to their cultivation. To treat the subject of Rose pests in a very thorough manner would involve the writing of a special chapter. Here all that will be attempted is to briefly enumerate the commoner and more destructive foes, and the methods of dealing with them, referring those who seek for further information about such of them as are to be found upon other plants as well to the chapter "On Pests in General."

The most troublesome of the pests affecting Roses are Aphides, Moth Caterpillars, Sawfly Caterpillars, Thrips, Earwigs, Ants, Weevils, Rosechafers, Leaf-cutting Bees, Rose-leaf Hoppers, Rust, and Mildew. Cockchafer grubs are now and again injurious to the roots of Roses; and Scale insects very occasionally assert themselves. The former is always a difficult insect to deal with; but the latter may be readily dislodged. Apart, too, from the foes enumerated, there are some curious growths known popularly as Rose-galls, which require something more than passing mention, as they occur so frequently alike on wild and cultivated Roses that every gardener who is anxious to be progressive would like to peep a little way into the life-history of these interesting and curious structures. First, as to the

Aphides.—These are by far the commonest and best known of Rose pests, though the methods of dealing with them satisfactorily present not a few difficulties to even the most energetic

of gardeners. With any insect pest the first question that a gardener must ask himself is, How does the creature feed? as upon that the method of combating it chiefly depends. The gardener who has not given a very deep consideration to the subject is frequently puzzled to find that after using perhaps a strong poison upon a food-plant, not the slightest impression is made upon the insects it was his desire to kill. The explanation is an easy one, and it will be dealt with in the chapter upon Pests already alluded to. Suffice it to say that Aphides, of which from four to six species derive their sustenance from Roses, are provided with a tubular beak, by means of which they extract the sap from the plant. They are objectionable on that account, as also by reason of the fact that they sometimes cover the leaves of the food-plant with excreta, and so clog them that they are quite incapable of performing their proper functions.

These pests are found upon indoor Roses as well as upon outdoor ones. In the former case recourse must be had to one of the vaporising insecticides. There are now many excellent preparations on the market, and they are so made that they leave behind no objectionable odour, as was the case with many of the old fumigating compounds; indeed, in one or two cases the insecticide leaves quite a pleasant smell. For outdoor trees there is nothing better in the early part of the season than to keep the syringe actively at work. Even lukewarm rain-water will in itself be beneficial, taking care to syringe the shoots very carefully. Gishurst Compound and Abol are two excellent aphidicides that are cheap and readily prepared. If a home-made one is considered best, then the following should be tried: 2oz. carbolic soft soap, well dissolved in one gallon of hot water, and sprayed while warm on both sides of the foliage. Two washings will effectually oust the enemy.

Moth Caterpillars.—These are very numerous and correspondingly destructive. The worst are the caterpillars of certain Tortrices, which feed either in a case, or else between two leaflets or leaflets and shoots, drawn together in a most ingenious fashion, so that the culprits are difficult to detect. Syringing is of little use to keep down these minute pests, as feeding as they do concealed they are not likely to be affected by it; moreover, they are readily alarmed, and on the first intimation that something is wrong drop from their snug retreats and lie concealed until danger is past. The commonest of the Tortrices—the grubs

of which infest Roses—are: *Pardia tripunctata*, reddish-brown, with black head; April and May. *Dictyopteryx bergmanniana*, yellow or yellowish-green, black head; May—a near relative of the oak defoliator, *T. viridana*. *Tortrix rosana*, olive-green, with darker dorsal line, white spots in the tubercular region, brown head; May and June. *Leptogramma variegana*, pale green, with darker dorsal line, head brownish; June and July. In dealing with these pests great factors are late pruning, and taking care to see that all shoots, &c., are collected and burnt. The late pruning is of course but a preventive measure. Once the trees are attacked something else must be done. There is nothing better than going over them each morning and squeezing between finger and thumb all distorted and spun-together leaflets. Many growers take the trouble to examine each case or set of spun-together leaflets; but this takes infinitely longer, and is no more useful in the end. Sometimes when pressure comes to be exerted on the leaves it will be found that they are empty. The gardener must then look a little higher, as the insect, having exhausted the food-supply, has sought fresh pastures—usually the shoots just above will be found to harbour the creature.

Of quite a different habit of life is the Tortrix *Spilonota roborana*. The caterpillar of this minute moth is responsible for a lot of damage to Rose-trees, as it is extremely common. Seldom, however, does it get detected, and the cause of the mischief is put down to something else. It is this caterpillar which lives in the pith of young shoots, causing them to die away in a somewhat mysterious manner. When this is the case, if the dead or dying shoot be cut off in April or May, there will probably be disclosed a small reddish-brown larva with a brown head. All such shoots should be burnt at once, and not consigned to the rubbish-heap, as is frequently the case.

Another very small caterpillar infesting Rose-trees is that pest of the fruit-grower, the Winter Moth (*Cheimatobia brumata*). It is only about $\frac{1}{2}$ in. long, and very variable as to colour—green, yellowish, or greenish-grey, with a darker dorsal line. The best preventive measures are grease-banding, as for fruit-trees, in late autumn. Sometimes, however, the wingless female manages to deposit her eggs despite every precaution; then nothing but spraying with a poisonous substance is of much avail: $\frac{3}{4}$ oz. of Paris green to 20 galls. of water, sprayed on lukewarm in April, before the buds have expanded, will be of the greatest use. The

larva of the Winter Moth is to a great extent kept in check by the Ichneumon flies, more than sixty species preying upon it.

In certain seasons the very destructive caterpillar of the Gooseberry Moth, *Abraxas grossulariata*, will attack Rose trees, and practically defoliate them. Powdered hellebore should be dusted on the foliage.

Hitherto all the moth caterpillars dealt with have been small and well concealed from sight. There are, however, to be enumerated several caterpillars of the larger moths well known to every gardener. They do not, however, select the Rose alone as a food-plant, but being practically omnivorous, the plant occasionally is laid under contribution to provide them with food. One of these is the caterpillar of the Gold-Tail Moth (*Liparis similis*) (*auriflua*). As will be seen by the illustration (Fig. 62), it is a strikingly-marked hairy creature. In colour it is black, with a red double dorsal line, red tubercles on the tenth and eleventh segments, and some white marks in the sub-dorsal region. The Common Vapourer (*Orgyia antiqua*) is no less omnivorous, and quite as striking as the caterpillar just illustrated. It is also extremely common, almost every garden containing it. This is a very voracious species, and would quickly defoliate a tree if present in any numbers. Like the last it is very hairy. It is grey, beautifully spotted with red, and edged with white. On the second and twelfth, and fifth and sixth segments the hair-tufts are black; whereas those of the fifth and eighth are yellowish. Once seen the creature is hardly likely to be passed over for anything else. The Lackey Moth (*Bombyx Neustria*) caterpillar, another hairy species which is found upon many plants, but always an undesirable visitor, frequently affects Roses. It has a bluish-grey

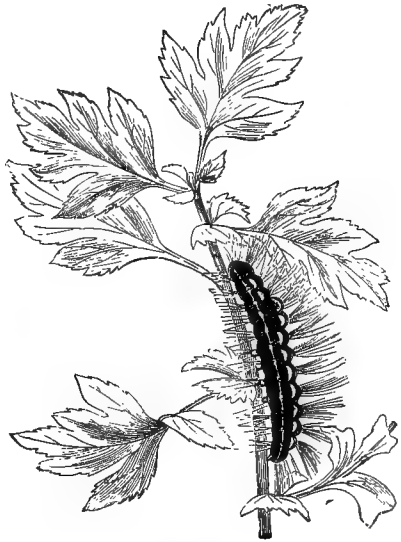


FIG. 62.—CATERPILLAR OF *LIPARIS SIMILIS* (GOLD-TAIL MOTH).

head, with two black spots in the vicinity. The body is striped with blue, yellow, and white. It emerges in April. Hand-picking is best for these conspicuous caterpillars, as they soon make their presence known. The trees may also be shaken over a sticky board, and the insects afterwards picked up and destroyed. With hairy caterpillars it is a well-known fact that the gardener gets very little help from the usual bird-dwellers. The chief exception, so far as the writer knows, is in the case of the cuckoo, which seems to have a particular relish for such hairy creatures.

One other species of moth should also be mentioned, as its food-plant is entirely the Rose. This is *Cidaria fulvata*, another very common species. The caterpillar emerges in April, but is not readily seen, as its colour harmonises so well with its environment. In colour it is pale green, with greenish-grey lines upon the back, and yellowish near the spiracles. Hand-picking is the only remedy.

Even more destructive than the moth caterpillars are those of the Sawflies feeding upon the Rose. Those generally seen feed exposed, though there is one species occasionally met with (*Pamphilius inanita*) which encloses itself in a case fashioned from its food-plant.

There is a large number of the Sawfly Caterpillars, but amongst the commonest and most destructive are *Hylotoma rosæ* (Fig. 63),

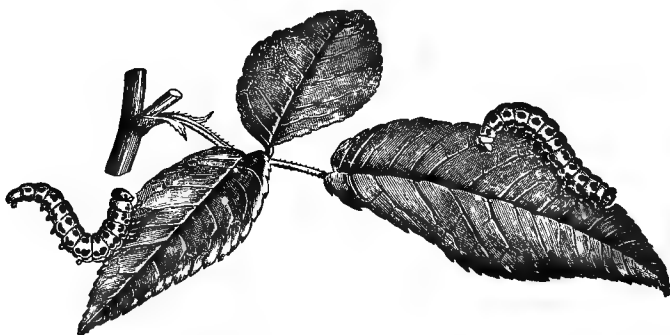


FIG. 63.—LARVÆ OF ROSE-LEAF SAWFLY.

a bluish-green insect with a black head. The eggs are laid in the Rose-twigs in a double row, each egg being deposited separately. To add to the gardener's trouble, the insect is double-brooded. When the larvæ hatch out, they at once commence

to feed upon the leaflets, working from the edges. Many of the Sawflies—and especially the one under notice and a species which infests Filbert-trees—are very restless on being disturbed, and assume what appears to be a defiant attitude; this is particularly well shown by the illustration. There are several other species of *Hylotoma* affecting Roses, but none more destructive than the one just described.

To the genus *Eriocampa* belongs another most voracious species, *E. rosæ*. This feeds very differently from *H. rosæ* and its allies, for instead of devouring the leaflets in their entirety it attacks only their epidermis. This characteristic betrays at once the presence of the caterpillars of *E. rosæ*, even if the objectionable-looking slug-like creature were itself not in evidence. This is a very near relative of the Slug-worm (so-called) of Pear- and Apple-trees. The eggs are deposited in May by the female Sawfly (which it would serve no good purpose to describe here) in the midribs of the leaflets, and they are hatched out in some two to three weeks. The resulting larvæ are yellowish-green, and when full-fed they pupate in oval cocoons spun beneath the surface of the soil.

A very distinct species is *Pamphilius (Lyda) inanita*, which feeds protected by a case, mimicing in this particular one of the objectionable Clothes-Moths. There are also other Sawflies, all of which feed on the leaves; for though there is a species which feeds on the pith it has been so seldom recorded that it is hardly worth taking into account. By many the pith-feeding moth caterpillar already alluded to is frequently mistaken for it.

Roses which have been sprayed with a weak arsenical solution several times before the blossoms expand will be less likely to harbour Sawfly caterpillars than those not so treated; but many growers have strong prejudice against the use of these arsenites. In such cases, powdered hellebore dusted on the leaves in the early morning when they are damp from the dew will be the best means of keeping Sawflies away, or destroying any larvæ which have taken up their abode on the plants. The caterpillars may also be shaken from the trees over a cloth, and collected and destroyed; but the hellebore (which by the way is a strong poison) is far more effectual and practical. As the Sawflies usually pupate just beneath the surface of the soil, it is a good plan when a tree has been severely attacked in summer, to remove the surface soil to a depth of two or three inches, replacing it with fresh. This is best done in late autumn.

Thrips, though very minute insects, in certain seasons inflict a lot of injury upon Rose blossoms; in fact, it is no uncommon experience with those who exhibit to find some of their choicest blossoms quite disfigured by the little creatures sucking the juices from the petals. Syringing is most helpful, and if fairly persistent before the buds open will be found an excellent preventative against the insects' attacks upon outdoor Roses. Under glass they are also pests, and in that case fumigation must be had recourse to. Teas usually harbour these little insects in the largest numbers.

Earwigs are injurious to Roses, but less so than to many other flowers—Dahlias for instance. They should be trapped by means of rolls of soft paper, old pieces of flannel, or inverted flower-pots half-filled with hay, and placed in the trees or on sticks. These traps must be examined each morning, and the offenders killed by shaking them into a vessel and pouring over them boiling water.

Ants.—Interesting and industrious as these insects undoubtedly are, they are enemies to the Rose-grower, and must be dealt with in the manner described in the chapter "On Pests in General." They are very numerous, and will soon make short work of a most promising bud, especially if such has been slightly injured previously.

Beetles.—Considering the numerical strength of the order *Coleoptera*, and the host of species to be found in gardens, it is astonishing to find such a very small percentage destructive to Roses. Offender in chief is the Rosechafer (*Cetonia aurata*) (Fig. 64), an insect which for beauty of colour rivals anything in the floral world known to this country. Viewed in bright sunshine its garments are of the most gorgeous hues: the upper surface being of a brilliant green with golden reflections—the under surface a bright copper. Seen, too, as it frequently is, in the centre of a Rose, whose colour only adds to the beauty of



FIG. 64.—THE ROSECHAFER
(*Cetonia aurata*).

the intruder, it is indeed fair to look upon; but there cannot be any doubt as to its destructive propensities, and the insect

must be taken and killed much as we admire it. The Rosechafer comes of a very destructive family—a family which includes the formidable Stag Beetle and the familiar Cockchafers. It is only as a perfect insect that it feeds upon flowers, or rather upon their principal parts: as a larva it lives, like its near relatives just named, upon wood. The Rosechafer will sometimes hibernate as a perfect insect, burying itself in the soil.

Phyllopertha horticola, or Coch-y-Bondhu of anglers, is a most common species, often, in fact, found in myriads flying round trees in summer-time. Roses do not escape their unwelcome attention, and suffer similarly to when attacked by the Rosechafer. The insects have reddish-brown wing-cases, and dark green head and thorax; they fly towards evening, and may then be captured with a beetle-net. During the day they are found upon various trees in the garden, from which they may be shaken and destroyed, as they are very sluggish at that time.

One or two of the Weevils, chiefly characterised by long, snout-like mouths, are found feeding upon the newly-budded portions of Rose-trees. *Otiorrhynchus picipes* is one sinner; it is chestnut-brown in colour. Another Weevil, which in certain seasons and certain localities proves most destructive, is *Otiorrhynchus scabrosus*, a very rough-coated, oblong-ovate, black insect, measuring some $\frac{1}{4}$ in. long. It affects standard trees and gnaws the bark off the young shoots, causing them to decay. Like the other members of its family, it is nocturnal, and during the day hides itself in the soil beneath or in the vicinity of the trees. Generally the bark is gnawed in a circle, but not always. Hand-picking with a lantern or shaking the trees over a sheet of paper smeared with a sticky compound, is the best remedy.

Rose-leaf Hopper.—Closely allied to the disgusting-looking Frog-Hopper of our gardens, is *Typhlocyba rosæ*, an insect about $\frac{1}{4}$ in. long, yellowish-white, and with practically transparent wings. The under-sides of the leaves are the parts affected, and the insects extract the juices from them without being readily seen. It is not until the foliage begins to assume an unhealthy appearance and is blotched with white, that the little pests are found. They are very active, and can fly strongly and well: on this account they are difficult insects to deal with, as they are off on the slightest movement. Again, living as they do on the under-surfaces of the leaves, they are not so readily reached by

insecticides. The foliage should first be sprayed and then dusted with tobacco-powder.

Leaf-cutting Bee.—The common Leaf-cutting Bee (*Megachile circumcincta*) is responsible for the removal of the semicircular pieces of foliage from Rose-trees, more especially from Maréchal Niel. The insect belongs to the Solitary Bees, and to the group *Andrenidæ*, which are chiefly characterised by their short tongues. The pieces of foliage so deftly removed by the female are required for the furnishing of her nest. She is smaller than the Honey Bee, and has a black back and yellowish-downy head. Though it is annoying to have foliage removed in the manner very familiar to Rose-growers, yet one cannot help admiring the little creature as, poising herself above a Rose-tree for a second or two, she rapidly snips away a piece exactly suited to her requirements—no mistake is made as to measurements—and away she flies with the piece held by means of her jaws and her legs. Having placed it in position, she sallies forth again until her nest is complete. Unlike the Social Bees, she has no workers to help in the elaboration of the house—she is architect and forager, labourer and queen-mother. The food is next deposited; it consists of pollen and nectar, which are carefully mixed, and on this is deposited a single egg. Another cell is made, and the food preparation and egg deposition are repeated until the requisite number of cells have been completed and sealed. The eggs first laid produce females, and those last males. The latter are, of course, the first to emerge, feed up, leave their snug retreat, and having performed the part which Nature has allotted them, die. The females produced hibernate to begin another season the cycle anew. Those who object to the foliage being disfigured must either catch the industrious little workers in a net, or else insert some plant which is objectionable in the vicinity of the Roses—Pyrethrum is as good as anything.

Scale Insects.—A whitish scale insect (*Diaspis rosæ*) is said to infest Rose-stems very occasionally, but it is so rare as to be hardly worth consideration.

Fungoid Diseases.—These are fairly numerous, but there are two or three which stand out from the rest on account of their markedly unsightly character—Mildew (*Spherotheca pannosa*), *Actinonema rosæ*, and Orange Rust (*Phragmidium subcorticium*). The first is characterised by a greyish mildew, which covers leaves, stems, and frequently the fruits. Indeed, it is by means

of the last-named, which are very persistent, that the parasite is reproduced again the next season, for it is one of those fungi which have both a summer and a winter stage. Mildew appears in late spring, or it may be not until summer, and as soon as the spores are ripened, they are distributed by various agencies, and a very large area may be involved. If, however, timely application of sulphide of potassium, as named below, is made, the parasite's progress is checked, and there is no winter stage. The leaves of affected trees should all be collected and burnt, as should also the fruits and prunings.

The chief characteristic of *Actinonema rosæ* is the formation of unsightly brown blotches, usually of irregular shape, on the upper surfaces of the leaves, chiefly in the vicinity of the midrib, but by no means confined thereto. The young shoots are also involved, and become blackened and die back. If neglected, the whole of the foliage assumes a yellow colour and quickly falls. A tree thus defoliated, and with the young wood blasted, presents a most deplorable appearance. Though the spots above alluded to vary somewhat in shape with the position in which they are found, some being nearly circular in shape, the colour is sufficiently distinct for the fungus to be readily distinguished.

Orange Rust appears to be much more prevalent than formerly, and certain varieties of the Rose are more liable to attack than are others. The smooth-leaved kinds enjoy the greatest immunity among Hybrid Perpetuals; but the Teas, Noisettes, and the charming Bourbon Roses, like Souvenir de la Malmaison, are freer still. Stems and leaves are both attacked by Orange Rust fungus, which is characterised by lemon-yellow spots, varying in size with the season. Towards summer, however, the colour changes to a brick-red, and ultimately in autumn to black.

In all three cases spraying early in the season with sulphide of potassium ($\frac{1}{2}$ oz. to the gallon of water), will be beneficial, and especially if all leaves, shoots, and fruits are burned. Powdered sulphur, if shaken on when the leaves are damp in the morning, will also be of assistance. Mildew will not put in an appearance if the plants are sprayed with the well-known Bordeaux Mixture when the growths are a few inches long, and again before the buds expand. The Bordeaux Mixture is not a cure for fungoid attacks, but is a splendid preventive if applied before any mildew appears. *Actinonema rosæ*, especially, should

be taken in hand directly it is observed, as it spreads very rapidly, and is fatal to the rosarian's chances of success.

Rose Galls.—The presence of these excrescences, often of large size, upon Rose-trees both wild and cultivated, is usually puzzling to the gardener. The most conspicuous is the Rose Bedeguar (Fig. 65), a leaf-gall of large size, and conspicuous by reason of the long red or green hairs. It is due to the

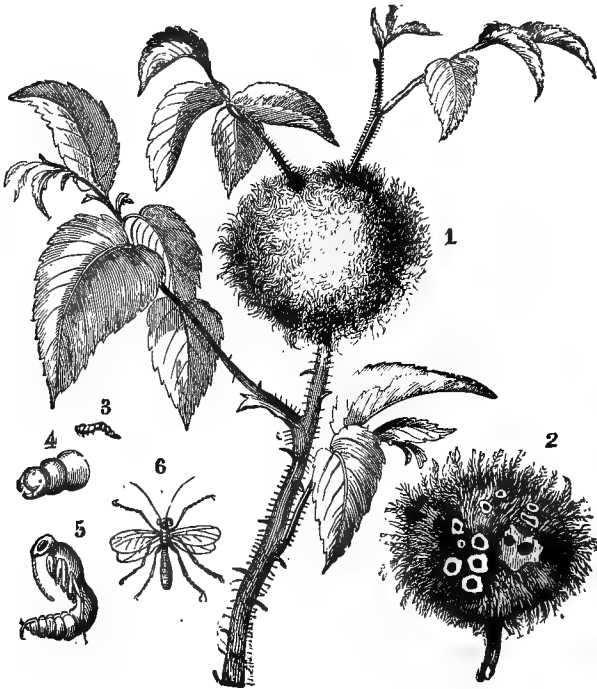


FIG. 65.—STAGES IN THE LIFE-HISTORY OF THE BEDEGUAR GALL.

punctures of one of the Gall-flies (*Rhodites rosæ*), a very puzzling lot of extremely minute insects. These creatures puncture the parts in the process of egg-laying, and the movements of the larvæ, combined with the exudations, affect the tissues of growing cells which are capable of further division. This is the theory of the late Professor Riley, who paid considerable attention to this most intricate but interesting subject. In the illustration (Fig. 65), 1 is the Bedeguar

Gall, natural size; 2 is the Gall shown in section with the various woody cells in position; 3 shows the larvæ inhabitants of such cells, with the front part of the creatures much magnified at 4; 5 is the pupa, and 6 the perfect insect (both much magnified). There are some half-a-dozen other Galls, but none so worthy of a short notice as the Rose Bedeguar. The Galls do practically no harm to the trees.



ROSE REINE MARIE HENRIETTE.

(From a Photograph by Richmond & Peto, Lustleigh, S. Devon.)



5.—On *Chrysan-* *themums.*

By
ALAN WYNNE.

THE "Queen of Autumn" is a term frequently employed in speaking of the Chrysanthemum, and certainly the title is most appropriate, as for a gorgeous display and wealth of colour, when in flower, few plants will compare with it. Not only so, but its culture does not require any special skill, except for exhibition purposes.

Not one of the Japanese sorts grown twenty years ago is met with now for exhibition or for any other purpose, and their names have practically disappeared from even Chrysanthemum specialists' catalogues. With the Incurved section, very few indeed of those most valued a quarter of a century ago are now considered worth cultivating. In the Anemone section there has likewise been the same advance; while the Early-flowering varieties, of which there is such a magnificent selection, were practically unknown. The same also applies to the Single and the Hirsute varieties, the Single sorts in many instances being very pretty and most useful for cutting. In the Pomponé and Reflexed sections there is the least advance, and it is a question if the last-named will ever become favourites. Sufficient, however, has been said to show how the Chrysanthemum has been improved and beautified by hybridisers, and also by importations from Japan, until it would almost seem as if no further improvement could be effected; in fact, there appears to be a danger of the varieties developing into coarseness and a size too large to be really serviceable.

Late or November-flowering Varieties.

CULTIVATION.—Twenty-five years ago even the most enthusiastic admirer of the Chrysanthemum would hardly have ventured to anticipate the popularity this section has attained, or the enormous number of varieties that have sprung into existence, or yet again the immense improvement which has taken place in the size, form, and colour of the flowers, with a comparatively dwarf habit. Strange to say, however meritorious a variety may prove when first put on the market, there seems to be always something better introduced every few years, and consequently old favourites are continually falling out of the ranks and sinking into oblivion. One of the causes of this disappearance is the constant propagation of stock from one's own plants, combined with high feeding to get large size or an abundance of flowers. Several large growers plant out all their varieties with a view to increase or improve their stamina, and thus obtain better cuttings than those taken from pampered pot plants. A still better plan is to procure cuttings from a distance where the conditions, as regards soil and situation, are totally different. Plants raised from these cuttings almost invariably produce far superior flowers to those obtained from home-grown ones. In all vegetable crops the benefits arising from a change of stock may be noticed, and such changes apply with equal force to flowering plants.

When cuttings are received from a long distance they are almost always somewhat limp. In such cases they should be placed in lukewarm water for an hour; this will freshen them up and make them in good condition for potting. Opinions naturally differ as to how they should be inserted, and also the temperature in which they ought to be placed. Without entering into details of all the various methods adopted in propagating, the following may be quoted as one which has always proved entirely satisfactory. In November, or as early in December as the cuttings become large enough, take those growths that spring from the soil (not those on the stem, unless the stock is short), selecting those that are short, sturdy, and with good foliage. Carefully cut away the two lower leaves and insert the cuttings at once singly in small "sixties." These should be well drained and filled with a compost of leaf-mould and loam in equal proportions, with sufficient sand added to make the whole porous. Immediately after the cuttings are put in

a thorough soaking should be given to settle the soil about them, and also to prevent the foliage from drooping. A low pit or frame, with a hot-water pipe round, is an excellent place to stand them, maintaining a temperature of 45deg., and keeping the place closed until the cuttings have rooted. If air is admitted by ventilation before the rooting process is completed, the foliage will be sure to flag, an evil always to be avoided. If the sun comes out brightly, it is an excellent plan to lightly damp the foliage overhead with a syringe; this tends to keep the leaves plump.

The process of rooting will vary considerably. Some varieties make roots very quickly, while others are very slow. Those that strike first should be removed to a cooler and more airy position, but safe from frost. The plants should be kept close to the glass to obtain all the light possible and induce a sturdy habit; unless this is done, particularly while the days are short, the plants become drawn and weakly. Watering, again, is a very important matter. To achieve success the plants should never suffer from lack of water from the time of their insertion as cuttings until after they have flowered. At the same time, continued saturation must be avoided. It is by close attention to detail that many leading *Chrysanthemum* growers have attained fame.

By the end of March the cuttings will have filled their pots with roots, and should be potted into 5in. size, draining carefully, and covering the drainage with moss, to keep it free. At this potting the compost should consist of three parts good fibrous loam and one part well-decayed leaf-mould or spent horse-droppings, with a 5in. potfull of fine bone-meal to every barrow-load of soil, thoroughly mixing the whole. If the loam is of a very heavy character, a little silver sand may be added; but it is advisable not to make the soil too light. Press the soil moderately firm, and leave a space about $\frac{1}{2}$ in. deep at the top of the pot for water. If the plants are watered well a little time before potting, it will not be necessary to water them again for a day or so. When it is necessary, give a good soaking, using a fine rose on the pot in order to avoid displacement of the soil.

After potting, a cold frame, with the floor covered with coal-ashes, is the most suitable place for the plants, but still keeping them close to the glass, and also somewhat close for a few days until the roots have started taking possession of the new

soil. Afterwards air may be admitted freely on warm or sunny days; in fact, when the weather is very mild, the lights may with advantage be taken right off. Any attempt at coddling will end in leggy plants, with no foliage at their base. Towards the end of April the lights may be left off the frames entirely except in very cold weather, and by the middle of May the plants may be stood outside in an open sunny position. By the end of May or early in June the plants may be transferred to their flowering pots. If required for exhibition, 8in. pots will be quite large enough; but if extra large plants are required for quantities of cut blossoms or conservatory decoration, 10in. or even larger-sized pots may be employed. The compost at this final potting should consist of three parts rich fibrous loam and one part dry horse-droppings, with a 7in. potfull of bone-meal to each large barrow-load of soil; or failing bone-meal a similar quantity of Thomson's Manure may be used instead. The drainage of the pots ought to be carefully arranged (inverted oyster shells are first rate) and covered with moss, while a sprinkling of soot will keep out worms for a considerable period. The soil should be rammed moderately hard, and must not fill the pot. A space of 2in. or 3in. at the top should be allowed for a top-dressing later on.

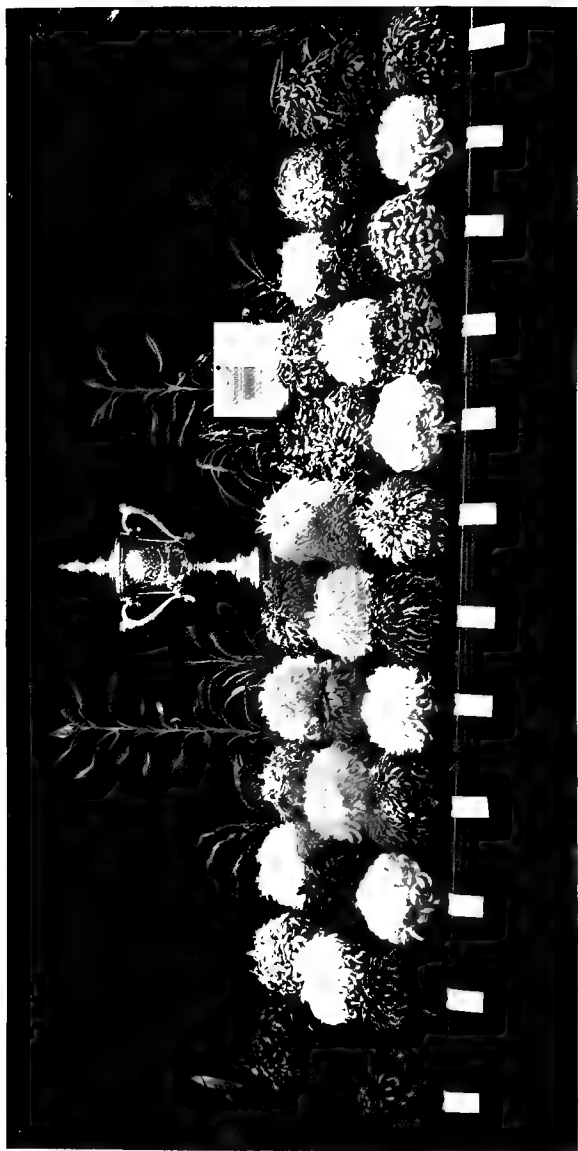
From this time onwards, the plants will demand constant attention in watering, staking, and tying, and ample space should be provided for each plant. A very good position for them is by the side of a sunny walk, in a single line. By having stakes driven in at intervals, with stout string running from each other, the plants may be securely tied thereto, and thus prevented from being blown down or injured by strong winds, while the sun and light have full play upon both sides of the plants, ensuring thorough ripening of the wood. Some growers advise giving no liquid or other manures until the flower-buds have formed, but a little weak liquid manure, or a top-dressing of soot or soot-water, certainly improves the health and colour of the growth. Immediately the flower-buds are formed, a mulch of fibrous loam and decayed manure, in equal proportions, will prove highly beneficial, and from the time of the flower-bud formation until the flowers begin to expand frequent applications of diluted liquid manure, or some of the prepared chemical manures, will be very serviceable, bearing in mind that the roots can only take up or use a limited amount of plant-food, and any great excess above their requirements is likely to do more harm than good.

Stopping, bud-taking, &c., are full of mystery to the novice, but they are comparatively simple matters, and depend a great deal upon the purpose for which the plants are grown. If for exhibition blossoms, the writer has found it best not to pinch or stop the shoots at all, but at each break to select from three to five of the strongest and best shoots, and rub out all the others. About the middle of August, or from then to early in September, these growths form buds (termed crown buds), and all except the centre or largest bud are pinched out. If these buds form in July or very early in August, they are too early for exhibition in November; consequently, they are taken out, and another shoot is made, which produces a "terminal," or second crown, bud.

A very great difference exists between these crown and terminal buds; in many cases the colour is quite distinct on the same plant, as may be proved by allowing one shoot to produce a crown, and one a terminal bud. For this reason, some varieties are best from one, and some from the other. In describing the sorts for exhibition, it will be noticed that it is stated which is the best bud to choose. If possible, the buds should all be secured by the end of August. Very fine blossoms are obtained from buds formed early in September, but there is always a risk of their not being in time, and also a doubt as to their proving up to the exhibition standard. Immediately the buds are formed, it is advisable to lightly spray the plants with Bordeaux Mixture to prevent mildew or other fungoid attacks.

At the end of September or early in October, the plants may be placed in a cool, light, airy house, where a little fire-heat may be turned on to expel damp, especially in dull or foggy weather. Plenty of ventilation should be given whenever the weather is favourable, and any needless spilling of water about the house ought to be avoided, otherwise it will be apt to cause the flowers to "damp." While the blossoms are expanding it will be necessary to pull out a few of the petals, as some are almost sure to be awkward or out of place, and would, if allowed to remain, spoil the symmetry of a blossom.

When fully developed, an Incurved flower should be deep, full in the centre, towards which all the petals should incurve, and be also fresh and of good colour. The Japanese section should have all their flowers deep, wide, with good petals, and well coloured. The same applies in a lesser degree to the Reflexed; while the Anemone section ought to have the centre, or cushion,



JAPANESE CHRYSANTHEMUMS.
Mr. Mills' Winning Blossoms at Croydon Show, 1898.

well developed, free from petals, and the outer florets or guard-petals in a well-formed circle round the cushion.

The dressing of flowers for exhibition is extensively practised by Chrysanthemum growers, and consists in the early removal of all malformed or useless petals. For instance, in an Incurved blossom some of the petals are ill-formed or twisted, and if allowed to remain would spoil an otherwise good flower; and the same applies to the Anemone section. Ivory tweezers and a fine small brush are employed to curl and fix the petals in a correct and symmetrical form. With a little practice on spare flowers it will not be found difficult to arrange the petals properly and thus improve the appearance of the flowers, although perhaps a little reducing them in size.

In arranging the blossoms on the exhibition-boards, the finest or largest flowers should be at the back, the colours so arranged as to give the best effect, and the blossoms raised sufficiently to show their depth and true character. Good taste, neatness, and punctuality in staging, are quite as requisite to the man who would become a successful exhibitor as fine flowers.

For the supply of cut flowers, or for plants intended only for decorative purposes, the details of culture are a little different from those which obtain when dealing with plants for exhibition. To furnish flowers in November, the cuttings should be "struck" or rooted as advised in November; but for flowers at Christmas and the New Year, January is soon enough to put in cuttings, growing them on sturdily as previously suggested, and also potting them similarly; but, instead of waiting for the plants to branch out naturally, it is advisable to pinch out points of the shoots several times to obtain dwarf and bushy specimens. All stopping or pinching of the shoots should, however, cease by the end of July. Proper attention to staking must, of course, be paid; and when the plants form their flower-buds in September, it is wise to cut away all the buds except three or four on each shoot. If all the buds were left, the lower ones on each shoot would fail to open except in the case of the Pompones; with these all the buds should be retained. It will be found that this early cutting-out of useless buds greatly improves the quality of the flowers, making them more valuable for home use or for market.

The remarks already made on feeding, mulching, and spraying with a fungicide are applicable to bush-plants; in fact, to grow

any *Chrysanthemums* thoroughly well, freedom from insect or fungoid pests and generous treatment are absolutely essential. In pinching or taking out the tops of the Japanese varieties in April or May, it is well to cut the shoots back 2in. or 3in. These points make splendid cuttings, and will root readily if placed in a cool close frame, in the compost already described. Immediately it is observed that the cuttings have rooted, ventilation should be given gradually, and the plants kept strong and short-jointed, pinching out all side-shoots as they appear, and only permitting one stem to grow. When the cutting-pot is well filled with roots, a shift into a 5in. or 6in. pot should be given; in this the plant should flower. By confining the growth to one stem, a short, strong plant, about 1ft. high, and with one large, well-coloured flower at the top, will be the result. These little plants are very useful for room-decoration, as they fit very well into vases, and continue fresh for a week or longer. More than one flower-bud will form, but all except the largest and best buds should be removed.

By sowing seed there is always a chance of raising new varieties equal to, and sometimes distinct from, existing varieties. Most of the leading seedsmen now advertise seed for sale. The best time to sow is in January or February, placing it in gentle heat to germinate, and afterwards keeping the seedlings close to the glass. Potting should be done as often as necessary, until finally the plants are in 7in. or 8in. pots, in which they should flower. It is always advisable to pot all the seedlings, however weak and delicate they may appear, as there is often the very best amongst the weakest, and to throw such away as worthless might be the means of discarding the only good variety in the whole batch. On the other hand, equally as satisfactory varieties occasionally originate from strong and moderately strong-growing varieties, showing the uncertainty of pinning faith to either strong or weak ones as the most likely to produce anything specially noteworthy. As a rule, the blossoms the first year are very disappointing, the major portion of the flowers coming single and semi-double, and a novice would probably throw them all away; this is a mistake to be avoided, for out of a large quantity raised from seed, the writer has never found a really good flower the first year. The better plan is to carefully select those combining good colour and width of flower with the largest number of petals or florets, and from such take cuttings in November, growing them on in the usual manner. If any of

them are of merit, they will show their true character in the second year, and the grower can decide if they are worth retaining.

From careful observations made, it seems that about ten years is the life of an exhibition variety in the Japanese class. In fact, it must be a very good variety indeed to stand as long as that on the show table; but with all other classes it is more difficult to raise new varieties of such merit as will entitle them to a place on the exhibition stands; consequently, they retain their hold upon the public for a much longer period. For convenience of reference, each section or class is described separately, commencing with the Japanese. The following are mostly new and splendid varieties for exhibition:

JAPANESE. — Annie Prevost, pure white, with good wide incurving florets; the plant has a strong dwarf habit; height 3ft. Australia, soft amaranth; florets broad and long; a grand exhibition variety; crown bud. Beauty of Adelaide, mauve-pink; florets long and deep; crown

bud. Beauty of Thrumpton, rich rosy-purple, with reflexed florets; flowers of large size and good form; height $4\frac{1}{2}$ ft. Bellem, clear pink; florets incurving; very handsome; terminal bud. Boule d'Or, beautiful straw colour; florets broad, deep, and incurved; crown bud. Charles Davis, bronzy-buff shade; a grand flower, with long, straight florets; crown bud. C. B. Haywood, white; long, stiff florets; immense flower; crown or terminal buds. C. Harman Payne, dark purple; florets



FIG. 66.—CHRYSANTHEMUM EDITH TABOR.

long and somewhat coarse; an enormous flower from a crown bud. C. W. Richardson, lovely yellow; florets long and beautifully curled; terminal bud. Dakota, deep yellow, the florets being mixed up together in a most attractive form; height 5ft. Duke of Wellington, salmon-buff; florets long and very broad; splendid terminal bud. Edith Dashwood, delicate pink or rose, with very long florets, which are gracefully twisted; a very pretty, large variety; height 5ft.

Edith Tabor (Fig. 66), lemon-yellow; florets long, broad, and deep; crown bud.

Emily Towers, rosy-pink, with a silver centre to the florets, which are beautifully twisted, forming a deep fine flower; height 4ft. Ernest Cannell, deep fawn; florets deep, broad, and incurved; very fine; crown bud. Edwin Molyneux, rich deep crimson, with golden reverse; one of the finest varieties when well grown; crown bud.

Etoile de Lyon, lilac-rose; florets long, broad, and reflexed; enormous flower; crown or terminal bud, though usually the best colour is found on the terminal bud. Florence Davis, white, with green centre; fine form; crown bud.

FIG. 67.—CHRYSANTHEMUM GOLDEN SHOWER.

George Foster, rich golden-yellow; florets broad and slightly twisted as they incurve; height $4\frac{1}{2}$ ft. Golden Shower (Fig. 67), fiery yellow; florets long, narrow, and drooping; flowers small, but valuable for decoration; height $5\frac{1}{2}$ ft. Graphic, rosy-mauve; florets twisted and incurving; terminal bud. Henry Weeks, bright rich crimson;



florets broad ; a grand flower ; height 4ft. Herbert J. Cutbush, deep red, marked with yellow ; a good front row flower ; crown bud. H. J. Jones, intense crimson : florets flat, broad, and handsome ; height $4\frac{1}{2}$ ft. John Pockett, a mixture of rich crimson



FIG. 68.—CHRYSANTHEMUM MR. A. G. HUBBUCK.

and bright bronze ; a deep and beautiful flower ; height 4ft. Joseph Chamberlain, very rich crimson, with a golden reverse to the broad florets ; a seedling from E. Molyneux, with a better habit and finer flower than its parent ; height $4\frac{1}{2}$ ft. Julia Scaramanza, bronzy terra-cotta ; florets long and deep ; crown bud.

King of Buffs, salmon-buff; very large, and of good form and substance; crown bud. Lady Crawshaw, white, faintly shaded with pink, the florets being beautifully twisted; height 5ft. Lady E. Clarke, pure white sport from Mrs. C. Harman Payne, and, like its parent, of large size; height $5\frac{1}{2}$ ft. Lady Hanham, golden rosy-cerise; a splendid variety; crown bud. Little Nell, pure white; florets broad and deep; a fine acquisition; height 5ft. Mr. A. G. Hubbuck (Fig. 68), chestnut-red, with gold reverse; very fine; crown bud. Mdlle. Therese Rey, ivory-white; splendid when well grown; crown bud. Madame Carnot, pure white; very large; one of the best; crown bud. Mrs. H. Weeks (Fig. 69), pure white, suffused with pink; a large fine flower; height 7ft.;



FIG. 69.—CHRYSANTHEMUM MRS. H. WEEKS.

crowns; crown bud. Mrs. G. W. Palmer, deep bronze; immense flower, with broad florets; crown bud. Mrs. Hermann Kloss, deep orange, almost bronze; very large; crown bud. Mrs. C. E. Shea, creamy-white; florets curled and twisted; very fine; crown bud. Mrs. J. Beggs, soft pink; a deep, massive, new variety, of great promise; crown bud. Mrs. W. H. Lees, white, tinged with pink; a deep and imposing flower; crown bud. M. Chenon de Leche, deep rose; florets long and drooping; extra good; crown bud. Mrs. Coombes, rosy-mauve; florets long and drooping; an immense flower that should prove valuable for exhibition; height $4\frac{1}{2}$ ft. Mrs. Ritson, a magnificent pure white sport from Vivand Morel; this variety promises to be

constant in character; height 4ft. Mrs. W. Mease, a sulphur-yellow sport from Madame Carnot; height $4\frac{1}{2}$ ft. Mrs. White Popham, white, shaded with carmine; florets long, drooping, and handsomely twisted; height 5ft. Mons.

Pankoucke (Fig. 70), clear yellow; a large deep flower; height 4ft.; crown bud.

Moor Park, golden-buff, marked with crimson; a deep flower, with long twisted florets; height $4\frac{1}{2}$ ft. Mons. Fatyer, soft yellow; very large and handsome; height $4\frac{1}{2}$ ft. Nina Dabbs, deep yellow, slightly shaded with green; florets broad and spreading; a large and deep flower; height 5ft.

Nellie Pockett, creamy-white; florets long, rather narrow, and twisted; a deep and lovely flower; height 5ft.

Niveus, probably the purest white; a lovely flower, of good size; crown bud. Ny-

anza, dark crimson; florets incurved; must be well grown; crown bud. Olive Oclee, rich deep bronze; florets incurved; good on crown or terminal buds. Owen's Memorial, rich crimson-red; florets broad, drooping, and slightly twisted; very large; height 4ft. Ponderosum, white; flowers of immense width and depth; terminal bud. Phoebus, a charming yellow; florets long and reflexed; crown bud. Pride of Madford, crimson-cerise; a beautifully-formed flower; crown bud. Royal Standard, deep crimson; flower of fine substance; very promising; crown bud. R. Hooper Pearson, one of the best of all the yellow varieties, and of dwarf, sturdy habit in growth;

height 4ft. Mrs. W. Mease, a sulphur-yellow sport from Madame Carnot; height $4\frac{1}{2}$ ft. Mrs. White Popham, white, shaded with carmine; florets long, drooping, and handsomely twisted; height 5ft. Mons.

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FIG. 70.—CHRYSANTHEMUM MONS. PANKOUCKE.

a decided acquisition; height 3ft. R. J. Upton, canary-yellow; florets long and flat; large and distinct; height 5ft. Snowdon, pure white; of great size and beauty; crown bud. Swanley Giant, lilac-pink; florets incurving; massive; crown bud. Vicar of Bray, crimson, shading to orange; very fine; crown bud.

Viviand Morel, blush-mauve; an indispensable variety; crown or terminal buds. What Ho! (Fig. 71), a semi-double flower of most curious form; the creamy-white florets of great length, that twist towards the points; height $5\frac{1}{2}$ ft. Yellow Madame Carnot this has all the excellent qualities of the white form; crown bud.

Some of the above varieties being only suitable for providing very large exhibition blossoms, the following are named as excellent for supplying medium-sized flowers, most useful for cutting or decorative purposes. A lengthy description is unnecessary, and only the habit and colour of flower of each variety are given.

Annie Clibran, pink; medium height. Bouquet de Dame, pure white; dwarf. Elaine, pure white; medium height; early. Etoile de Lyon (Fig. 72), lilac-rose; medium height. Florence Percy, white; medium height. Gaspard Bou-

charlat, deep orange; medium height. Golden Dart, buttercup-yellow; dwarf; very late. King of Plumes, deep yellow; medium height. L. Canning, pure white; dwarf; very late. Lady Selborne, white; medium height; early. Madame Walker, rosy-mauve; rather tall; flowers quilled. Mdle. Lacroix, white; medium height;

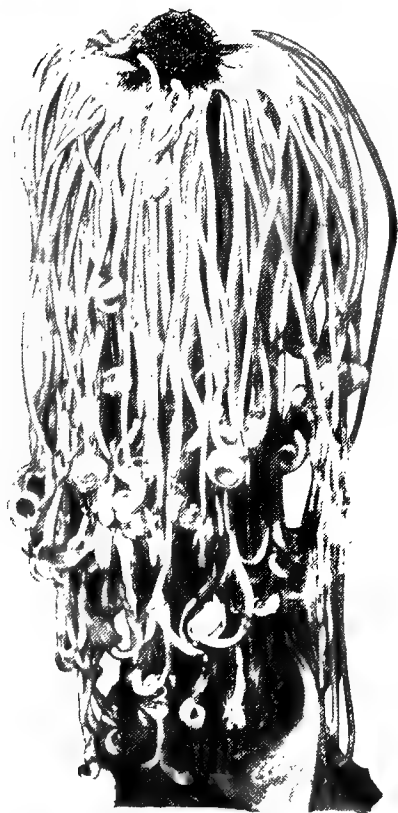


FIG. 71.—CHRYSANTHEMUM
WHAT HO!

a favourite. Margot (Fig. 73), blush-white; dwarf habit. Mr. Chas. E. Shea, yellow sport from Mdlle. Lacroix. M. Freeman, rosy-pink; dwarf. Owen's Brilliant, deep crimson; medium height. Roseum Superbum, salmon-pink; tall. Source d'Or, deep bronze; medium height. W. Robinson, salmon-orange; tall. W. Holmes, deep crimson; dwarf.

HAIKY VARIETIES.—The Hirsute or Hairy Chrysanthemum has recently not only increased in the number of varieties, but also in popular favour, and no doubt special classes will ere long

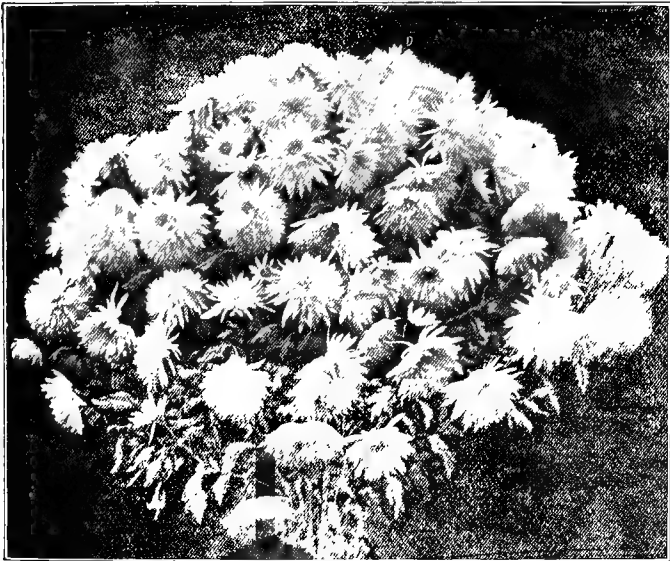


FIG. 72.—CHRYSANTHEMUM ETOILE DE LYON.

be allotted to this section at some of the leading shows. At present, if shown at all, they are staged in the Japanese classes, deep blossoms of good colour always counting their full number of points when judged. The following are all distinct varieties, and the plants of vigorous habit: Abbe Pierra Arthur, pure white; petals long and usually drooping; a fine large flower. Belle des Gordes, rich rosy-red; florets nicely incurved; fine. Captain L. Chaure, yellow; florets incurved; a large massive flower. Esau, salmon-blush, shading to yellow; a pretty variety. Gold Dust, golden-yellow; florets incurved; a very pleasing flower;

plants dwarf. Golden Hair, golden-yellow, the florets being very hairy. Hairy Wonder (Fig. 74), reddish-bronze; the most massive and best hirsute variety. Louis Boehmer, a shade of purplish-pink; very hairy; good habit. Madame M. Marchant, rosy-pink; large flower, and plant of sturdy habit. Midnight, bronze; flower very large and very hairy. Mrs. C. B. Freeman, golden-yellow sport from Louis Boehmer. Mrs. W. J. Godfrey, probably the best white hirsute variety; good habit. M. Fernand Bertin, white, shading to red; a large, bold flower. Souvenir de l'Ami Coye, white; of good size, and dwarf sturdy habit.



FIG. 73.—CHRYSANTHEMUM MARGOT.

SINGLES.—These are particularly serviceable for cut flowers, being light, graceful, and remarkably free-flowering. A few varieties should be grown in every garden. Their culture is identical with that already described for bush plants. It may be stated that the Single Chrysanthemum flowers usually continue fresh longer than the other sections, and damping of the flowers very rarely occurs, even in bad weather. Alice, white, with yellow disk; large. Annie Heard, white, yellow disk; dwarf. Dolly Varden, rosy-pink; flowers small, and produced in great clusters;

very dwarf. Dorothy Wooderson, soft pink ; large. D. Windsor, chestnut ; large and fine. Emily Wells, lovely clear pink ; very pretty ; rather small. Eucharis, pure white ; large beautiful flower ; very dwarf. Framfield Beauty, deep crimson ; extra good. Golden Star, pure yellow ; large and excellent. Kate Hawthorn, one of the finest yellows ; splendid. Mary Anderson, white, tinged with



FIG. 74.—CHRYSANTHEMUM HAIRY WONDER.

pink ; small and pretty. Miss Rose, soft pink ; small and lovely. Mrs. A. E. Stubbs (Fig. 75), pure white ; of fine form and great beauty ; height 3ft. Rev. W. E. Remfrey, deep crimson ; excellent. Terra Cotta, terra-cotta ; dwarf, and very free.

INCURVED.—Except for purposes of exhibition, these beautiful, though somewhat formal-shaped, flowers are losing ground ;

in fact, the Japanese have almost ousted the Incurved from many gardens. Though it must be admitted that the less formal Japanese class are the more beautiful, it is more difficult to



FIG. 75.—CHRYSANTHEMUM MRS. A. E. STUBBS.

grow a really deep, well-formed flower of an Incurved variety than it is to produce a fine Japanese blossom. Not only is considerable cultural skill requisite, but a knowledge of dressing or petal manipulation is essential to have Incurved blossoms

sufficiently good in character to put on the exhibition table successfully. In the list of varieties only those suitable for show purposes are named, with the bud that usually gives the best flower: Alfred Salter, lilac; a deep, well-formed flower; must be grown strongly; crown bud. Austin Cannell, purple maroon; large, and of good form; crown bud. Baron Hirsch, chestnut-red; a well-formed, large flower; crown bud. Bonnie Dundee (Fig. 76), beautiful orange shade; a perfect flower when well grown; terminal bud.

C. B. Whitnall, purple; fine form; the crown bud should be selected early in August. Chas. H. Curtis, rich yellow; extra good, and indispensable; crown or terminal buds. D. B. Crane, bronze-buff; deep flower, of good form; terminal bud. Duchess of Fife, white; a splendid new variety, full of promise; crown bud. Empress of India, pure white; a magnificent flower, but must be grown well; crown bud. George Haigh, carmine-rose, shaded with yellow; deep flower, of good shape; crown bud. J. Agate, pure white; deep flower, of splendid form; crown bud. Jeanne d'Arc, white, tipped with purple; a deep flower, of medium size; crown bud.



FIG. 76.—CHRYSANTHEMUM
BONNIE DUNDEE.

John Fulford, reddish-crimson; a large flower, of good form; terminal bud. John Lambert, pale buff; a deep and fine flower; must be grown strong; crown bud. Lucy Kendall, coral-red; a pretty, well-formed flower; crown bud. Lord Alcester, pale primrose; splendid flower if grown strong; crown bud. Lord Wolseley, bronzy-red; a deep, well-shaped flower; terminal or crown buds. Lord Rosebery, mauve; large and telling flower; terminal bud. Lyne, jun., golden-bronze; of good form; crown bud. Madame Darier, nankeen-yellow; extra good shape and size;

crown bud. Major Bonnaffon, much in the same form and colour as Chas. H. Curtis, and by many is considered synonymous; crown or terminal buds. Miss M. A. Haggas, primrose; a lovely deep flower; crown bud. Mr. James Murray, bright



FIG. 77.—CHRYSANTHEMUM
GOLDEN CHRISTINE.

pink; a fine new variety, of good substance; terminal bud. Mrs. F. W. Flight, white; a deep massive flower, well incurved; crown bud. Mrs. Heale, white; a medium-sized and perfect flower; crown bud. Mrs. R. C. Kingston, soft pink or mauve; blossoms of large size; crown bud. Prince Alfred, rosy-carminé; an old variety still worth growing; crown bud.

Princess of Wales, blush; only good when well grown, then it is fine; crown bud. Queen of England, blush; a splendid flower when strongly grown; crown bud. Robert Cannell, deep bronzy-red; very fine form; crown buds; late. Robert Petfield, silvery-mauve; large flower, well incurved; terminal bud. Sir Trevor Lawrence, pure white; a massive flower, of good shape; crown bud. The Egyptian, deep red; very large; a new variety of promise.

William Tunnington, reddish-chestnut; must be grown strong; terminal bud.

REFLEXED.—The true Reflexed Chrysanthemum has usually a moderately large flower, with the florets or petals straight and reflexing towards their points. It is neither so ornamental nor so useful as most of the other classes; and although some of the varieties are well adapted for making a display in the conservatory, they are not much admired. Only those varieties suitable for

developing nice sturdy plants, with a floriferous habit, are mentioned. If four buds are retained at the point of each shoot, and all the others are removed, the plant will make a very good display for several weeks. *Boule de Neige*, pure white; valuable for its late flowering. *Chevalier Domage*, deep yellow; a well known old favourite. *Clara Jeal*, pure white; a new and very pleasing variety. *Cullingfordii*, crimson-scarlet; should be grown for its freedom and fine colour. *Dorothy Oxberry*, soft pink; a pleasing colour. *Felicity*, creamy-white; wonderfully free-flowering and of good habit. *Golden Christine* (Fig. 77), golden-buff; a well-known old favourite, formerly much grown. *King of Crimson*, rich dark crimson; dwarf habit. *Miss Florence Lunn*, light amaranth; flowers large and very full. *Progne*, amaranth; violet-



FIG. 78.—CHRYSANTHEMUM PINK CHRISTINE.

scented; small flower; very free. *Phidias*, rose-blush; dwarf, and an abundant blossomer. The *White*, *Pink* (Fig. 78), and *Peach Christine* varieties are all three well worth growing, being of dwarf habit and free flowering.

ANEMONES.—These may be divided into three sections—*Japanese*, *Large*, and *Pompones*, the first being the most admired, and also the most extensively cultivated. To have very fine flowers of the first two sections the plants should

be carefully disbudded, leaving only one bud to each shoot; but with the Pompone class no disbudding is either necessary or desirable. The plants of these latter should be pinched or stopped several times during growth to induce a bushy habit, to be covered later with a mass of small flowers.

Japanese. — Belinda, disk rose, guard-petals dark crimson. Cinderella, pure white. Duchess of Westminster, disk pinkish-bronze, guard-petals bluish. Fabian de Mediana, disk purple, guard-petals lilac. James Weston, white. Jeanne Marty, bluish-white; a very fine full flower. Mabel Miller, white; large and excellent. Madame Clos, disk white, guard-petals rose. Marsia Jones, one of the finest whites. Mr. Hugh H. Gardiner, deep rose; very fine. Rider Haggard, deep rose and pink; the largest



FIG. 79.—CHRYSANTHEMUM ROBIN ADAIR.

Japanese Anemone. Robin Adair (Fig. 79), blush-white, tinged with lilac; an extra good variety. Souvenir de Madame Blandineries, a handsome crimson. Tam O'Shanter, rosy-lilac; a splendid flower. W. W. Astor, salmon-blush; one of the best.

Large.—Delaware (Fig. 80), white; very large handsome flowers. Descartes, crimson, with very prominent disk; a fine variety. Emperor, blush, with paler centre or disk; large and good. Empress, blush, disk lilac; prominent, and of good form. Geo.

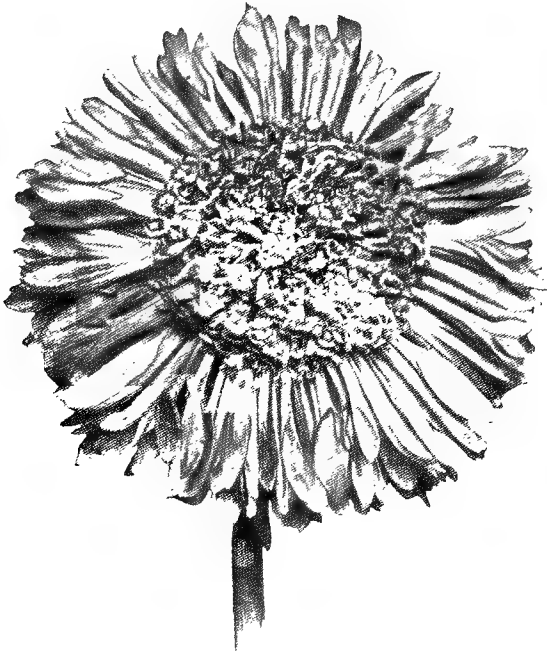


FIG. 80.—CHRYSANTHEMUM DELAWARE.

Hawkins, a lovely golden-yellow. Gluck, golden-yellow; a well-known old variety. Lady Margaret, pure white, of fine shape; a tall grower. Madame Robert Owen, pure white; large and excellent; dwarf habit. Miss Annie Low, a yellow Lady Margaret. Miss Caterer, pure white; of splendid form and habit. Mrs. Judge Benedict (Fig. 81), pale flesh, with a prominent lemon disk; an excellent variety; height 3ft. Mrs. C. J. Salter, buff-orange; pretty and effective. Nouvelle Alveole, a shade of blush-lilac; fine flowers. Robin Adair, blush, with a good disk; fine flowers; height 4ft. Stoneacre Gem, yellow, shading to red; excellent.

Pompones.—Astarte, amber and gold; dwarf. Calliope, ruby-red; very striking flower. Emily Rowbottom, creamy-white; fine.

Eric, deep orange-buff. Madame Montels, white, yellow disk. Magenta King, magenta, yellow disk. Mr. Astie, golden-yellow; dwarf. Perle, rosy-lilac. Reine des Anemones, white; fine for cutting. Virginale, white; rather large flower; valuable for its lateness.

POMPONES.—This class, with its small flowers borne in great profusion, should find a place in every garden where Chrysanthemums are grown; for not only are the plants of dwarf habit, and



FIG. 81.—CHRYSANTHEMUM MRS. JUDGE BENEDICT.

covered with blossom, but the flowers, being small, can be employed for purposes for which the large-flowered classes would be useless. A few of the best of this pretty section are as follow: Aurore Boreale, bronze-orange. Bob, very dark crimson. Cedo Nulli, white, golden, and lilac; three very fine varieties. Comte de Morny, bright purple. Florence Carr, deep bronze. Harry Hicks, soft pink. La Purite, pure white; very useful for wreaths, &c. Marion, deep orange. Our Fred, blush-pink. Prince of Orange, pale orange. Rosinante, blush; very fine.

Snowdrop, white ; remarkably small flower ; pretty. William Payne, deep orange ; dwarf and free.

Early-Flowering Varieties.

Though the early-flowering Chrysanthemums have not made the advance in public favour that they should have done, considering their great utility alike for garden decoration and for furnishing cut flowers for home use or for market, there is strong evidence that their merits are beginning to be more fully recognised, and that their culture is extending in all directions. In time, no doubt they will occupy much of the space now devoted to plants which neither produce such a good display in the flower garden, nor supply so many cut flowers for so long a period.

CULTIVATION.—In forming a collection of early-flowering Chrysanthemums, it is always advisable to grow two lots of plants of the same varieties ; one in pots, and another outside in a nice sunny position. The former will be extremely useful for room or conservatory decoration, and should any of the plants outside prove tender and unable to withstand the rigour of winter, or fail to throw up cuttings for propagating, their stock may be grown from the pot plants, and the risk of losing choice varieties is reduced to a minimum. Unless duplicates are thus grown, it is practically certain that losses will occur amongst the outside plants, and usually most highly-prized varieties are those to disappear.

With all early-flowering varieties the end of February or beginning of March will be quite soon enough to put in cuttings. If inserted earlier they seldom make such good or such floriferous plants as those put in later, which grow on freely without a check. In taking cuttings, it is always best to choose those shoots springing from the soil, avoiding those which may have formed on the stem below where it was cut down ; the latter never make such large or vigorous plants as those struck from suckers coming through the soil. In preparing the cuttings, carefully remove a few of the lower leaves, and then insert singly in small pots, properly drained, using a sandy compost of loam and leaf-mould, in equal proportions, thoroughly mixed. Press the soil firmly about the cutting, and immediately afterwards give a good watering, which tends to settle the soil, and to prevent the foliage from flagging. A close cold frame is a very suitable place to stand the pots in, keeping it quite close

until the cuttings are rooted, and beginning to grow. Every care should be taken to see that the plants have sufficient water.

As soon as it is seen that the cuttings have taken root, air should be gradually admitted on all favourable occasions in order to keep the plants sturdy and strong. About the first week in April the plants may be shifted into larger pots (say large "sixties"). By the middle of May these pots will be full of roots, and the plants may be either transferred to the pots in which they are intended to flower, or they may be put out in a sunny place, where the soil has been deeply dug and well manured during the past winter. If potted, a compost of three parts fibrous loam and one part spent horse-droppings mixed together, with a little bone-meal added, will prove excellent.

Naturally, some varieties are much taller than others, and in the list appended the average height of each is mentioned, indicating which sorts are best for back and front rows respectively. A fine effect may be produced by a judicious blending of colours; or the beds in large gardens may be planted with one variety only, thus giving a mass of one colour, as is done in many of the large public parks. The plants should be supported by neat stakes early, otherwise many will be broken by the wind, and thus cause unsightly blanks in the beds. If the soil is rich and deep, and the plants are strong and healthy, $2\frac{1}{2}$ ft. or 3ft. between each will be a suitable distance; if the soil is poor or shallow, 1ft. less space should be given. On all soils, however, it is advisable to make fresh plantations each year.

The following varieties have proved most meritorious in a large collection :

JAPANESE, OR LARGE-FLOWERED.—Alfred Droz, soft yellow; borne in profusion; height 2ft. Albert Chausson, orange-red; very fine in pots or beds; height $2\frac{1}{2}$ ft. Baronne G. C. de Brailles; pale pink; very large and fine; height 3ft. Coral Queen, lovely coral; a charming variety; height 3ft. Crimson Queen, deep crimson; a great favourite, and of fine habit; height 2ft. Comtesse Foucher de Cariel, orange-yellow; excellent and free; height 2ft. De la Bouere, amaranth; large and fine; height 2ft. Dorcas, white; bushy habit and free-flowering; height 2ft. Edie Wright, pale pink, passing to white with age; excellent in every respect; height 2ft. Edith Syrratt, soft pink; wonderfully free and dwarf; height $1\frac{1}{2}$ ft. Gaspard Boucharlat, a lovely orange colour, produced in profusion; height 2ft. General Hawkes, crimson-amaranth; very free; height 2ft. George Wermig, rich soft

yellow; a well-known old favourite; height $2\frac{1}{2}$ ft. Harvest Home, bronzy-red, tipped with gold; very handsome and free; height $2\frac{1}{2}$ ft. Lady Fitzwygram, a splendid early white; height 2ft. Madame Desgranges, white; well known for its excellence; height $2\frac{1}{2}$ ft. Madame Eulalie Morel, a beautiful cerise and gold; height 3ft. Madame Marie Masse, lilac-mauve; one of the best; height 2ft. Mytchett White, snowy white; a magnificent variety; height $1\frac{1}{2}$ ft. Prefet Cassagneau, deep crimson; fine habit; height 2ft. Ryecroft Glory, deep orange; most effective; height $1\frac{1}{2}$ ft. Sam Barlow, a charming salmon-pink; very free; height 3ft. The Don, lilac; profuse and early; height 2ft. Vice-President Hardy, deep red; good habit; height $3\frac{1}{2}$ ft.

POMPONES.—The small compact-flowered Pomponé varieties are greatly admired by many, and are extremely useful for cutting purposes, or for massing in beds. Amongst the many varieties in commerce, the following may be described as of high merit: Alice Butcher, red, shaded with orange; excellent; height $2\frac{1}{2}$ ft. Anastasio, pale purple; very dwarf and bushy; height $1\frac{1}{2}$ ft. Blanch Colomb, ivory-white; free and pretty; height 2ft. Canari, yellow; flowers in great abundance; height $1\frac{1}{2}$ ft. Early Blush, soft blush; very fine variety; height 2ft. Frederick Pele, crimson and gold; makes an effective bed; height 3ft. Golden Fleece, straw-yellow; one of the best of its colour; height 2ft. L'Ami Conderchet, primrose; probably the best Pomponé; height 1ft. Longfellow, pure white; splendid for cutting or for beds; height $2\frac{1}{2}$ ft. Madame Jolivart, white, tinged with pink; very pretty; height 2ft. Mrs. Cullingford, white; excellent; height $3\frac{1}{2}$ ft. Miss Davis, soft pink; a sport from Mrs. Cullingford, but dwarfer. Mr. Selley, a blush-white; very pretty and effective; height $1\frac{1}{2}$ ft. M. Jules Paquet, white, and violet-rose; height 1ft. Piercy's Seedling, deep yellow; wonderfully free; height 2ft. Silversmith, white, of large size; a most useful variety; height 3ft. Strathmeath, a soft rosy-pink; excellent; height 2ft. Toreador, a rich crimson and gold; height $2\frac{1}{2}$ ft. Yellow L'Ami Conderchet, deep yellow; sport from L'Ami Conderchet. For further list of varieties, see "Appendix."

ANIMAL AND VEGETABLE DISEASES, &c.—Very few flowers with a popularity as great as the Chrysanthemum enjoys can boast such an immunity from pests. And it is this, as much as anything, which has caused the flower to be so enthusiastically taken up by the amateur. The most formidable which has asserted itself within recent years is the Chrysanthemum Leaf-

Rust, a pest which, if not dealt with as soon as noticed, will cause serious trouble to the grower. Insects and several molluscs will attack the blossoms, and in the case of exhibition plants, timely remedies must be employed, or after months of careful attention, the grower's fondest hopes will be rudely shattered. In this chapter it is only necessary to briefly note the chief offenders, and to call attention to the best means of dealing with, or preventing, such attacks in the future.

Aphides.—These are amongst the most destructive insects infesting Chrysanthemums; they multiply very rapidly, and quickly sap the very life from the plants. Frequently they are present in incredible numbers, though the "greenflies" at any rate approximate so closely to their surroundings, that they are not so readily seen as the "black fly" (*Aphis rumicis*), which is also troublesome. Under glass, the new vaporising insecticides are the best remedies to employ: they are easily applied, and very effective and cheap. Before using any insecticide it will be well to remove any of the Ladybirds and their larvæ, the leech-like larvæ of the Hawk-fly (*Syrphus lucorum*), or even the gaily-apparelled if gauzy-looking Lacewing Flies. All these insects are working in man's best interests, and should be preserved. They are the natural enemies of Aphides, and they will consume vast numbers in a short time. Outdoors, a weak solution of carbolic soft soap will be sufficient to cleanse the plants of the "greenfly" and "black fly," both of which species, as already stated, are at times troublesome. This will be rendered more effective if applied luke-warm.

Earwigs are most destructive at times to Chrysanthemum blossoms, and in a single night will disfigure the best of flowers, rendering them quite unfit for show. They should always be trapped with loosely-rolled tissue-paper, old dusters laid in the vicinity of the plants, or by means of an inverted flower-pot half-filled with hay and stood upon the stakes. It may here be stated that Earwigs, though as a rule vegetarians and destructive to many plants, occasionally forsake such a diet for one of flesh, and then they even render the gardener service by devouring aphides, thrips, and other injurious pests.

Leaf-Mining Fly.—Occasionally the leaves of Chrysanthemums and closely-allied plants suffer from the attacks of that plague of the Marguerite-grower, *Phytomyza nigricornis*. This fly deposits its eggs upon the foliage; the larvæ are in due time hatched out, and feed between the two surfaces. Their presence is revealed by a blister-like swelling and by white or light-coloured zigzag tracks over the leaves. Feeding as they do, the pests are difficult to eradicate by means of insecticides; but, by way of prevention, the leaves of the plants may be sprayed with a weak emulsion of paraffin or with a quassia-chip solution; or fumigation will make

the leaves distasteful to the perfect insect. The old-fashioned method of squeezing the insects between finger and thumb has much to recommend it. Occasionally plants are so badly attacked that nothing short of burning the infested leaves is of any use.

Thrips are sometimes destructive to the shoots; but they may be destroyed by syringing them with the preparation suggested for Aphides on outside plants.

Ants are injurious to the buds, and will penetrate them if but a beginning has been made. They should be trapped by means of pieces of sponge dipped into a sweet liquid or some bones containing a little meat. In the latter case the insects should be brushed off into boiling water; while in the former the sponge should be dropped into a vessel of boiling water.

Cockroaches of several kinds attack the blossoms, though on account of their night-feeding propensities they are seldom seen, and less often suspected. Heat, however, being absolutely necessary to the welfare of these insects, it is only where this is applied that Cockroaches are really troublesome. The ranks of these insects have been considerably strengthened of late years by further introductions from abroad—all undesirable visitors because of their omnivorous tastes. Phosphorus paste or the Ballinkinrain preparation may be most serviceably employed in keeping down these insects.

Woodlice.—Turning from the insects for a moment to crustaceans, the Chrysanthemum-grower has in Woodlice some very objectionable animals, as, like the Cockroaches, they will considerably damage the blossoms. As a rule, they are strong in numbers, and once thoroughly established they are difficult to oust. Vegetable traps in the form of sliced or hollowed potato, may be tried; but usually flower-pots half filled with hay and turned upon their sides, are the most effective, as the Woodlice shelter there after their midnight revels, and may easily be shaken out and destroyed. More effective still is the trap where the inside of the pot is smeared with a sugary mixture composed of treacle, foot's-sugar, and beer.

Slugs.—Certain members of yet another distinct family, the *Mollusca* (viz., Slugs, &c.), infest the Chrysanthemum, and take toll of the blossoms. Slugs are nocturnal, and should be enticed with bran or brewers' grains, and then collected and destroyed.

Leather-Jackets.—These are the destructive larvæ of the Crane-fly, or Daddy Long-legs. They abound in pastures and lands, and therefore they may be readily introduced with the potting-soil. They feed for a long time as larvæ, and would quickly destroy the roots of any Chrysanthemum. The soil should therefore be carefully examined at potting-time, and if any of the insects are noticed they should be destroyed.

Leaf-Rust (Puccinia hieracii).—Within the last year or so growers of Chrysanthemums have suffered not a little from the ravages of this destructive rust-fungus. In several cases practically whole collections have been destroyed, and in a great many more the loss has been extremely heavy. The generic name at once singles the pest out as a near relative of the much-dreaded Hollyhock fungus, and the specific one suggests that it is not the Chrysanthemum alone that it affects, but the Hawkweeds, many of which are among the commonest wayside flowers. It is necessary—indeed, important—to know this, as it to a certain extent accounts for the transference of the rust by various agencies from weeds to cultivated plants. Nor are the Hawkweeds alone host-plants of the pest. Burdock, Knapweed, Thistle, and Groundsel are quite as commonly infested.

The rust is found occasionally on the upper surface as well as upon the under surface of the leaves, which after a time are found to be covered with a number of brownish spots of varying size. Sometimes such spots are separate, at others they coalesce, until practically the whole leaf is involved; finally the leaf assumes a still more unhealthy hue—first yellow and then brown—and falls. Prior to this latter stage, however, the numberless spores which have formed have been distributed over an extended surface. Then it is that the parasite is readily carried by insect and other agencies into non-infected areas. In fact, a collection which, say a week or so before, presented a healthy appearance and without the slightest trace of fungus, could practically be ruined in that short time. First one plant, then another, becomes involved, and the collection goes from bad to worse. The actual time occupied by one of the spores in developing, once it has found a congenial resting-place, varies, but from eight to ten days at most would probably cover it.

Here it may be well to state that the first manifestations of the disease to the gardener are usually the formation of the now familiar rust. Long ere this, however, the insidious pest has been working unseen on the leaf-tissues by means of mycelium. In fact, the “rust” is the outward and visible sign that one kind of fruit has been matured—that known as uredo-spores, or summer spores—and it is by means of this that the area of infestation is increased. And this is where the value of spraying comes in, as it prevents such spores as fall, or are carried upon the foliage, from germinating.

If spraying with a fungicide be not adopted, then later in the year (towards autumn) another kind of spores are produced. These are named teleutospores. By means of these the plant-disease is usually carried over the winter, though in certain cases it may be continued by means of the summer spores. The grower would therefore be wise to burn such plants before they have arrived at the stage when the winter spores are formed. If

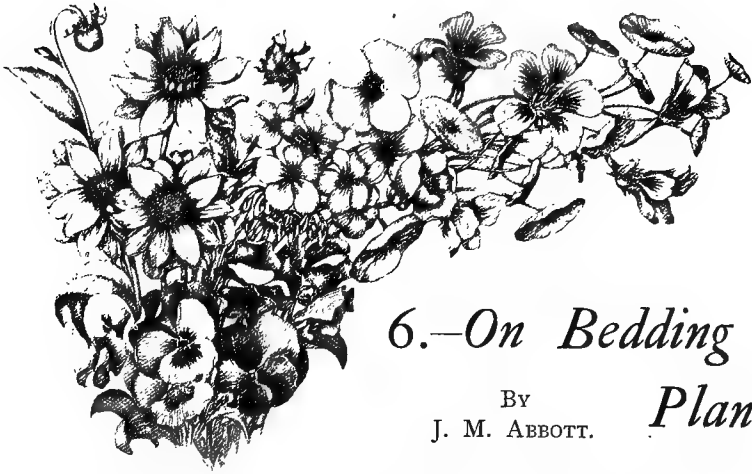
this be not done the teleutospores are dispersed in various ways, many falling upon the soil. They will not germinate the same season, but they assuredly will do so in the ensuing spring, commencing again the cycle of life, unless the grower sprays his plants from the earliest times, as suggested below.

There is absolutely no cure when once the Leaf-Rust fungus has asserted itself. It is, however, possible to stay its progress by spraying with sulphide of potassium (a common fungicide with rosarians and others), at the rate of 1oz. to 3galls. of water, used lukewarm. This will destroy the spores before they can enter the foliage. Affected plants should also be isolated. As a precautionary measure, too, growers would be well advised to spray periodically—say, every eight or ten days—throughout the season. Still, notwithstanding the spraying, some of the spores will doubtless find a suitable resting-place. Where, therefore, the disease has been known to exist, very great care should be exercised by the gardener in collecting every leaf and stem from plants which have been infested, and instead of consigning them to the rubbish-heap they should be burned, otherwise next season the chances are that a severer attack will be experienced.

Mildew, though not a formidable fungus disease like the one just described, is nevertheless undesirable, and has a debilitating effect upon its host-plant. Many growers are under the impression that certain atmospheric conditions are able to produce Mildew: in other words, that a spontaneous origin is possible. Those, however, who have paid a little attention will know that while certain conditions will predispose to an attack, the Mildew usually found upon Chrysanthemums is due to the presence of a specific fungus, *Oidium chrysanthemi*, a relative of that pest of the Vine, *Oidium Tuckeri*. Powdered sulphur, or better still, spraying with sulphide of potassium of the strength recommended for Leaf-Rust, will be found effectual, especially if combined with plenty of light and air, and fluctuations of temperature are avoided.

Leaf-Spot (*Septoria chrysanthemi*) is a disfiguring and weakening fungus disease characterised by dark brown spots on the foliage. They are at first small, but gradually increase in size, and the leaves fall. Spraying, as before recommended, is the remedy.

Damping.—The condition of the blossoms popularly described as “damping” is too well known. Frequently it is present with the Mildew attack above noted, the conditions of the atmosphere being favourable for the development of either. Chrysanthemums in foggy towns are more liable to the condition than those grown where fogs are comparatively light. An atmosphere surcharged with moisture is also fatal, and therefore a buoyant one should prevail. Another prolific source of “damping” is due to the use, or rather to the abuse, of stimulants.



6.—*On Bedding*

BY
J. M. ABBOTT. *Plants.*

THE term "Bedding Plants" is usually applied to such half-hardy subjects as Pelargoniums and Calceolarias, which are planted out in beds for summer display. This, however, seems to be a rather restricted meaning of the term, as the hardy plants which are used for the decoration of the same beds during winter and spring have as just a claim to the title of "Bedding Plants" as have the summer occupants of such beds, and they will therefore be included in this chapter. The system of planting a series of beds with half-hardy plants for summer decoration has for many years been extensively adopted in this country, and there can be no doubt that to produce an effective display of blossom for the longest possible time in a group of beds, this system of filling them in May or June with plants of the half-hardy class, followed in the autumn by a distinct set of hardy bedders (bulbs, &c.), for spring decoration, must be adopted.

Bedding plants may be divided into three groups, according to the season when they are employed, viz., spring, summer, and winter bedders, and these will be treated under their respective headings, beginning with those used in

Summer Bedding.

PREPARATION OF BEDS.—Before passing on to the plants themselves, a few words on the preparation of the beds for the

reception of the occupants are necessary. It is now a recognised thing that the cultivation of the majority of plants for a long-continued display of flowers is very exhausting to the soil, and consequently they require as good a foundation laid for their culture as many of our vegetables. It is therefore indispensable that the beds should be well-drained, well-manured, and deeply-worked, if their occupants are to be creditable. What can be worse than stagnant water about a bed of plants? It keeps down the temperature of the soil, and prevents the air from entering and sweetening it, thereby bringing about a condition of things fatal to the life of the plants. As to deep cultivation, the benefits to be derived from it are many: it gives a greater degree of openness to the soil, so that the roots can penetrate the more easily, and in dry seasons descend to where the soil is moist, thus escaping, to a greater degree, the evils of drought. In wet seasons, the surplus water also escapes more readily to the drains and subsoil, instead of standing about the roots of the plants and causing their decay. An excellent plan to adopt is to trench the beds to a depth of 2ft. every second season, and time thus spent will be well repaid by the superior health and beauty of the plants grown. Then as to soil, the best for the cultivation of the majority of bedding plants is undoubtedly a deep, light loam, resting on a dry subsoil. In a soil of this description, it is surprising how well these plants grow and flower. If the soil is very light and sandy, it is greatly improved by having a quantity of heavy loam incorporated with it; but if it is naturally unsuitable, the best way to remedy the evil is to excavate the original soil to a depth of 2ft., replacing it with, say, a compost of two parts friable loam and one of leaf-mould.

If plants are to be grown in the same ground for several consecutive years, manure must be applied to the soil, or it will soon become exhausted. For this purpose, nothing is better than old hotbed- or well-decomposed cow-manure, on no account using the latter in a fresh state. The dressings are best applied when the beds are trenched, mixing the manure well with the soil. If trenching is not necessary, the manure might be scattered over the surface and forked well in. In districts where the rainfall is great, as in the neighbourhood of hills, many plants, such as Pelargoniums, produce leaf at the expense of flower. In such localities, the soil should be raised more above the ground-level, and, of course, manure should be more sparingly applied.

PLANTING.—The time for planting out depends on the general climate of the district, the position of the garden as to shelter, and the condition of the plants, together with the character of the individual season. It is certainly much better to wait a week or two than to remove plants out of sheltered situations into the open beds, if there is any fear of cold winds or a night's frost, in which case they would no doubt receive a check sufficient to affect their well-being for the whole season. The usual time for planting out is the end of May or during the month of June. Showery weather is generally chosen for the operation, but should dry weather prevail, planting may commence in June, providing the beds receive a good watering immediately after. This is preferable to planting when the soil is very wet and sticky, as then it is apt to be pressed into hard lumps. When the plants are in pots, it is best to water them thoroughly overnight, so as to have the balls in a perfectly moist condition by the morning; as when turned out of a pot and when rather dry, it is almost impossible to get water to enter the ball after the plant has been put in the ground, and it naturally suffers in consequence. If the weather continues dry after planting, liberal waterings should be given at intervals, never allowing the plants to suffer for want of water. The removal of decayed leaves and flowers should be regularly seen to throughout the summer, so that the beds may at all times present a neat and tidy appearance.

The blending and contrasting of colours is a subject that requires great attention in bedding arrangements. The harmonising of one colour with another generally produces the most pleasing effect. Thus, by arranging the colours purple, red, pink, salmon, yellow, and white, in the order named, the eye is led gradually from one colour to the other, and perfect harmony prevails. In planting small beds, however, it is not advisable to introduce too many shades of colour—two, or, at the most, three, will suffice. The most accommodating colour for contrasting with others is white or very light grey, such as is supplied by *Cineraria maritima* or *Cerastium tomentosum*; these plants associate well with all strong colours, and produce striking contrasts. The shrewd gardener is always on the alert for suitable combinations, and when he sees any that take his fancy, he jots them down in his note-book for use in future seasons.

The gardener of the present day has considerable advantage over his predecessors in the matter of bedding, as the number

of beautiful subjects at his disposal is infinite, so that by a judicious selection he may, during the summer, convert his garden into a veritable fairyland. To attain this end he has the choice of three distinct styles of summer bedding, viz. (1) Ordinary summer bedding, (2) Sub-tropical, and (3) Carpet bedding, and for our purpose it will be best to deal with the plants used in each style separately, beginning with :

Ordinary Summer Bedding.

AGERATUMS.—These are useful bedding plants, blossoming continuously from June till October, or until destroyed by frost ; they vary in height from 4in. to 15in. ; the flowers, which are some shade of blue, or white, are lasting, and retain their colour well. They are excellent plants either for edgings, for small beds by themselves, or for mixing with Tricolor Pelargoniums, &c. ; also as carpeting plants for Fuchsias or other tall-growing subjects. Seeds may be sown in January or February in heat, and the seedlings grown on in small pots and gradually hardened off ready for planting out in June. They are also propagated readily from cuttings at any season, a little bottom-heat being beneficial.

The dwarf varieties of *Ageratum mexicanum* are the kinds generally used for bedding purposes, and the selection here given may be relied upon. (See also "Half-hardy Annuals.") Cupid is one of the best ; it grows about 9in. high, and is very floriferous, producing rich blue flowers, set off by bright green foliage. Swanley Blue, 6in. to 9in. high, has very dark blue flowers ; it is often used as an edging plant for beds of Variegated Pelargoniums, in which position it is very effective. The Zoo is a fine variety, 8in. or 9in. high, of compact habit ; it bears large trusses of bright violet-blue flowers at the point of every shoot. Albiflorum Nanum, 9in. high, has pure white flowers, and makes a useful bedding plant. Cannell's Dwarf grows only 3in. high, and yields an abundance of bright lavender-blue flowers. Imperial Dwarf, Lady Jane, Countess of Stair, Johannas Pfitzer, Le Geant, and Perle Bleu are all good blue-flowered varieties ; whilst among the whites *Enfant de Paris*, *Tapis Blanc*, *Snowflake*, and *Candeur* are excellent.

BEEET.—Several varieties of *Beta vulgaris* are used for bedding on account of their highly-coloured crimson, dark purple, or bronzy foliage. The seed may be sown in April or May in a reserve bed, and the seedlings transferred to their permanent quarters when required. Dell's Crimson is dealt with under "Biennials." *Victoria* (Fig. 82) is an old and well-tried variety, with foliage of a nice deep bronzy-red. *Dracæna*-leaved Beet is

also good for edgings, growing only 1ft. high, and producing elegant recurved crimson foliage.

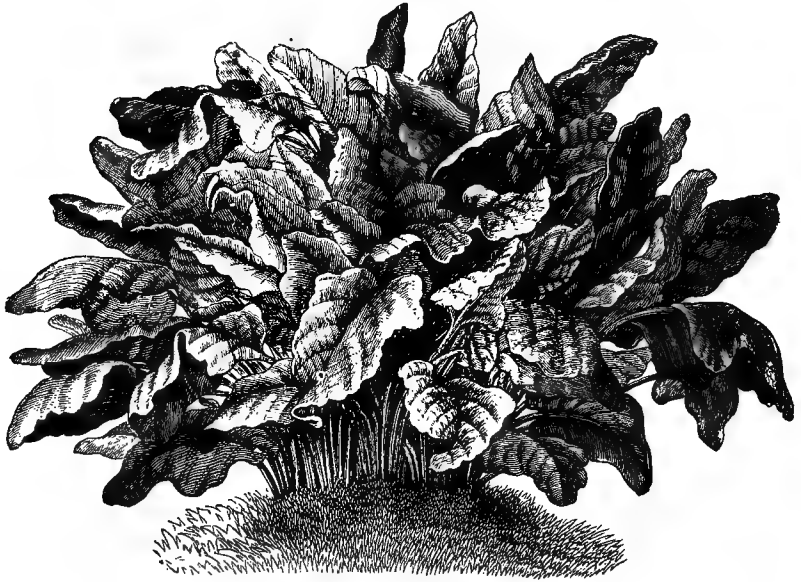


FIG. 82.—*BETA HORTENSIS METALLICA*, OR VICTORIA BEET.

BEGONIAS.—The tuberous-rooted Begonias constitute a class of plants admirably adapted for this style of bedding. They may be grown with less labour and attention than many bedding plants, and when in flower it is surprising how they will withstand the ill-effects of wind and heavy rain, and remain one mass of colour until frost puts in an appearance. The tubers are started into growth about March by placing them either singly in pots or several together in boxes of light soil composed of loam, leaf-mould, and sand, with a little decayed cow-manure added. The pots or pans should be well-drained, and the compost in a moist condition when used. The tubers should be potted firmly, placing them just below the surface, and watering carefully until growth is fairly active. They should be gradually hardened off by admitting air, and transferred to the beds in June. In dry weather water should be freely applied, never allowing the tubers to get dry at the root; they will then produce a display which, for brilliancy of colour, and duration and profusion of blossom, will compare favourably with any other bedding plant grown. When lifted in the autumn, the tubers require to be

dried carefully (which may be done by placing them in a light, dry, airy position), or the decaying stems will rot them. As soon as they are thoroughly dried they should be packed away in boxes of dry sand or cocoa-nut fibre, and placed in a cool position out of the way of frost until time for starting them again the following spring. They are easily propagated by division of the tubers just when starting into growth in the spring. The tubers should be cut carefully with a sharp knife, and the cut surfaces smeared with dry charcoal before repotting. They may also be raised from seed sown in pans of light, sandy soil in early spring. The pans should be well-watered before the seed is sown. No covering of soil is required, as the seed is



FIG. 83.—SEEDLING TUBEROUS-ROOTED BEGONIA.

very minute, but squares of glass might with advantage be placed over the pans so as to keep the soil in a uniformly moist condition. They should be placed in a temperature of from 60deg. to 65deg., and kept shaded. When the seedlings are large enough to handle, they should be pricked off into pans of light soil; they should afterwards be potted singly in small pots, grown on, and finally hardened off and planted out towards the end of June. Seedlings thus treated, if sown early enough, will flower the same season.

The shrubby fibrous-rooted section also contributes several species which are now used for bedding purposes; of these, *B. semperflorens* and its varieties are especially suitable, as they

flower with the greatest profusion throughout the whole summer, and also stand the wet weather exceedingly well. They may be raised in quantity from seed; cuttings may also be rooted by inserting them in a light sandy soil round the edge of the cutting-pot, and placing them in a propagating-case having a bottom-heat of about 70deg.

The varieties of *Begonias* suitable for bedding purposes are now numerous, the following being amongst the best: *Worthiana*, a great favourite, with small orange-scarlet flowers; it is of robust constitution and exceedingly floriferous, and requires to be planted at about 10in. from plant to plant. *Erfordi* has dark bronze-coloured leaves and rosy-carmine flowers. *Vesuvius* is an excellent variety, of compact habit, producing bright orange-scarlet flowers. *Cannell's Scarlet* is a good dwarf form, bearing numerous small scarlet flowers. *Baumannii*, primrose-scented, produces bright rose-coloured flowers in profusion. *Queen of Bedders* is a variety of the shrubby *B. semperflorens*, and has rich dark bronze foliage, which sets off to advantage its dazzling-red flowers. *Ascotensis* has pink, *Castanæfolia* has rose, whilst *Knowsleyana* has blush-coloured flowers. Most of our nurserymen offer seeds of both single and double varieties, saved from flowers of all shades of colour from white, orange, yellow, and pink, to dark crimson. Tubers may also be obtained, either of the named kinds or mixed specially for bedding purposes. Seedlings are frequently employed for Bedding, and may be cheaply procured. Fig. 83 represents an especially good seedling, with flowers some 6in. across.

CALCEOLARIAS.—These are subjects that require good, deep, rich soil, with plenty of manure, the object being to grow them vigorously so as to get healthy green plants, free from insects. Propagation is effected by means of cuttings of firm young shoots, put in during September and October, in a cold pit or frame. The frame should be in a dry position, and the cuttings must not be dibbled in too thickly, on account of damping. They should be carefully shaded during sunshine, and kept as close and cool as possible. They may also be propagated by cuttings, placed in pots at the same season, keeping them in cutting-pots during the winter, potting off singly into 3in. pots in the early spring, and gradually hardening off. Those that are struck in the cold frame will not require to be potted up, but are best planted out direct from the frame to their flowering quarters. All the autumn-struck cuttings should have their tops pinched out about March, so as to form nice bushy specimens. If more plants are required, these tops may be put in as cuttings, either in hot-beds or in pans or boxes placed in heat, and when rooted and growing freely they may be hardened off gradually and planted out at the same time as the others. Watering the cuttings is a point which requires

great care, or "damping" will ensue. The shrubby kinds are generally grown for bedding purposes; these include such well-known forms as Gaine's Yellow, a good old-fashioned bedder, of robust constitution; Sultan, a fine dark variety; and Golden Gem, one of the best, with bright yellow flowers; these grow from 12in. to 18in. in height. *Calceolaria amplexicaulis* belongs to the herbaceous section. The leaves are stem-clasping, and the lemon-coloured flowers are produced freely from June until late in the autumn. The plant grows 1½ft. high, and is very good for associating with other taller-growing subjects.

CELOSIAS.—Although typically greenhouse and stove plants, some of these are now used for bedding purposes, and very graceful decorative plants they prove to be, with their showy, feathery plumes of flowers.

Seeds should be sown in March or April in pans of light soil, pricking off the seedlings when large enough into thumb-pots, and growing them on quickly in gentle heat. They will soon be ready for shifting into 5in. pots. They should be kept rather on the dry side, and as near the glass as possible, to induce flowering, gradually hardening them off, and planting out in June, after the crowns of flowers are formed. *Celosia pyramidalis* grows to a height of 18in., and has numerous varieties, usually some shade of yellow or crimson. In catalogues they are generally described under the name of *C. plumosa*. Sutton's Dwarf is one of the best, being of compact habit and possessing free-flowering properties. *Celosia*



FIG. 84.—CELOSIA CRISTATA.

cristata (Fig. 84) is the Cockscomb. Seed should be sown in March, and the seedlings pricked out into pans of light soil and grown on quickly for a time; then by keeping them cooler for a few days their combs will soon appear, and although small, it is easy to distinguish which are worth keeping. These should be potted up, and grown on in heat. When the combs are fairly well developed, the plants may be hardened off, and transferred to beds in warm situations. There are several varieties

most of them with crimson combs. Giant Empress grows 1ft. high, and has dark foliage and large brilliant purple combs. Vesuvius is a handsome plant, with golden-yellow combs, the upper part being of a bright red colour.

CENTAUREA RAGUSINA is a valuable bedding plant, with broad silvery-white foliage, for which alone it is used; it is excellent for contrasting with any strong colour, and forms a suitable subject for edgings to beds of *Coleus*, *Iresines*, *Perillas*, &c. It is propagated by cuttings taken off preferably with a heel, and inserted in pots of sandy soil during September, plunging the pots in a cold frame, and keeping close for a few weeks, until the cuttings are rooted. Plenty of air should then be admitted, keeping the leaves dry, so as to avoid damping. Plants will winter successfully in a frame providing that frost

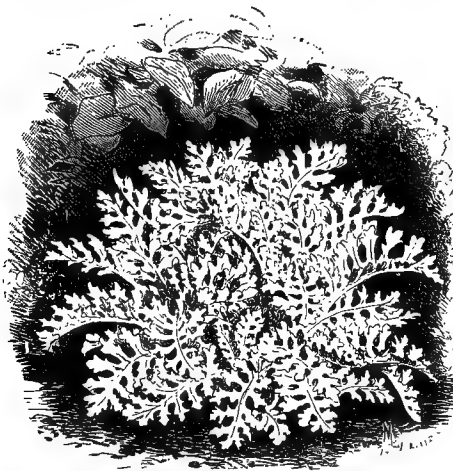


FIG. 85.—*CINERARIA MARITIMA*.

CINERARIA MARITIMA (Fig. 85) is a hardy perennial with silvery-white foliage and heads of yellow flowers. The flower-stems must, however, be pinched out as soon as they appear, as it is the silvery foliage that is required. It is largely used for edgings to beds of *Perillas*, &c., taking the place of *Centaurea ragusina*. It may be increased by cuttings of short side-shoots, taken off the old plants in early spring, and placed in gentle heat. Seeds also germinate freely if sown in heat about February, pricking off the seedlings when large enough into boxes, and keeping in heat until established, afterwards hardening off in a cool pit or frame. The seedlings, however, do not develop such fine coloured leaves as do the plants struck from cuttings, so that it is always best to

is excluded. Some growers prefer to insert the cuttings singly in small pots, potting on in the spring, and pinching, to form bushy plants. Those kept in the cutting-pots during the winter ought to be potted up singly in the spring, into "forty-eights," in which they will stand until bedding-out time arrives. Seeds may also be sown in August in heat, and the seedlings pricked off singly into small pots and treated in the same manner as the cuttings.

pot up a few old plants in the autumn for furnishing cuttings early in the spring. *C. maritima* grows from 12in. to 18in.

COLEUS VERSCHAFFELTII is one of the best crimson-leaved plants used for bedding; it grows from 12in. to 18in. high, and strikes freely from cuttings placed in bottom-heat in spring. A few old plants taken up and potted in the autumn will yield an abundance of cuttings in the spring, as each "eye" will grow and form a plant. March is the best time for propagating for bedding, growing the cuttings on in heat until May, and then very gradually hardening them off. They make very effective beds when edged with silver- or golden-leaved plants, such as *Cineraria maritima* or Pyrethrum Golden Feather. Taylor's Pet is a very dark crimson form, which, when planted out, turns almost black; it withstands the cold better than *C. Verschaffeltii*.

FUCHSIAS.—These are now largely used in summer bedding arrangements, and very effective plants they prove to be, with their graceful drooping flowers. They are propagated by means of cuttings of the young growing shoots, taken from the old plants just as they start into growth in the spring, and placed in a warm propagating-frame. They root quite readily, and are soon fit for potting up singly into small pots. The cuttings should be kept near the glass in a warm house, so as to induce them to make stout, healthy growth, repotting them into 6in. pots before the roots become matted together. They should be kept growing freely during the summer, gradually drying off in the autumn by withholding water and keeping them in a cooler temperature. They will then make excellent stock plants for starting into growth, in heat, during the early spring, gradually hardening off, and planting out in June. The following autumn they should be taken up before severe frost occurs, ripening them off well, previous to storing away in cool, dry sheds or cellars for the winter. Some Fuchsias are allowed to assume a bush form, whilst others are kept to a single stem, and grown into pyramids. The dwarf, bushy kinds form excellent beds, either alone or edged with other dwarf-growing bedding plants. Those grown into pyramids make beautiful objects, their drooping branches showing off to advantage. They require a carpeting of Ageratums, Violas, or other dwarf-growing subjects. The varieties of bedding Fuchsias are very numerous; in fact, almost all of the Fuchsias are sufficiently hardy to stand outside during the summer. Dunrobin Castle is a very distinct bedding variety of compact habit. It has small dark foliage and bright coral-red flowers, which are produced in great profusion for weeks in succession. It is suitable for either small beds, carpeting below taller plants, vases, window-boxes, or for growing into standards. There are several varieties, with richly-coloured or variegated leaves, which are grown extensively for bedding purposes. Amongst these are Cloth of Gold, an old favourite, having

golden leaves margined with green; Sunray, a beautiful decorative variety, with red variegated leaves; Meteor, a valuable bedder, the lower leaves of a buff-yellow colour, whilst the upper ones are of a rich crimson hue.

GAILLARDIAS.—As well as being ornamental border-plants, these are excellent for bedding displays. They should be planted rather thinly, so as to allow room for pegging down the shoots. Propagation is effected by means of cuttings taken in the autumn, and treated in the same way as *Pelargonium* cuttings. It is surprising how well they succeed in a dry season, producing an abundance of flowers from June to November. *G. grandiflora maxima* is one of the best of the perennials, having large handsome yellow flowers, with a central crimson ring; the shoots grow about 18in. long. Numerous named varieties are now in cultivation.

The half-hardy annual varieties, such as *Lorenziana*, *Drummondii* or *picta*, *amblyodon*, &c., are also very effective and useful bedding plants, on account of their richly-coloured flowers and the long duration of their flowering period; but as these are described under "Half-hardy Annuals," it will be unnecessary to repeat the descriptions here.

GAZANIAS.—These are useful plants for sunny positions; they are best propagated by cuttings put in during August in a close frame. When rooted, they should be removed to a cool, airy place, the object being to keep them short and sturdy. It is advisable to winter them in the cutting-pots or boxes, merely keeping them out of the way of frost. In the spring they should be potted off singly, keeping them close until established, and afterwards hardening off for planting in May or June. These autumn-struck cuttings should not be topped in the spring, as is done with many bedding-plants, or they will be very late in flowering. In colour the flowers are generally yellow, with dark basal spots. *G. splendens* is a handsome and much-grown trailer, with stems 18in. long; it has bright orange-coloured ray-florets, with a black-and-white spot at the base, the disk being paler in colour.

GERANIUMS.—See *Pelargoniums*.

GOLDEN FEATHER.—See *Pyrethrum*.

HELIOTROPES.—These are popular bedding plants, being much prized for their deliciously fragrant flowers, which are produced abundantly throughout the summer. The dwarf kinds are suitable either for forming beds by themselves or for carpeting beds of taller-growing subjects, whilst the vigorous growers are admirable for training into pyramids, carpeting the beds with other dwarf subjects. Propagation is best effected by means of cuttings taken about the end of August, and placed in a close case until rooted. They should be kept in a warm greenhouse during the winter, and in the spring be brought into a higher

temperature, where they will make an abundance of cuttings. These should be placed in bottom-heat, and kept close until rooted; they may then be potted on and kept growing freely until bedding-out time. As the plants are rather tender, it is not advisable to put them out until a continuance of warm weather is tolerably assured. Plants intended for pyramids should be struck from cuttings in August, and kept growing on during the winter, training them to a single stem, until the desired height is reached. If the points are then pinched out, the side branches will soon develop and form a head. If named varieties are not required, seed may be sown in early spring, and the seedlings grown on for planting out into good dry soil in June; these will flower the same year as sown. Miss Nightingale, although an old variety, is still one of the best for bedding; it is of dwarf, floriferous habit, and bears dark lilac flowers. President Garfield has bright mauve flowers. White Lady has whitish-lilac flowers, the trusses of which are very large.

IREFINE.—To this genus belong two or three plants which are indispensable for summer bedding, on account of their richly-coloured foliage. Propagation is effected by means of cuttings placed in a close propagating-frame in August and September; when rooted, they should be taken out of the frame, kept rather dry, and wintered in a greenhouse temperature. About February they should be potted up singly and introduced to more heat and moisture, and at the same time their tops should be pinched out; this will cause them to break back and form an abundance of good strong cuttings, which, if placed in a close case, will soon emit roots; these may be potted up, kept in a warm place until well established, and then gradually hardened off. Like Heliotropes, Iresines are rather tender, and ought not to be planted out until the season is well advanced. To bring their foliage to perfection a warm season, with an abundance of sunshine, is necessary. *Iresine Herbstii* has splendid foliage; the upper surface is of a dark greenish colour, with the mid-rib and principal veins of a rich carmine hue; the under surface is deep crimson. The stem, which grows to a height of 12 in. or 18 in., is also bright carmine. The variety *aureo-reticulata* (Fig. 86) has the stem, leaf-stalks, and principal veins of a deep red colour, whilst the surface of the leaves is green, blotched



FIG. 86.—*IREFINE HERBSTII*
AUREO-RETICULATA.

with gold. *I. Lindenii* is an excellent species, and largely grown for bedding purposes; it has deep blood-red leaves, with purplish mid-ribs; the leaves are more pointed than those of *Herbstii*. It forms a fine edging plant to beds of Pelargoniums, &c.

LANTANAS.—The named varieties of Lantana, with their large Verbena-like heads of richly-coloured flowers, produced abundantly during the whole summer, are charming subjects for flower-beds. They are as easy to cultivate as Pelargoniums, and may be used either in beds by themselves, or as carpeting plants for tall-growing Fuchsias, &c., or they may be trained as standards. Propagation is effected by means of cuttings, treated like those of the Iresine. *Drap d'Or* is unequalled for bedding; it is of dwarf compact habit, and very floriferous, producing numerous heads of bright yellow flowers. *Don Calmet* is also very floriferous, bearing an abundance of clear lilac flowers with red centres; it grows about 1ft. high.

LOBELIAS.—The predominating colour amongst the dwarf-growing Lobelias is blue, a colour which is rather rare

amongst the ordinary run of bedding plants. To this, and to their dwarf compact habit may be attributed the reason of their universal adoption for bedding purposes, and especially as edgings to beds of taller subjects. They are

readily increased by either seeds or cuttings. Seeds may be sown in February or March in pans of light sandy soil (covered but slightly, as

they are very minute) and stood in a warm house. They should afterwards be pricked off into boxes and kept under glass until nearly bedding time, when they should be hardened off.

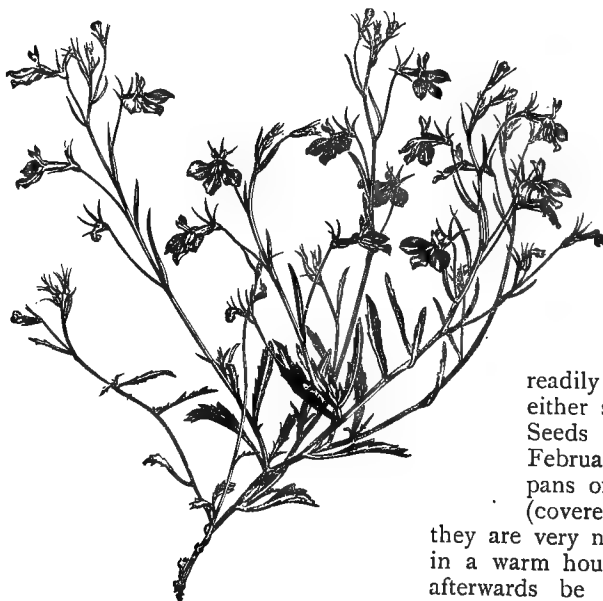


FIG. 87.—LOBELIA ERINUS.

They may also be sown thinly in rows, in a frame close to the glass, and transferred direct to their flowering quarters

As they are liable to sport from seed, the best way to perpetuate and preserve any special variety is by means of cuttings; these may either be inserted in autumn, or a few old plants may be taken up, potted, and kept in a frame during the winter. Early in the spring remove them into a warm, moist atmosphere, where they will soon make an abundance of cuttings; these may be taken off, placed in a warm propagating-frame, and when rooted pricked out into boxes and hardened off before bedding-out time. In this way any amount of plants of uniform habit may be obtained.

The taller-growing species may also be increased readily by means of seeds, cuttings, or divisions of the old plants in spring. *Lobelia Erinus* (Fig. 87) is the species from which most of our dwarf bedding varieties have sprung. The typical plant has blue flowers, with a white or yellowish throat; it grows only 6in. high. *L. speciosa* is an old favourite, of free, graceful habit, suitable for trailing over vases; it has dark bronze foliage. *L. compacta* is of neat and compact habit, suitable for edgings, &c.; there is also a white-flowered variety, and one with golden foliage. *L. pumila magnifica* is an excellent bedder, with bright blue flowers; it grows only 3in. high. *L. ramosa* is a taller-growing form, reaching a height of 9in.; it has deep purple-blue flowers. There are also numerous good named varieties, of which Cobalt Blue, Swanley Blue, Crystal Palace, and Emperor William, are amongst the best.

Of the taller-growing species, *L. cardinalis* (Fig. 88), with rough corrugated foliage, and numerous spikes of crimson-scarlet flowers, is one of the finest; it grows from 1½ft. to 2ft. high. *L. fulgens* or *L. splendens* is also excellent; it has reddish leaves, which are rather longer, narrower, and more downy than those of *L. cardinalis*, and beautiful scarlet flowers. The form Queen Victoria has deep mulberry-coloured foliage, and intense vermilion-scarlet flowers; it attains a height of from 2½ft. to 3ft. Firefly also has bright scarlet flowers, and sometimes reaches a height of 5ft. The rich and brilliant-coloured flowers and foliage of these tall perennial Lobelias



FIG. 88.—LOBELIA CARDINALIS.

render them indispensable for summer bedding ; in mild districts they prove hardy enough to stand the winter outside with a light covering of ashes, &c., though it is always best to lift and store them in a dry shed, starting them into growth again in spring.

PELARGONIUMS.—In the whole range of bedding plants it would be difficult to name a more popular favourite than the Zonal Pelargonium ; it matters little where you go, whether into the gardens of the wealthy, or into those of the humblest cottagers, the “Zonal” is to be seen in all its splendour. It is a plant very easily propagated by means of cuttings at any season ; the best time, however, is about the middle of August, when the plants in the beds have made vigorous and firm growth, and the cuttings will not be missed. The best cuttings are obtained from the outsides of the beds, where the growths are usually short-jointed and firm ; these make much finer plants than those from the centre of the beds, where the growths are long and grassy. The cuttings will root freely if inserted in boxes of light sandy soil and stood in cool frames, or even in the open air. During the winter they should be placed in a dry pit, having at command sufficient fire-heat to keep them safe from frost, and to expel damp. If the foliage is crowded it might with advantage be thinned out a little, so as to allow of a free circulation of air amongst the cuttings. After the end of October they should not have more water than is necessary to keep them from drooping. During the winter they should be constantly looked over, and any dead or decaying leaves ought to be at once removed. About the middle of February they may be taken carefully from the cutting-boxes and potted singly into 3in.-pots in a compost of loam, sand, and a little well-decayed farmyard manure, placed in light, dry pits, kept rather close for a few days until established, and then given an abundance of air. About the beginning of May they should be placed outside so that they may be thoroughly hardened off ready for planting out in June. Some people insert the cuttings somewhat thinner in the cutting-boxes, pinch out the points in February, and transplant direct from the boxes to the open ground. Others strike the cuttings in the open ground in autumn and when rooted, lift and pot up singly into 3in. pots ; this method may be very good, but far more room is required for housing the plants in winter, and this is not always at liberty. If it is found during the winter that more plants will be required than has been bargained for, a quantity of the autumn-struck cuttings should be introduced to heat early in February, and when a few inches of growth have been made, they may be topped for cuttings, placing the tops in a warm propagating-frame until rooted, then potting off carefully and hardening by introducing to more light and air.

The varieties suitable for bedding are very numerous, and include such well-known forms as the following :

Ordinary Zonals.—Vesuvius, having scarlet flowers with a small white eye; one of the best and most popular. Henry Jacoby, with crimson-maroon flowers; very compact in habit, and producing an abundance of fine trusses. John Gibbons, with orange-scarlet flowers. Rev. H. Johnston, with large trusses of dark crimson flowers.

Golden-bronze Zonals.—Model, Golden Harry Hieover, and Bronze Queen, with a golden-yellow disk and margin, separated by a more or less brown-bronze zone, shaped like a horse-shoe.

Yellow-leaved Section.—Crystal Palace Gem and Robert Fish, with zoneless leaves.

Novelties.—Happy Thought, with a creamy-white centre, and green round the outside.

Golden Tricolors.—Mr. Harry Cox, having intensely-bright markings, with a well-defined zone of rich crimson, and bright yellow margin. Mrs. Pollock; an old, well-known kind.

Silver Tricolors.—Mrs. Laing, Eva Fish, Miss Farren, and Dolly Varden.

White-Edged Section.—Flower of Spring, with cream-coloured variegation. Little Trot; leaves margined with a broad band of white; an excellent bedder, of branching habit, scarcely attaining 6in. in height. These fine-foliaged varieties are generally grown for the sake of their leaves, and on this account are seldom allowed to flower.

Ivy-leaved Pelargoniums are suitable for covering trellises and for growing in vases, where their long, trailing growths, hanging over the sides, show off to advantage. They are rather more tender than the Zonal kinds, and require to be kept a little warmer during the winter. Numerous varieties are now advertised, amongst which are La France, Masterpiece, and Mrs. H. Cannell, with single flowers, and Madame Thibaut, Jeanne d'Arc, Incomparable, and Gloire d'Orleans, with double flowers.

PERILLA NANKINENSIS.—This is a most useful bedding plant, with dark mulberry-coloured foliage; it grows from 1ft. to 2ft. high, and is generally used for edgings or for mixing with silver-leaved plants, on account of its dark purplish foliage. Seed may be sown about the end of February in pans or boxes, and placed in heat. The seedlings, when large enough, must be pricked out into other boxes, and when well established, and growing freely, they should be gradually hardened off, previous to planting.

PETUNIAS.—These are very showy and popular subjects when grown in masses in a sunny position and fairly rich soil. They have showy salver-shaped flowers, crimson, purple, and white, striped and blotched in various ways. They are very effective when trained over hoops, fences, and trellises, as well as disposed

over tree-stumps. Seed may be sown in February or March, pricking out the seedlings into boxes, and transplanting to the open border during June. Cuttings will also root freely if placed in a warm case about August; when rooted, they should be transferred to a cool position for the remainder of the summer, removing to a warm greenhouse before any signs of frost appear. In the early spring, they should be potted up singly, and kept in a gentle heat; they will soon make plenty of new growth, and if more plants are required, the tops may be taken off and put in as cuttings; if placed in a close case, these will soon root and make fine specimens for planting out in June. Numerous named varieties are now grown, some having double and others single flowers. Of the latter, Dr. Hogg and Spitfire are amongst the best; whilst of the double forms, Kate Tidy (white), Wm. Brown, Perfection, and Mrs. Chas. Wilson cannot be beaten.

PHLOX DRUMMONDI is a plant which cannot be passed by unnoticed, as for filling small beds, or for mixing with taller-growing subjects, it is superb. It is a half-hardy annual, and in this work is treated of under "Half-hardy Annuals."

PYRETHRUM GOLDEN FEATHER is a well-known, free-growing bedding-plant, suitable for edgings, &c. It has been styled the "gardener's friend," and it certainly is a treasure to him, for it can always be relied upon, and is always in season. In spring the plants look like masses of gold, and in summer they light up the whole garden, and harmonise with everything. As they are grown for their beautiful golden foliage, which is often elegantly cut, the flower-buds should be picked off as they appear. To secure plants suitable for bedding out in June, the seed should be sown in March in a warm pit, and the seedlings grown on rapidly in a light position.

VERBENAS.—These rank amongst the showiest of our summer-bedding subjects; they are easily raised from seed sown in spring; or they may be grown from cuttings of short, stubby shoots dibbled into a slight hot-bed in August. They may also be increased by potting a few old plants in the autumn, wintering them in a cool, light greenhouse, and placing them in heat about January, when they will make an abundance of cuttings. These will root readily if placed in a close propagating-frame, and will make useful subjects for planting out in June. Those raised from seed are more robust in growth, and yield more flowers than those grown from cuttings, and, moreover, are not so liable to fall a prey to the disease which attacks those raised from cuttings; it is therefore advisable to grow them annually from seed, and if care is taken in selecting the seed, excellent results will be obtained. *Verbena venosa* has rose-purple flowers, and grows to a height of 18in.; it is very

effective in beds, especially when mixed with some contrasting colour, such as is supplied by the Silver-Leaved Pelargoniums; it is of branching habit, and answers well when pegged down. There are also several named varieties which are very useful for bedding purposes, such as Crimson King, of fine habit, having bright crimson flowers with white eyes; Purple King, an old and well-known variety with purple flowers; and *V. Melindres splendens*, with brilliant scarlet flowers. Most of our nurserymen also advertise choice mixed seed, producing beautiful shades of white, rose, scarlet, blue, and purple flowers, so that no difficulty will be experienced in obtaining a fine selection of these deservedly-popular bedding-plants. The flowers of the last-named are in close, compact heads.

Sub-Tropical Bedding.

The introduction of large-foliaged, stately, sub-tropical plants into our flower-gardens during the summer months has been

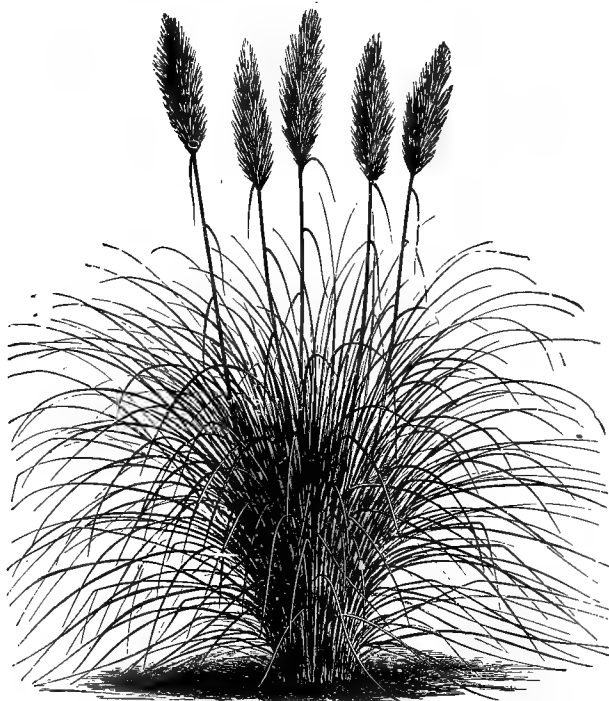


FIG. 89.—GYNERIUM ARGENTEUM.

arranged so as to enable us, as it were, to obtain faint glimpses of the grandeur of tropical vegetation. In this style of bedding

any sub-tropical plant may be used, providing it is sufficiently robust in constitution to withstand the variations of our changeable climate. Many of the plants used are of a tender nature, and only suitable for standing outside during the hottest part of



FIG. 90.—ARUNDO DONAX.

the summer; but there are others which are hardy enough to withstand an ordinary English winter—in the South of England, at any rate. To this latter group belong such plants as *Gynerium argenteum* (the Pampas Grass) (Fig. 89), *Arundo Donax* (Fig. 90), *Gunnera scabra* (Fig. 91) and *G. manicata*,

Chamærops humilis, *Chamærops Fortunei* (*Trachycarpus excelsus*), and the Bamboos. These stately subjects are suitable for planting either as single specimens about the lawn or in groups in sheltered positions. The Gunneras require damp situations, preferably near the banks of lakes or streams, and when the foliage dies down in the late autumn, the crowns should be protected from frost by having a quantity of dry leaves thrown over them to the depth of 12in. or 18in. As the Gunneras start into growth early in the season, the winter covering should be removed before the young leaves have made much progress,

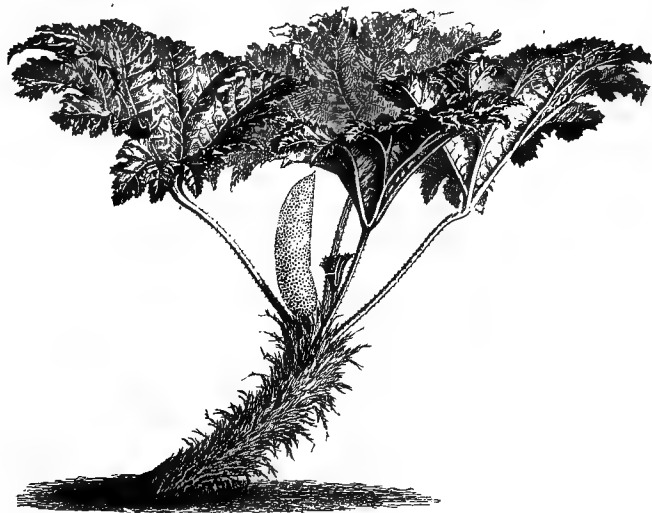


FIG. 91.—GUNNERA SCABRA.

otherwise they will be damaged during the operation. When in the young state the leaves are very tender, and preparation must be made for covering up the plants if any signs of frost appear.

Returning to the non-permanent sub-tropical bedders, there are two distinct groups—to the one belong the Agaves, Yuccas, Dracænas, Musas, Tree-Ferns, and several of the Palms—plants generally of slow growth, which are kept in pots or tubs, and plunged outside during the summer, and have to be removed to the greenhouse for the winter; these present a fine appearance, giving to the garden a tropical aspect. One of the most essential points in the culture of Musas, Tree-Ferns, and, in fact,

of all tender large-foliaged plants grown outside, is that of shelter, as if exposed to high winds the leaves get torn to shreds, and the plants are thereby disfigured, and look unsightly objects in the flower-garden. It is therefore imperative that a sheltered position should be chosen for this phase of sub-tropical bedding. For more exposed situations, and for terrace gardens, the Agaves and Yuccas are amongst the best of stately-foliaged plants, as the leaves are not liable to be damaged by the wind, and the plants themselves are more in accordance with their surroundings. As this class of plants require a considerable amount of room for their accommodation in winter, it is evident that sub-tropical bedding cannot be carried out to any extent, except in very large establishments, where plenty of room is at command during winter.

To the other group belong the Cannas, the tuberous-rooted Solanums, &c., the tubers of which may be taken up in the late autumn, and after being dried, stored away for the winter in a shed or other suitable structure, where they are out of the reach of frost. These may be readily increased by division of the tubers, just as they are starting into growth in the spring, placing them in a warm case until established, afterwards growing on, and hardening off, ready for planting out when all danger of late spring frosts is past.

With this group may be included numerous robust-growing annuals that are readily raised from seed sown in February, and which make quite large plants, if grown well. Of these the Castor-oil and Tobacco plants are examples. With regard to planting out, the second week in June is about as early as it is safe to plant out Castor-oil plants and other soft-wooded subjects grown from seed. It is preferable to have stout young plants, well-rooted, and carefully hardened off, as they succeed much better than larger specimens grown on in a high temperature and insufficiently hardened off; in fact, this point constitutes one of the elements of success in the management of these large-foliaged plants.

Besides the plants mentioned in the following pages, numerous others may be used for sub-tropical bedding, such as *Carlina*, *Aloe*, *Sumach*, *Fatsia* (*Aralia*), *Funkia*, *Eryngium*, *Rheum*, *Heracleum*, *Bocconia*, *Cassia*, &c. Also available are some of the ordinary summer bedding plants, such as *Coleus*, *Iresines*, *Perillas*, *Beet*, *Centaureas*, *Cinerarias*, &c., which are used either for mixing with the sub-tropical plants in the beds, or as edgings

for the same. Carpeting plants, such as the *Alternantheras*, are also used, and when judiciously arranged, give a finished appearance to the beds. In fact, the modes of arranging the plants at command are endless; yet the same object is kept in view, viz., an attractive and effective display, avoiding all formality, but at the same time aiming at a neat, symmetrical appearance when completed.

ABUTILONS.—If these are planted outside in June they will flower freely throughout the summer; the flowers are bell-shaped and pendulous. Abutilons are readily propagated by cuttings of the young wood struck in a mild bottom-heat in September. Several ornamental-foliaged varieties are grown for bedding purposes: *A. Thomsoni*, 3ft. to 4ft. high, with leaves freely blotched with yellow; *A. vexillarium* (*A. megapotamicum*), 3ft., flowers with dark red sepals, pale yellow petals, and dark brown stamens, the variety *variegatum* being very attractive; and *A. Sellowianum marmoratum*, with large leaves beautifully mottled with bright yellow.

ACACIA (ALBIZZIA) LOPHANTHA is a handsome plant for mixed sub-tropical bedding. It is of quick growth, and produces an abundance of graceful bipinnate leaves. Seed sown in heat in February will yield plants suitable for transferring to the open beds in June.

CANNAS.—These are splendid plants, admirably adapted either for massing in beds by themselves or for mixing amongst other subjects. They are of stately growth, producing massive, broad foliage, varying in colour from rich green to chocolate-crimson, and having noble heads of yellow, orange, or crimson-scarlet flowers. Seed may be sown in February in heat either in pans or singly in small pots. Previous to sowing it should be steeped for twenty-four hours in lukewarm water: this will tend to soften the seed and stimulate its germinating properties. The seedlings must be grown on quickly, and thoroughly hardened before planting out, and they will flower the first season. They prefer a rich, porous soil, which ought to be dug and manured two or three weeks before planting. In the autumn the tubers must be taken up and gradually dried previous to storing away for the winter under the stages in the houses, or in dry sheds where they will be safe from frost. They may be divided and potted up in early spring and placed in heat; they will soon grow away freely, and make nice plants fit for planting out in June. Numerous hybrids are now grown, most of which have been reared by M. Crozy, of Lyons. Madame Crozy is of compact habit, has green foliage, and handsome apricot-coloured flowers. Paul Bert has dark foliage, shaded with purple, and flowers of a golden-amber colour. Ménélik is of dwarf habit, with fine rich

velvety-crimson flowers. These hybrid Cannas vary in height from 18in. to 4ft., and flower during the late summer and autumn.

DATURAS are handsome massive-foliaged plants, with large trumpet-shaped flowers, and are much admired. The half-hardy annuals may be easily raised from seed sown in a hotbed in early spring, potting up singly, and finally planting out into a



FIG. 92.—DATURA METELOIDES.

light, warm soil in June. *D. ceratocaula* grows 3ft. high, and in July produces large sweet-scented flowers, with green tubes, and white corollas tinged with pink. *D. cornucopia* (1½ft. high) has large flowers formed of three layers, one within the other, like three cones. They are rich purple in colour, with white throats. *D. meteloides* (*D. Wrightii*, Fig. 92) is a handsome plant, growing 2ft. high, and bearing white flowers bordered with lilac.

EUCALYPTUS GLOBULUS (Blue Gum-Tree) is a fast-growing subject, having leaves of a peculiar glaucous hue. Seed should be sown in August in heat, and the young plants grown on through the winter. In this way much larger specimens may be obtained than if the seed is sown in spring.



FIG. 93.—*GREVILLEA ROBUSTA*.

FICUS ELASTICA is an ornamental subject for sub-tropical bedding, and is suitable either for mixing in groups of tall-growing plants, or for planting amongst dwarf carpeting plants. It may be raised from either eyes or cuttings.

GREVILLEA ROBUSTA (Fig. 93) is a most graceful plant, with fern-like foliage. It is of easy culture, and attains a height of

5ft. It may be propagated by cuttings of the half-ripened shoots placed in pots of sandy soil, and kept in a cold frame till callused, afterwards removing into bottom-heat, when they will soon emit roots. Seeds may also be sown in spring, and placed in heat, the seedlings, when large enough, being potted up singly, previous to planting out in the open.



FIG. 94.—WIGANDIA VIGIERI.

HUMEA ELEGANS.—See “Biennials” in the Chapter on “Annuals and Biennials.”

LAVATERA ARBOREA VARIEGATA.—See “Biennials.”

MELIANTHUS MAJOR (Cape Honey Flower) grows from 4ft. to 6ft. high, and produces finely-cut glaucous foliage. Its distinct and elegant appearance always attracts attention. Seeds

should be sown early in the spring, and the seedlings will then form nice plants for transferring to the open border in June. Cuttings also root freely in a cold frame.

NICOTIANAS are treated under "Half-hardy Annuals."

RICINUS.—See "Half-hardy Annuals."

SOLANUMS.—Several of the strong-growing Solanums are worthy of a place in the sub-tropical garden on account of their massive foliage. The annuals are easily raised from seed sown in heat during February and March; the tuberous-rooted Solanums may be increased by division of the tubers in spring, just when they are starting into growth. The following are most suitable for sub-tropical bedding:—*S. marginatum*, 3ft. to 4ft. high, with handsome scalloped leaves, margined with white. *S. robustum*, 3ft. to 5ft. high, with elegant foliage, covered with long spines; the leaves when young assume a rich brown tint. *S. Warszewiczii*, a grand subject, growing 5ft. or 6ft. high; the stem is armed with strong spines, and the leaf-stalk and mid-rib are covered with red prickles.

WIGANDIAS.—These are noble plants, of bold habit, possessing massive foliage. They are easily raised from seed sown in February, in heat, or from cuttings of the young shoots. *W. macrophylla* (*W. caracasana*) grows 6ft. high, and should have a warm sheltered position and good rich soil if to be seen at its best. The stems are covered with short hairs. The leaves grow to a tremendous size, and are very ornamental. *W. urens* has spreading deep green leaves, the leaf-stalks being shaded with red; it is of looser habit than *macrophylla*, and possesses stinging properties. *W. Vigieri* (Fig. 94) is also grown.

Carpet Bedding.

This style of summer bedding is not nearly so much practised as it was formerly; this is no doubt due to the fact that it was overdone, bed after bed being filled with the same dwarf plants, until at last the eye grew weary and longed for a change. Another reason is no doubt the expensiveness of the system, for even a small plot of ground requires an immense number of plants to produce the desired effect, whilst the labour entailed in preparing and planting is enormous. Carpet bedding, as practised years ago, consisted of the planting of beds in geometrical form with various dwarf coloured-foliaged plants, the object being to imitate fancy designs, such as were found on Turkey carpets, &c., and to work them out in different colours. The dwarf plants so used needed constant attention with regard to pinching and keeping them within their allotted space, or the design would quickly be

spoiled by the strong growers running into and smothering the weaker subjects, and the bed present the appearance of disorder and neglect. At the present day a decided improvement in the art of carpet bedding is to be seen in many of our large public parks and other places; this consists of a freer use of tall, graceful subjects, suitable for associating with the typical carpet-bedding plants; and in this way many pleasing effects are produced.

Carpet bedding should not be done until about the middle of June. The beds ought to have been dug over about a fortnight previously and left to solidify; they will then only require to be made moderately firm and to have the surface soil raked smooth and even at the time of planting. The design is then transferred to the beds by drawing lines in the soil. Circles may easily be drawn by fixing a stick firmly in the centre of the bed and looping a piece of string over it, then by attaching another stick to the string at the distance required, the circles may be drawn correctly. When all the lines are drawn they are traced with a little dry silver-sand, so as to make them more distinct for the operator. Planting then commences: the tall dot plants are put in first, then the leading lines, and afterwards the intermediate spaces or panels are filled in.

As the majority of the plants are very small, and have to be planted quite close together, a narrow, pointed trowel is used; or the trowel may be dispensed with altogether and the work done with the fingers. The soil is made fairly firm around them, and a good watering given immediately after planting. If dry, hot weather sets in, the beds must have occasional waterings throughout the summer. The dwarf plants will also require pinching at frequent intervals so as to keep them dwarf.

Irrespective of the popular carpeting plants mentioned below, there are numerous others belonging to the sub-tropical and ordinary summer-bedding class that are available either as dot or centre plants in connection with carpet bedding. Of these, the following may be mentioned: *Abutilon Thomsoni*, Agaves, *Fatsia (Aralia) Sieboldi*, Centaureas, Coleus, *Dracena australis*, Iresines, Perillas, and Yuccas.

The following list of plants includes the best of those most commonly grown for carpet bedding. The Saxifrages, Sempervivums, and Echeverias may be allowed to flower if it is desired; but generally the flowers are pinched out. All the other plants are grown exclusively for their foliage.

ALTERNANTHERAS.—These are amongst the most useful of plants we possess for bedding purposes; they grow from 2in. to 3in. high, and are largely used for filling in panels, divisional lines, &c. *Alternantheras* are all grown for their foliage, which varies in colour from bright yellow to dark purple. A few old plants are taken up and placed in pans or boxes in the autumn, or cuttings are struck at the same time to form stock plants for standing the winter. These are kept on the shelf in a warm house until about March, when they are planted in a hot-bed; in this situation they soon form an abundance of cuttings, which will root freely if dibbled in hot-beds about an inch apart, close to the glass, and kept shaded. In the course of a week or so, the shading should be discontinued, and air gradually given them until they are finally hardened off and planted out. Several species and varieties are grown: *A. amabilis* has broad foliage of deep orange and scarlet. *A. amœna* has orange and purple foliage, shaded with dark green and bronze; it is of spreading habit. *A. versicolor* has crimson and rose-coloured foliage. *A. baronychioides* has orange-red foliage, shaded with green. The following are considered to be mere varieties of the latter species: *A. aurea nana*, a very dwarf free-growing variety, with golden-yellow foliage; *A. magnifica*, with red foliage; *A. major*, with bronze foliage, tipped with scarlet; *A. m. aurea*, with large bright golden-yellow foliage; *A. rosea nana*, with deep pink or rose-coloured foliage, presenting a charming contrast to *A. aurea nana*.

ANTENNARIA TOMENTOSA, or *A. CANDIDA*, is a dwarf, silvery-leaved plant, growing from 2in. to 3in. high. It is largely used for edgings or divisional lines, and is readily propagated by division of the roots or by seeds sown in spring.

CALOCEPHALUS (LEUCOPHYTON OR LEUCOPHYTA) BROWNII, has silvery-white foliage, and is propagated by cuttings in spring. It grows from 2in. to 4in. high, and is used for filling in panels, &c.

CENTAUREA RAGUSINA COMPACTA grows about 9in. high. It is a silvery-leaved plant, neater in appearance than the type, and useful for "ribbon-bedding," a style which consists of filling a border the whole length with rows of plants, each row being of a different shade of colour, so that the border, especially when viewed from a distance, presents the appearance of a ribbon. It is also used as a dot plant.

CERASTIUM TOMENTOSUM is used for edgings, for filling in panels, &c. On account of its silvery-white foliage, it goes under the name of "Snow-in-Summer." It is easily propagated by cuttings or division, and grows 6in. high.

CHAMÆPEUCE CASABONÆ and **DIACANTHA** are largely used as dot plants in connection with carpet bedding, as well as for sub-tropical work. They are thistle-like plants, and may be raised from seed sown in February. *C. Casabonæ* has deep green leaves

with white veins and brown spines, whilst *C. diacantha* has shining green leaves with silvery lines and ivory-white spines. They grow 18in. high.

ECHVEVERIAS.—These are used for edgings, divisional lines, &c., and are readily increased by offsets. The flower-stems vary from 6in. to 12in. in height. *E. agavoides* has glaucous green fleshy leaves, each ending in a rigid spiny point; it is used as a dot plant. *E. metallica* has large leaves, with a purplish metallic lustre. *E. Peacockii* has light glaucous green leaves, with a reddish tinge round the margins; it is also used largely as a dot plant. *E. secunda glauca* is the one most commonly grown; it forms a rosette of glaucous fleshy leaves.

HERNIARIA GLABRA is a creeping plant of neat, close habit, suitable for filling in the groundwork; it has deep olive-green foliage, and may easily be increased by division. It does not grow more than 2in. from the ground.

KLEINIA REPENS is a succulent plant, growing 2in. high, and is used for divisional lines. Its foliage is of a bluish hue. Increased by division in spring.

MENTHA PULEGIUM GIBALTARICA is a useful groundwork plant, very effective when surrounded with brighter colours; it is a dwarf, dense-growing subject, having deep green foliage. Height, 3in. to 5in.

MESEMBRYANTHEMUM CORDIFOLIUM VARIEGATUM has creamy-yellow leaves, and is used for filling in panels, &c.; it grows freely, and soon covers the ground. Increased by cuttings. Height, 2in.

PACHYPHYTUM BRACTEOSUM is an attractive succulent plant, the foliage forming a rosette of a light glaucous hue. Propagated by leaves, pulled off from the old plants, and inserted in pots or pans of light sandy soil, and placed in a dry, warm pit. It grows 1ft. high, and forms a useful dot plant; or it may be used for dividing lines.

SAGINA PILIFERA AUREA, or **GLABRA AUREA**, is an excellent subject for filling in panels, forming, as it does, a dense yellow carpet, not more than 2in. high. It may readily be increased by pulling the tufts in pieces and transplanting.

SANTOLINA INCANA is a neat, dwarf-growing plant, 9in. high, producing slender, twig-like growths, and fine silvery leaves. It is useful as a dot plant, and may be propagated by cuttings, taken in either spring or autumn.

SAXIFRAGA.—Several of these dwarf-growing subjects form excellent carpeting plants, for either summer- or spring-bedding. The foliage grows close to the ground, the flower-spikes rising from 6in. to 12in. high. They are multiplied by offsets or

division. *S. hypnoides*, *hibernica*, *muscoïdes*, *pulchella*, &c., form compact mossy-green tufts. *S. pectinata* has dense silvery-margined foliage in rosettes. *S. Aizoon*, or *intacta*, has rosettes of silvery leaves, and forms a good edging plant. The mossy kinds are useful for filling in panels.

SEDUM.—Of the kinds suitable for carpet bedding, *S. glaucum* and *S. lydium* are the most popular. The former is a minute species, growing about 2in. high, and densely covered with small grey leaves. *S. lydium* is similar in habit and stature to *S. glaucum*, but has greenish leaves tipped with red. They are easily increased by division of the old plants in spring. Used for panels.

SEMPERVIVUM. — These are succulents forming rosettes of thick, fleshy leaves, growing not more than 2in. from the ground. The flower-spikes are from 8in. to 12in. high. They delight in a light sandy soil. Propagation is effected by means of offsets, which in many cases are freely produced. *S. montanum* is a pretty species for edgings to small beds, &c., as it grows very close and thick. The leaves are tipped with red-brown. *S. tabulæforme* is an excellent dot plant for carpet bedding; it forms broad rosettes of leaves, which grow close to the soil. *S. triste* is quite distinct, its beautiful rosettes of leaves being of a deep reddish-brown colour, and thus forming a striking contrast to glaucous-leaved plants. All the *Sempervivums* are very useful for forming divisional lines, &c.

SPERGULA PILIFERA AUREA is synonymous with the plant described under SAGINA PILIFERA AUREA.

STELLARIA GRAMINEA AUREA (Golden Chickweed) is a trailing plant with golden foliage, which does not grow above 2in. or 3in. in height. It is easy of cultivation, and forms a bright carpeting plant for dividing lines or for filling in panels. Easily increased by either seeds, cuttings, or division.

The designs furnished will give the gardener a fair idea of how the above-mentioned plants may be utilised in the present system of carpet bedding. As individual tastes differ, however, so the arrangements of the dwarf plants may be altered accordingly, and the tall plants may or may not be used as fancy dictates. If the beds are small, it will not be advisable to include too many dot plants, but hard-and-fast rules cannot be laid down, and in such cases the planter must use his own judgment. In some beds it is well to have the central portion raised from 6in. to 12in. above the outside portion, the edge being planted with *Echeverias* or *Sempervivum tabulæforme*. This may easily be done in the beds H and I (Figs. 102 and 103), and will greatly enhance their beauty.

In bed A (Fig. 95), No. 1 might have a centre plant of *Grevillea robusta*, and be carpeted with *Echeveria Peacockii*; No. 2 with *Sempervivum montanum*; No. 3 with *Leucophyta Brownii*; No. 4 with *Alternanthera versicolor*, having a dot plant of *Grevillea* at the centre of each panel; No. 5 with *Alt. baronychioides*; No. 6



FIG. 95.—DESIGN FOR CARPET BED (A).

with *Alt. aurea nana*; No. 7 with *Alt. major*; No. 8 a dot plant of *Santolina incana*, carpeted with *Alternanthera amabilis*; No. 9 should be filled in with *Mesembryanthemum cordifolium variegatum*; and No. 10 with *Alternanthera magnifica*.

In bed B (Fig. 96) the panels numbered 1 might be filled in with *Alternanthera amœna*, and have a small plant of *Acacia (Albizzia) lophantha* inserted near the end furthest away from the centre of the bed; No. 2 would look well with a centre plant of *Dracæna (Cordylina) australis*, or any other tall, graceful-foliaged plant, carpeted with *Echeveria secunda glauca* or *Leucophyta Brownii*; panels numbered 3 might have dot plants of *Dracænas* at their centres, and also one near each end, carpeted with *Alternanthera magnifica*; panels marked 4 with *Alt. versicolor* and a dot plant or two of *Echeveria Peacockii*; No. 5 with *Alt. rosea nana*;

and the portions marked 6 with *Alt. aurea nana*; the groundwork (No. 7) might then be filled in with *Herniaria glabra* or one of the Mossy Saxifragas.

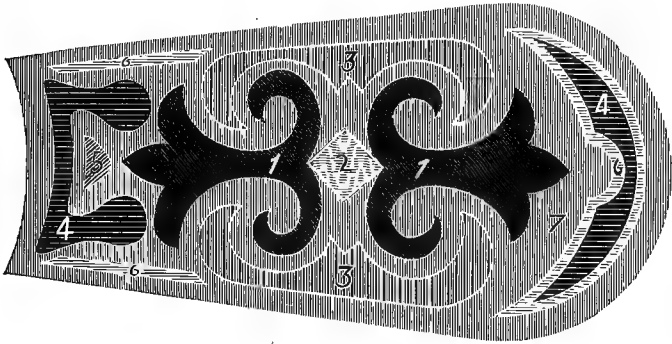


FIG. 96.—DESIGN FOR CARPET BED (B).

In bed C (Fig. 97), No. 1 should be filled in with *Mesembryanthemum*, and have a plant of *Acacia lophantha* at the centre of the heart; No. 2 with *Alternanthera major aurea*, No. 3 with *Alt. magnifica*, having a dot plant of *Acacia* in the centre of each; No. 4 with *Sagina (Spergula) pilifera aurea*; those outside the panels numbered 6 should each have a plant of *Chamæpeuce* in the centre; No. 5 should be filled in with *Leucophyta Brownii* or *Antennaria tomentosa*, having a dot plant of *Acacia* in the centre; No. 6 with *Pachyphytum bracteosum*, also

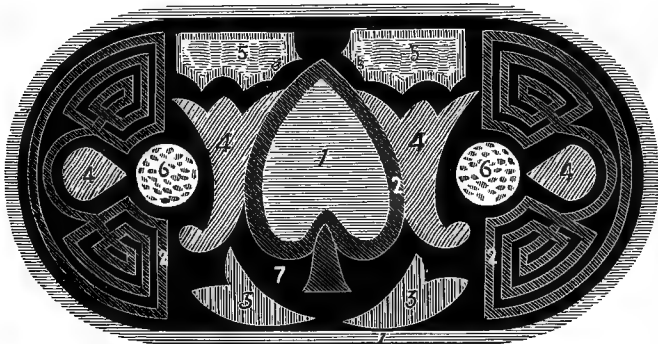


FIG. 97.—DESIGN FOR CARPET BED (C).

having an *Acacia* in the centre if the bed is made large enough to allow of it without overcrowding; the groundwork (No. 7) should consist of *Herniaria* or one of the *Sedums*.

In bed D (Fig. 98), No. 1 is filled in with *Alternanthera magnifica*; No. 2 with *Alt. versicolor*; No. 3 with *Alt. amœna*; Nos. 2 and 3 should also have a centre plant of *Ficus elastica*,

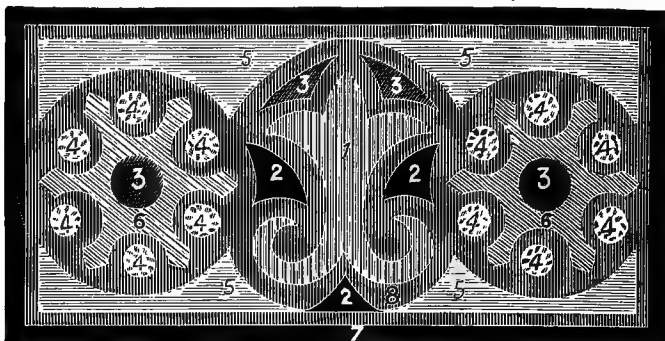


FIG. 98.—DESIGN FOR CARPET BED (D).

Aralia Sieboldii, or a small Palm; No. 4 should be filled in with specimen dot plants of *Coleus*, *Perilla*, *Iresine*, *Centaurea*, *Santolina*, &c., planted in opposite pairs; No. 5 should be filled with *Mesembryanthemum*, and lined with *Kleinia repens*; No. 6 with *Sagina pilifera aurea*; No. 7 with *Mentha*; and the groundwork (No. 8) with *Antennaria tomentosa*, *Sedum glaucum*, or *Sedum lydium*.

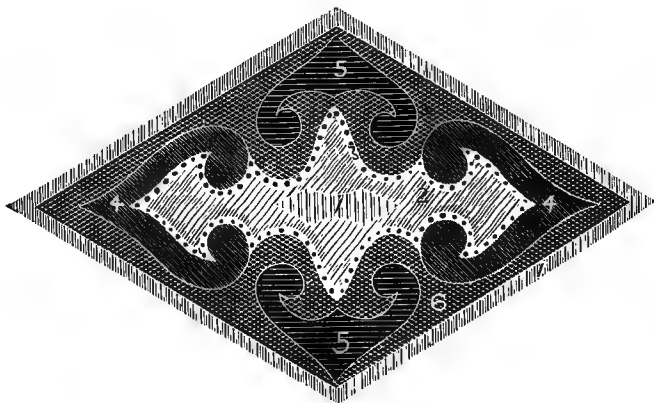


FIG. 99.—DESIGN FOR CARPET BED (E).

In Bed E (Fig. 99), No. 1 might be filled in with *Alternanthera major*, and No. 2 with *Alt. major aurea* or *Stellaria graminea aurea*; a row of from three to five plants of *Chamæ-*

peuce might be placed along the middle of Nos. 1 and 2. No. 3 might be planted with *Kleinia repens*, No. 4 with *Alternanthera*

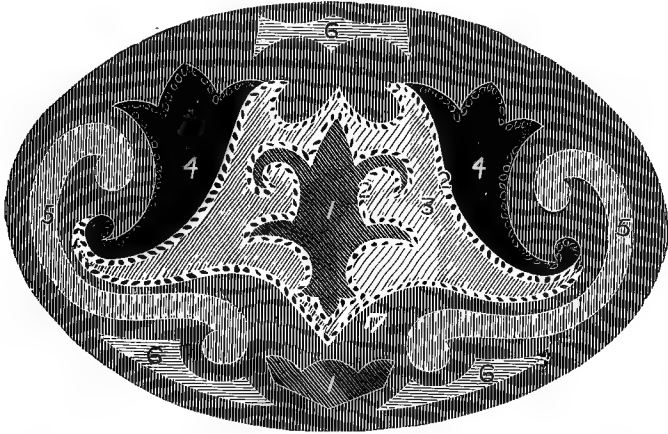


FIG. 100.—DESIGN FOR CARPET BED (F).

amæna, No. 5 with *Alt. amabilis* or *magnifica*, having centre plants of Chamæpeuce. The groundwork (No. 6) might be filled with *Mentha*, *Herniaria*, *Antennaria*, or one of the Sedums. If the bed is of sufficient size, *Eucalyptus globulus* might be substituted for the plants of Chamæpeuce.

In Bed F (Fig. 100), panel No. 1 might be filled with *Alternanthera amæna*; No. 2 with *Echeveria secunda glauca* or

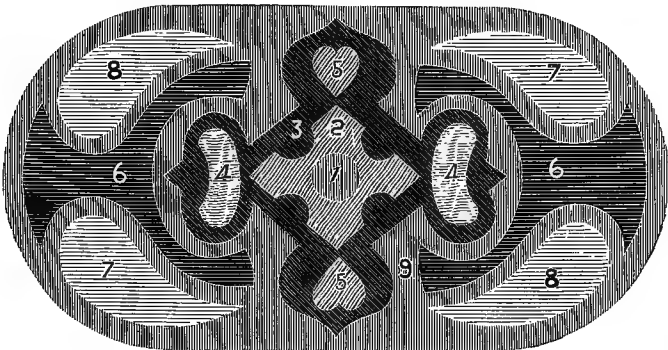


FIG. 101.—DESIGN FOR CARPET BED (G).

E. agavoides; No. 3 with *Cerastium tomentosum* or *Sagina pilifera aurea*; No. 4 with *Iresine Lindeni*; No. 5 with *Alternanthera*

major; No. 6 with *Alt. aurea nana*, and the groundwork (No. 7) with *Mesembryanthemum*. If dot plants are required for this bed, specimens of *Dracæna*, *Grevillea*, or *Acacia lophantha* might be inserted in the centre of Nos. 1, 4, 5, and 6.

In Bed G (Fig. 101), No. 1 should consist of a small specimen *Yucca* or *Dracæna*; No. 2, *Echeveria Peacockii*, edged with *Sempervivum montanum*; No. 3, *Alternanthera amæna*; No. 4, *Pachyphytum bracteosum* or *Leucophyta Brownii*; No. 5, *Antennaria tomentosa* or *Alternanthera major aurea*; No. 6, *Alternanthera*



FIG. 102.—DESIGN FOR CARPET BED (H).

versicolor; No. 7, *Mesembryanthemum*; No. 8, *Mentha*. The centres of Nos. 4 and 5 should consist of small specimen Palms; whilst the centres of the panels 7 and 8 might with advantage have plants of *Coleus*, *Perilla*, or *Iresine* inserted.

All the panels should be raised and bevelled off, the central cross of *Echeveria Peacockii* being raised still further, and the *S. montanum* planted on the sides. A nice plant of *Chamæpeuce* may be planted in the centre of the panels No. 6.

In Bed H (Fig. 102), No. 1 might be filled with *Kleinia repens*, having a centre plant of *Aralia Sieboldii*; No. 2 with *Alternan-*

thera versicolor; No. 3 with *Alt. paronychioides*, having a small plant of *Ficus elastica* at each of the four corners; No. 4 with *Mentha*; No. 5 with *Echeveria secunda glauca*; No. 6 with *Alternanthera amœna*, having centre dot plants of *Centaurea ragusina compacta* or *Santolina incana*; No. 7 with *Alternanthera aurea nana*; No. 8 with *Echeveria metallica*; No. 9 with *Cerastium tomentosum*, having dot plants of *Iresine* in the centre; No. 10 with *Mesembryanthemum*; No. 11 with *Alternanthera major aurea*, having dot plants of *Chamæpeuce*; No. 12

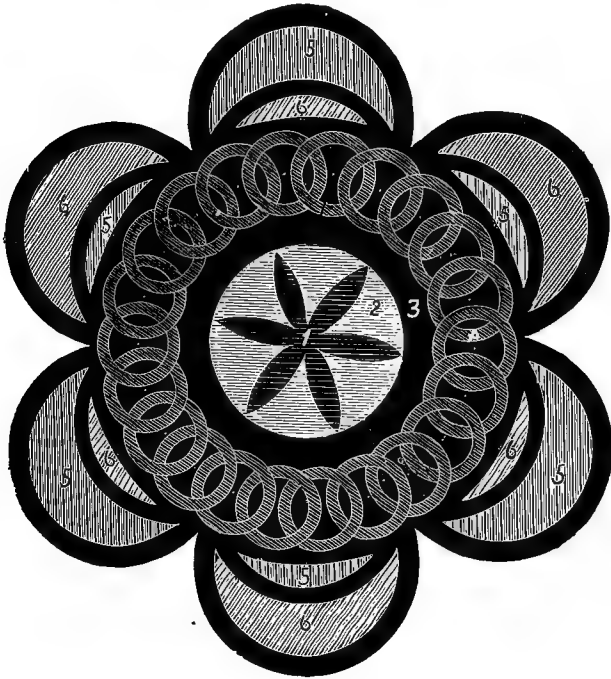


FIG. 103.—DESIGN FOR CARPET BED (I).

with *Antennaria* or *Spergula*, interspersed with *Sempervivum tabulaforme* or *S. triste*. The beauty of the bed will be improved if the whole of the central portion from No. 5 inwards is raised about 8in., and the *Echeveria* planted in a double row on the edge.

In Bed I (Fig. 103), No. 1 should have a centre plant of *Grevillea robusta* or *Eucalyptus globulus*, and be carpeted with *Alternanthera magnifica* or *Alt. versicolor*; No. 2 would be best filled in with *Mesembryanthemum* or *Sagina pilifera aurea*; No. 3 with *Herniaria* or *Mentha*; No. 4 with *Alternanthera major*; No. 5 with

Alt. rosea nana, and No. 6 with *Alt. aurea nana*. The three outside panels numbered 5, and also the three outermost numbered 6,

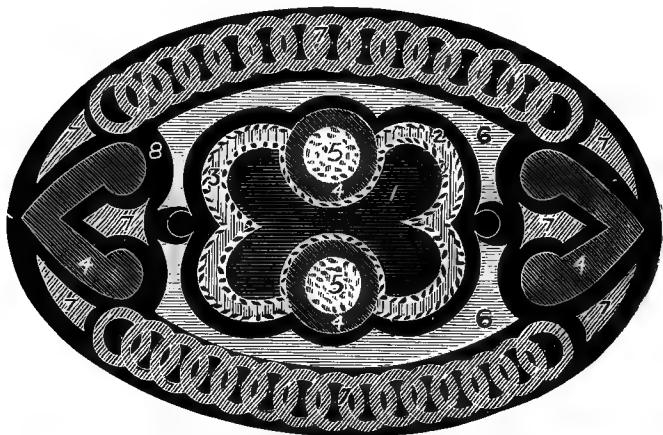


FIG. 104.—DESIGN FOR CARPET BED (J).

might each have a specimen plant of *Grevillea* in the centre, or those numbered 5 would look well with a plant of *Chamæpeuce* in the centre, and those numbered 6 with one of *Coleus*.

In Bed J (Fig. 104), No. 1 might be filled in with *Iresine* or *Alternanthera baronchioides*; No. 2 with *Echeveria secunda*

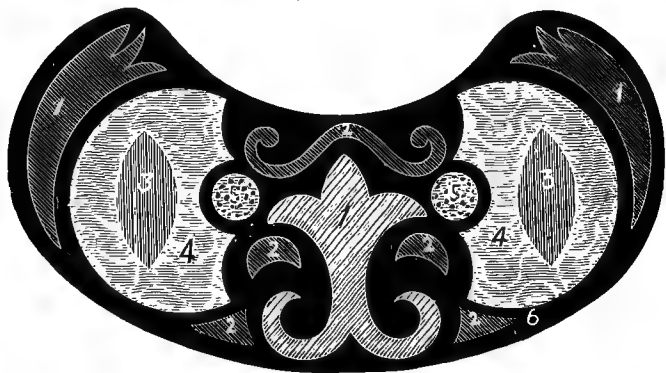


FIG. 105.—DESIGN FOR CARPET BED (K).

glauca; No. 3 with *Mesembryanthemum*; the panels numbered 4 might be planted with *Alternanthera amœna*, and have a

plant of *Abutilon Thompsoni* in the round portions at each end of the panels. The number 5's should each have a centre plant of Abutilon, and be carpeted with *Pachyphytum bracteosum*; No. 6 with *Alternanthera versicolor*; No. 7 with *Alt. major aurea* or *Alt. aurea nana*; the groundwork (No. 8) being carpeted with *Mentha*, *Herniaria*, *Antennaria*, or *Sedum glaucum*.

In Bed K (Fig. 105), panel No. 1 might be planted with *Alternanthera aurea*, having a centre plant of *Perilla*; No. 2 with *Alt. amœna*; while the top and the two lower No. 2 panels might each have a centre plant of *Chamæpeuce*; No. 3 with *Alternanthera versicolor*, having centre plants of *Centaurea*; No. 4 with *Alternanthera magnifica*; No. 5 with specimen dot plants of *Perilla*; the groundwork (No. 6) might be filled in with *Mentha*, *Herniaria*, *Antennaria*, or *Stellaria*.

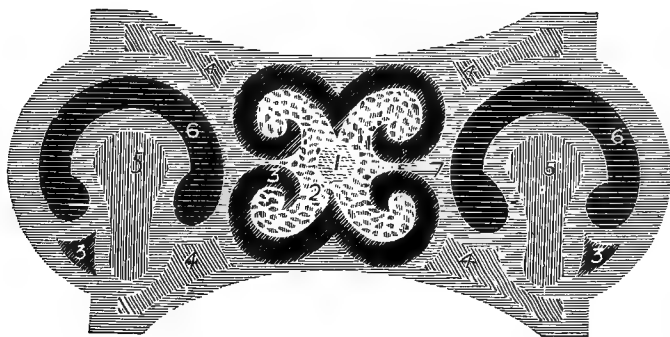


FIG. 106.—DESIGN FOR CARPET BED (L).

In Bed L (Fig. 106), No. 1 should be planted with a specimen *Dracæna* or *Aralia*; No. 2 with *Echeveria Peacockii*; No. 3 with *Alternanthera amœna*; No. 4 with *Alt. aurea nana*, having centre plants of *Iresine*; No. 5 with *Alt. magnifica* or *Alt. rosea nana*, having centre plants of *Acacia lophantha*; No. 6 with *Alternanthera versicolor* or *Alt. major*; the groundwork (No. 7) with *Mentha*, *Mesembryanthemum*, *Antennaria*, *Herniaria*, or *Sedum*. The central panel might be nicely moulded from a slightly raised centre to the edges.

Spring Bedding.

This consists in planting beds in the autumn with bulbs and hardy herbaceous subjects for an early spring display. When the summer bedders have lost their beauty, and no longer present an attractive appearance, they are removed—those that are required for next season's display are placed in their winter

quarters, whilst the others, such as Pelargoniums, from which an ample stock of cuttings have been procured, are thrown away. It is then usual to dig over the beds, and plant immediately with the spring-flowering subjects; this is generally done in September and October—the sooner the better—so that the plants may be well established before winter sets in.

Bulbs play a very important part in the decoration of the beds in spring. For this purpose they should be procured as soon as convenient in the autumn, those known as “Dutch bulbs” being inserted as soon as they arrive from the Continent, if the best results are to be obtained. They answer splendidly either grown in beds by themselves or mixed with other spring-flowering subjects, such as Polyanthes, &c. After flowering they must be removed, so as to make room for the summer bedders, and this very often, if not always, has to be done before the foliage has died down, in which case they must be laid close together in beds in the reserve garden or in damp ashes, &c., to thoroughly ripen off. For a list of bulbs and tubers the reader is referred to the chapter upon the subject.

The varieties of these subjects are very numerous, and it will not be necessary to mention them here, as large quantities may be procured from our various seedsmen, either in named varieties or in mixed sorts. The catalogues generally give the colour of each kind.

Hardy annuals are also used for spring bedding; these are obtained from seed sown in July or August in the reserve garden, transplanting the seedlings when large enough, so as to make fine strong plants for transferring to their permanent positions in September and October.

The hardy perennials, when removed from the beds in spring, are planted in the reserve garden, there to have every attention as regards watering, weeding, &c., until required for transferring to their flowering quarters again in the autumn. Propagation is generally effected by division of the old plants when transplanting, in either the spring or autumn. Large numbers may also be raised from cuttings or from seeds.

The arrangement of the plants in the beds is an item which demands attention, if good results are to be obtained; but in this matter each admirer has his own particular fancy, and excellent effects are produced by blending and contrasting colours in a variety of ways. It is a mistake to aim at too much in a single bed, two or three colours being quite sufficient

to produce a charming display. In planting round beds it is a general rule to do so in circles, using first one colour and then another, alternately, say, a circle of white *Arabis*, then one of yellow *Alyssum*, and then one of the blue *Myosotis*. Excellent effect is, however, obtained by filling beds with distinct families of plants; for instance, a bed filled with mixed *Polyanthuses* in various shades of colour proves very attractive; Wallflowers might also be used in a similar way.

The following are the most important of the spring-flowering subjects suitable for bedding:

ALYSSUMS.—The Golden Alyssum (*A. saxatile compactum*) grows 6in. high, and in spring is covered with golden-yellow flowers; it contrasts charmingly with the white *Arabis* and blue *Aubrietia*.

ANEMONES.—Several of the Anemones are useful bedding plants, including *A. blanda*, with deep blue flowers; *A. apennina*, with lovely light blue flowers; and *A. coronaria*, with flowers of various shades of colour. This last-mentioned is one of the parents of the "florists' Anemones," which are indispensable for spring flowering; the tubers should be taken up, thoroughly ripened, cleaned, and stored away until planting time.

ARABIS ALBIDA (white *Arabis*) is a compact plant, growing 6in. high, covered in spring with a mass of white flowers. The variety with variegated foliage is suitable as an edging plant.

AUBRIETIAS.—These are charming dwarf plants for spring bedding, producing sheets of flowers of various colours, including blue, violet, purple, and rose-red. *A. deltoidea* (Fig. 107) has bluish flowers; *A. Campbelli* and *A. graeca* have purple flowers, and are of neat and effective habit; *A. Leichtlinii* is one of the very best of the family, forming perfect sheets of reddish-crimson flowers; it is splendid for massing and for edgings. The only drawback to the cultivation of *Aubrietias* for spring bedding is that they are often in full flower when the beds are required for the summer occupants, and they have therefore to be removed whilst they are doing good service; they



FIG. 107.—AUBRIETIA DELTOIDEA.

are not alone in this respect, however, and if the precaution is taken to plant these and similar subjects in beds that are intended for sub-tropical and carpet-bedding plants (which are generally made up after the ordinary summer-bedders), the difficulty will be to a certain degree overcome, as the plants will have an extra week or two in which to display their brilliant colours.

CANDYTUFT.—See *Iberis*.

DAISIES.—The double varieties are indispensable for spring gardening. Several named varieties, with pink, red, and white flowers are in existence. If seed is sown in April, the plants will flower during the summer, and the best of these should be selected for spring bedding.

ERYSIMUMS.—Described under "Hardy Annuals."

IBERIS.—The Candytufts are charming spring-flowering plants, producing an abundance of whitish flowers, which remain long



FIG. 108.—*IBERIS SEMPERVIRENS*.

in beauty. *I. sempervirens* (Fig. 108) is the Evergreen Candytuft; it is of branching habit, grows 9in. high, and produces pure white flowers. The variety *Garrexiana* also has large handsome heads of pure white flowers. *I. gibraltarica* has large white

flowers, changing to a soft pink with age; it grows from 12in. to 18in. high, is of straggling growth, and requires a well-drained soil.

MYOSOTIS (Forget-me-Not). — These are lovely subjects for spring flowering; they are of easy cultivation in any damp ordinary garden soil. *M. dissitiflora* is a well-known bedding variety, growing 6in. high, and bearing a succession of clear blue flowers from February (in favourable seasons) onwards throughout the spring.

PHLOX.—The dwarf early-flowering varieties are extremely useful for spring display; of these the two following are the species generally grown: *P. amæna*, an excellent plant, 6in. high, with bright pink flowers. *P. subulata* (Fig. 109), with pinkish flowers, having dark centres; of prostrate habit, seldom rising more than 6in. from the ground; it is noted for its free-flowering qualities.



FIG. 109.—PHLOX SUBULATA.

POLYANTHUS.—These are showy subjects for spring bedding, and are useful for growing in beds by themselves, or for mixing with other plants; they grow to a height of 6in. A packet of mixed seed, procured from any of our nurserymen, will yield an abundance of plants with rich and various-coloured flowers. These plants are fully dealt with in "Florists' Flowers."

SILENES.—The species *S. pendula* and *S. compacta* are plants largely used for spring bedding; the former grows upwards of 1ft. in height, whilst the latter averages 6in.; both have bright rose-coloured flowers. There are several named forms of *compacta*, including Snow King, with large white flowers, and Amelia, with pretty rose-coloured flowers; of dwarf and compact habit.

VIOLAS.—Many of these are indispensable for spring bedding; they grow only 6in. high, and blossom profusely during the early spring. Distinct varieties must be propagated by cuttings or division. Numerous named varieties are in cultivation, all of which are fine bedding plants. See also the Chapter upon "Florists' Flowers."

WALLFLOWERS.—These handsome old-fashioned favourites are extremely effective, and are highly appreciated for their massive spikes of large sweet-scented flowers. There are several shades

of colour, the chief being golden-yellow and blood-red. Seed may be obtained in carefully selected strains from any of our nurserymen. (*See* "Biennials.")

Winter Bedding.

This is a style of bedding which is very little practised, it usually being the custom to fill the beds with bulbs and other hardy subjects in the autumn for spring display, and the consequence is that throughout the dull dark days of winter the beds present a very bare and uninteresting appearance.

When they are at some distance from the house, or in parts of the garden little frequented in winter, this prevailing bareness does not matter much; but when the beds are on the lawn immediately in front of the house, as is often the case, it is evident that they ought to be filled with plants of some sort, so as to make a show during the winter.

Taking into consideration that the beds are required for summer occupants, and therefore cannot be planted with permanent subjects, it is obvious that those selected to fulfil the requirements of winter bedding, must be such that will bear transplanting well, and at the same time they must be perfectly hardy. The plants that possess these essentials are undoubtedly our hardy evergreen shrubs and small Conifers, and seeing what a wealth of these subjects are now in our possession, it is a pity that they are not more used for the decoration of beds in winter. Of course, if spring bedding is to be adopted in its entirety, winter bedding is impossible; but why not come to a compromise between the two systems, and have a little of both? For instance, some of the beds might be filled with hardy evergreens, and the remainder with spring bedding-plants; the effect would then be materially improved, for during the winter the evergreens would enliven the scene to a certain extent, whilst in the spring, when they were making their new growth, and the spring-bedders were at the zenith of their beauty, the effect would be charming. If the evergreens are grown in pots for this purpose, it is only necessary to plunge them in the beds in the autumn, and to remove them in the spring. The best place for them during the summer is in the reserve garden, plunging them in soil or ashes, and taking care that they do not suffer for want of water. Growing in pots is a good method, for, their roots being restricted, they do not grow so freely, and they are

therefore available for service for a much longer time than those planted out.

If the evergreens, however, are planted out in the beds, the greatest care must be taken in planting and replanting, or they will suffer by the somewhat harsh treatment to which they are subjected by being lifted twice a year. They should be planted in the late autumn and removed again about April. It is not advisable to defer lifting and transferring to their summer quarters later than is absolutely necessary, as the plants ought to be established before the hot, scorching days of summer set in. The best plan is to plant them carefully in a somewhat shaded border in the reserve garden, the only attention necessary during the summer being that of watering, keeping clean, &c.

The following list of Conifers includes most of those suitable for winter bedding: *Cryptomeria japonica elegans* and variety *nana*, *Cupressus nootkatensis* (*Thuopsis borealis*) and variety *compacta*; *Cupressus Lawsoniana* and its many varieties, including *argentea*, *compacta*, *nana*, *albo-picta*, &c.; *Cupressus obtusa* and varieties *aurea*, *nana-compacta*, &c.; *Cupressus pisifera* and varieties *plumosa*, *plumosa aurea*, *squarrosa*, &c. (the two last-mentioned species and their varieties are generally known in gardens under the name of Retinosporas); *Cupressus thyoides* (*Chamaecyparis spherioidea*); the dwarf varieties of *Picea excelsa* (Norway Spruce); *Taxus baccata aurea* and *elegantissima*, also *fastigiata* (the Irish Yew); *Thuja occidentalis* (the American Arbor-Vitæ) and its varieties *aurea*, *erecta-viridis*, *globosa*, &c.; *Thuja orientalis* (Chinese Arbor-Vitæ) and its varieties *aurea*, *compacta*, *elegantissima*, *semperaurescens*, &c. (these are generally known as Biotas). Those known as Retinosporas and Biotas are decidedly the best of the Conifers for winter bedding.

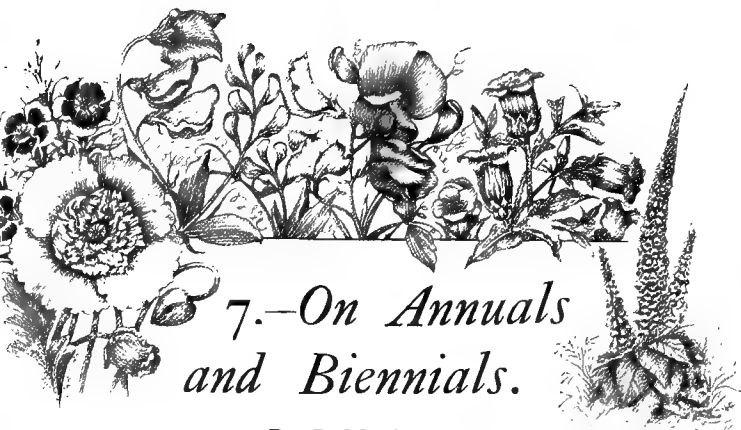
A large number of our hardy evergreen shrubs are also suitable for winter bedding, of which the following might be mentioned: Aucubas; *Berberis Aquifolium* (generally known as *Mahonia Aquifolia*) and *B. Wallichiana*; *Buxus* (Box) in variety; *Euonymus japonicus* and *radicans variegata*; Hollies, in variety; Ivies (the different forms of Tree-Ivy); Laurels (especially the Portugal); Laurustinus; Osmanthus (a dwarf Holly-like plant); Pernettyas; Phillyreas; Skimmias, &c. The variegated *Euonymus* and variegated Tree-Ivies are the showiest of the evergreen shrubs, and may be used with excellent effect in combination with any of the other subjects mentioned; the former is an excellent edging plant.

As a rule, it is best to keep beds of mixed Conifers distinct from those of shrubs, but such plants as the Yew will be quite at home in either combination, and beds devoted to the Yew and Osmanthus, with an edging of variegated Euonymus, present a very cheerful appearance during winter.

It is not necessary to confine winter bedding strictly to the planting of Conifers and evergreen shrubs, for many other hardy evergreen plants, such as the large-leaved Saxifrages or Megaseas, may be used with equal effect; but enough has been said to show that there is no dearth of subjects suitable for this much-neglected style of bedding. Those who require still further information with respect to Trees and Shrubs will find it in the chapter devoted to that subject.



SAXIFRAGA PURPURASCENS.



7.—*On Annuals and Biennials.*

By J. M. ABBOTT.

ANNUALS are plants which, botanically speaking, grow from the seed, flower, fruit, and die within the short space of one year. This definition is, however, not absolutely correct, as some annuals, by a special mode of culture, may be enticed to live longer. Such is the case with the Mignonette, which will continue to flower for two or more years, if the old blossoms are pinched off as they decay, thus preventing seed from ripening, and throwing the strength of the plant into the production of more growth and flower.

For a long time, annuals occupied a very subordinate position in the garden, this no doubt being due to the fact that they were cultivated in a manner not calculated to show them off to the best advantage. Perhaps the craze for "summer bedding" also helped to bring about this deplorable state of affairs. Far too often the only cultivation they received was the scratching over of the surface-soil with a rake, followed by the seed-sowing. For the rest they were allowed to take care of themselves, and, if they escaped the attacks of slugs, &c., they were left unthinned and unlooked-after, the result being a weak, spindly growth, and consequently a short-lived, miserable show of flowers. Like all other plants, they require attention to bring them to perfection, and under good cultivation they produce a splendid display. They are certainly a beautiful class of plants, and it is a pity that they should have fallen into such a state of neglect. At the present day, however, it is gratifying to observe a distinct revival in the

cultivation of annuals, and let us hope that ere long they will be thought as much of as they were in the days of our forefathers, before the introduction of the bedding 'Pelargonium. Our public parks and gardens are moving a step in the right direction by introducing numerous annuals into their summer bedding arrangements, and thereby raising the standard of this class of plants in the eyes of the garden-loving public.

The chief use of annuals is undoubtedly the embellishment of the mixed herbaceous border. If time and money are at command, the border may be kept quite gay with annuals for a considerable time, for, as the old clumps get shabby, they may be replaced by other annuals, which have been grown on in pots, and, therefore, do not suffer much by planting out during the heat of summer. An extensive herbaceous border, however, if treated in this manner, entails a large amount of labour, as, in addition to the growing of plants in pots for succession, there are the weeding, staking, watering during dry weather, &c.—operations which must be attended to in order to keep the border in a presentable condition.

Some annuals make excellent beds in themselves, such, for instance, as the Virginian Stock, and some are also very useful in summer bedding, but as a chapter is devoted to bedding, it will be out of place to deal with that here.

Annuals which are grown for outside display are divided into two classes, viz., Hardy and Half-hardy.

Hardy Annuals.

This class includes all those plants that are able to withstand the winter in the open ground. The time of sowing must, however, depend largely upon the time when the display of flower is required.

METHODS OF RAISING—FOR EARLY SHOW.—If the plants are intended to flower in April and May, the best time to sow is in August and September, selecting a warm, sheltered border. The most suitable soil for the majority of annuals is a sandy loam, which, if poor, ought to have been moderately enriched with manure, and deeply dug some time previously. The first thing to do, then, is to level the border and make the surface soil fine and even by means of a rake; the seed should then be sown in shallow drills, and a little fine soil drawn over it, the quantity depending upon the size of the seed, very small seed requiring only a mere sprinkling of soil, just enough to cover

it, whilst larger seed may have a depth of a quarter of an inch or so.

Sowing in drills, as recommended, is a much better plan than sowing broadcast, as the operator is then able to run the hoe in between the rows, and so keep the surface of the soil open for the admission of air, a state which is very beneficial to the young seedlings. Another advantage is that the young plants can be much more easily and expeditiously thinned. After sowing, a good soaking should be given through a fine rose, so as not to disturb the seeds, and a thin shading of tiffany, or other light material, should be thrown over the border to prevent excessive evaporation, and keep it in a uniform state of moisture. Great care must be taken to remove this as soon as the seedlings show the slightest sign of breaking through the soil, or they will be spoiled. As soon as the seedlings appear, and are large enough to handle, they should be thinned, so as to get sturdy little plants, which are better able to withstand the winter, and are also in a much better condition for removal to their permanent positions in spring. If allowed to grow up without thinning, the roots become matted together, and get broken during transplanting, and the plants are thereby weakened. After thinning, the only attention that is needed is to keep them well watered and free from weeds during the remainder of the autumn. If exceptionally hard weather sets in during the winter, they may have a few dry leaves, or other light material, thrown in amongst them, so as to break the force of the frost. The best time to transplant into their flowering positions is in March, or even earlier, if the weather will allow. At this sowing, only the hardiest kinds should be sown.

FEBRUARY SOWING.—This may be done in a cold frame or handlight, thinning out the seedlings when large enough, and finally transplanting into their flowering quarters during favourable weather in April and May. The general plan, however, is to sow the seed in pans or boxes in a warm house, prick off the seedlings into other boxes, gradually hardening them off, by inuring to light and air, and afterwards transferring to the open border when fear of sharp frost is past. A very handy size of box is one about 18in. or 20in. long, by 10in. to 12in. wide, and 4in. deep.

LATE SOWING.—For late summer and autumn display, the usual plan is to sow where the plants are intended to flower, in

April, May, and even June, if a late autumn show is needed; the seed ought to be sown thinly in patches or broad masses, if effective displays are aimed at, taking care that this is not done in wet weather, when the soil is in a pasty condition. The ground should be deeply dug and enriched with old hotbed manure, leaf-mould, &c., the surface being made fine by raking. It is a mistake to apply too much manure, especially cow- or horse-manure, as over-abundant nutriment tends to promote vegetative growth rather than the production of flowers. At the same time a sowing may be made in pans in a cool house, and the seedlings pricked off singly into small pots; these come in very useful for transferring to the open border, taking the place of those which have flowered earlier and have been removed.

GENERAL TREATMENT OF HARDY AND HALF-HARDY ANNUALS GROWN IN THE OPEN BORDER.—When annuals are sown in the positions in which they are intended to flower, one of the most important items to be observed in their cultivation is that of thinning, and it is one that well repays for the time occupied in its execution. Very often annuals are sown thickly in patches in the borders, and allowed to run into flower without any attention being paid to this important item, and the result is that they neither blossom so freely nor are the flowers so fine as when properly thinned. As soon as the seedlings are large enough to be easily handled, thinning must commence, pulling out all the weakly seedlings, and leaving only those that promise to make sturdy, healthy specimens. Finally, they should be thinned so as to leave from three to a dozen to the square foot, the quantity depending upon the size of the mature plant: each one must have sufficient room to develop properly. Slugs very often prove a nuisance in the garden, and they appear to be particularly fond of annuals when in the young state, so that the gardener will act wisely if he is on the alert to prevent their ravages. They seem to have a decided objection to soot, and it is, therefore, a good plan to sprinkle a little over the soil previous to sowing and working it in, afterwards scattering a little over the surface. A ring of dry sharp sand is sometimes placed around the patch of seedlings for the same purpose; but bran laid in patches, or brewers' grains similarly disposed, will be found very attractive.

Staking is another point which must be attended to, if the plants are to be shown off to the best advantage; and it is unfortunately a point which is very often done badly. There

cannot possibly be anything more unsightly in an otherwise neat and well-kept garden than that of seeing a number of thick rough stakes about the border. When stakes are used they ought to be placed so as to be as little seen as possible; the stakes themselves should also be neat in appearance, and preferably green-painted ones, so that if it is impossible to hide them, they will not strike the eye as unsightly objects. Another thing to avoid in staking is that of placing a single stake in the centre of a group of annuals, or, in fact, any other plants, and binding the whole lot to it in a bundle, much after the same fashion as a sheaf of corn. If one stake only is used, the plants should be looped up lightly to it, not bound up tightly, as though the owner were afraid of them running away. Staking is an operation which must be attended to in good time, as when once the plants get beaten down by wind or rain, it is no easy matter to stake them so that they may again appear neat and tidy. For graceful, loose-growing subjects, such as Gypsophilas, Coreopsis, &c., it is best to use twiggy branches, placing them around and amongst the plants in good time, so that when the plants have grown to their full size, the supports will be hidden amongst the foliage.

If the foregoing operations are promptly attended to, together with those of weeding and watering, these lovely plants will well repay the cultivator for his pains by a display of flowers which ought to convince even the most fastidious of observers that annuals are worthy of a place in every British garden.

The following is a selection of hardy kinds :

ADONIS ÆSTIVALIS (Fig. 110), often known as *Adonis Flos*, the Pheasant's Eye, is a compact free-flowering little plant, 1ft. in height, producing its beautiful crimson-scarlet flowers in June and July; it forms a very effective border plant, and is quite easy of cultivation.

AGROSTEMMA CÆLI-ROSA (Rose of Heaven), often referred to *Lychnis*, is a free-flowering and exceedingly pretty plant, 1ft. high, the flowers varying in colour, some being white, others rose, whilst others again have a tinge of purple in them. It flowers in July. This is sometimes given under the name of *Eudianthe cœli-rosa*.



FIG. 110.—ADONIS ÆSTIVALIS.

There is a variety grown in gardens, *fimbriata*, having rose-coloured flowers with white centres, which is certainly an improvement on the type. As its name implies, it has fringed



FIG. III.—*AGROSTEMMA CÆLI-ROSA FIMBRIATA*.

petals (Fig. III). Another variety, with dark purplish flowers and of neat, compact habit, is known as *purpurea*; it forms an ornamental plant for growing in dense patches in the border.

ALYSSUM MARITIMUM, often known as *Kæniga maritima*, is the Sweet Alyssum. Though only growing 6in. high, it forms a charming little bedding plant, valuable also for rockwork and for edgings in the spring flower garden, producing, as it does, numerous small white flowers on its much-branched stem. It commences to flower in early spring, and continues throughout most of the summer. It produces seed in abundance, and if not interfered with, will become self-sown. It is an excellent bee-plant, and is familiar in some gardens under the

name of *Alyssum odoratum*. There are in cultivation two or three varieties of it, viz., Little Gem, a dwarf compact-growing plant, only 4in. high, suitable for edging, and Rock Alyssum, a dwarf, spreading plant, valuable for rockwork, baskets, or vases. Both varieties have white flowers. A variegated form is also grown.

AMBLYOLEPIS SETIGERA (*Helenium setigerum*).—A composite plant, with fragrant orange-yellow flowers. It is a native of Texas, and, in this country, grows from 1ft. to 2ft. high. Although seen at its best in July, it flowers most of the summer.

AMBROSIA MEXICANA is a fragrant hardy annual, growing 2ft. high; it is valuable for bedding on account of its sweet-scented and ornamental foliage.

AMMOBIUM ALATUM (Winged Everlasting) is closely related to the Gnaphaliums. It has white, chaffy flowers, with numerous yellow disk-florets, borne from May to September; height from

1½ft. to 3ft. On light sandy soils, it very often assumes a perennial form, but on heavy ground it should be treated as an annual. It does well if seed is sown in the autumn, the plants being kept in a cool house until spring. The variety *grandiflorum*, with flowers almost twice as large as the type, and much whiter in colour, forms a fine ornamental border plant, and is also much prized for cutting. It grows about 2ft. high, comes true from seed, and is a decided improvement on the species.

ANCHUSA AFFINIS, one of the Borage Worts, with cobalt-blue flowers, blossoms all the summer and autumn. It is of bushy habit, growing about 1ft. high.

AVENA STERILIS (Animated Oat) is an elegant plant, growing 2ft. high, and producing loose panicles of drooping barren flowers; it belongs to the same genus as the common Oat, and is easily grown.

BARTONIA AUREA (Fig. 112) is a very ornamental and decorative plant, with large golden-yellow flowers an inch or more across; they open in the evening, and are then very fragrant; as they fade they assume a reddish tinge. It grows to a height of 1½ft., and produces flowers about June. It is best sown in April, in the position in which it is intended to flower, the seedlings being thinned out to a distance of 4in. The seed should only have the merest sprinkling of soil over it, as it is very fine, and if buried too deep it would be impossible for it to push through. It is best grown in patches in the herbaceous border, where its bright flowers are shown off to advantage; it would also do admirably in a prominent position in the rock garden, care being taken that it does not smother any of the dwarf-growing alpinines.



FIG. 112.—*BARTONIA AUREA*.

BRIZA MINOR (Small Quaking Grass) (Fig. 113), known also as *B. gracilis* and *B. minima*, is one of our native grasses, being found occasionally in the southern counties of England. It is very much like the common Quaking Grass, though decidedly smaller, seldom growing more than 8in. or 9in. in height. The seed may be sown in the open border in March, and the plants

will then flower in June and July. It is a very ornamental, graceful plant, and is alike at home in the hardy fernery and in the herbaceous border. It is also largely grown for cut flowers, as it is exceedingly useful for making up bouquets and for the decoration of vases; for this purpose a large batch of



FIG. 113.—BRIZA MINOR.



FIG. 114.—BRIZA MAXIMA.

it should be grown in a part of the garden devoted entirely to growing plants for cut flowers, and when the branches are full grown they should be cut and placed in stands to dry, or hung up in light airy positions in the sheds. Another good ornamental grass is *B. maxima* (Fig. 114).

CACALIA COCCINEA (Flora's Paint-brush) is an attractive composite border plant, growing to a height of $1\frac{1}{2}$ ft., and producing brilliant scarlet flowers. *Cacalia aurea* is much the same in height and habit, but differs in having bright orange-coloured flowers. These species form excellent border plants, and the cut flowers are sought after for bouquets and vases. *Cacalias* should be sown in the border in April.

CALANDRINIA SPECIOSA (syn. *C. Menziesii*) is one of the Rock-Purslanes, and is useful for either borders or rockwork. It is very dwarf-growing, seldom exceeding 6 in. in height, yet producing large, rosy-purple flowers, 1 in. across. It should be grown in a light, sandy soil, and if sown early in spring where it is intended to flower, a succession of blossom will be kept up from June to September. As the *Calandrinias* only open their flowers during bright sunshine, they should have a sunny situation given them. A white variety is now offered, under the name of *C. speciosa alba*; this may either be grown separately or mixed with the type, in which case it shows off to advantage.

CALENDULA.—*C. officinalis* (Pot Marigold) is an interesting old-fashioned garden plant, grown extensively for its large yellow flowers. The typical plant grows to a height of 2 ft., and flowers from June to September. If sown in March or April, and the plants thinned to 9 in. apart, they form excellent

subjects for the mixed herbaceous border ; they are also suitable for showy positions in the wild garden or woodland, in which situations they should be sown or planted to form bold groups. A large number of varieties are now sent out, amongst the best being Meteor, double, yellow, striped with brown, 1ft. ; Orange King, 1ft. ; Yellow Queen, double ; Prince of Orange, 1ft. *Calendula pluvialis* (*Dimorphotheca pluvialis*), the Cape Marigold, is a free-growing subject, very effective in beds and borders, producing large single white flowers, with golden centres, the underside of the petals being of a rich maroon colour. It is a plant somewhat resembling a Marguerite, and grows to a height of 18in. Flowers in June and July.

CALLIOPSIS. — The plants found in catalogues under this name will be noted under "Coreopsis."

CALLIRHOE PEDATA (Poppy Mallow) is an elegant malvaceous plant with beautiful saucer-shaped flowers of a brilliant carmine, with a white centre. It grows to a height of 2ft. Seed should be sown early in spring, steeping it well before sowing, and transplanting into a moderately dry soil, in which position it will commence to flower in July, and will keep on until quite late in the autumn. The variety *nana* is a dwarf form, growing 1ft. high, with flowers like the type. It thrives best in poor dry soil, and is very effective in flower-beds and borders. As the Callirhoes make tap-roots, great care must be taken in transplanting.

CENTAUREA. — *C. Cyanus* (Cornflower, Fig. 115) is one of the loveliest of our blue-flowered annuals. It is a native plant, growing to a height of 3ft., and flowering in July. Although the typical colour is a bright blue, considerable variation is shown, some being found with pure white, others with purplish flowers, whilst others again are of a deep rose. Several named varieties are



FIG. 115.—CENTAUREA CYANUS.

now advertised, such as Victoria Blue, a lovely little plant for edgings, rockwork, &c., with bright blue flowers; it is very dwarf, growing only 6in. high; Emperor William, another dwarf annual, with blue flowers, &c.

These varieties of *C. Cyanus* are exceedingly showy plants for the herbaceous border, and also make charming pictures when grown in quantity in wild gardens and woodlands. A small bed in the flower-garden would produce a grand display if sown with mixed seed, saved from the dwarf-growing kinds. The cut flowers are also highly prized for vases and bouquets. The Cornflower will stand our hardest winter outside without injury. It is best sown in the early autumn in beds, to be transplanted in the early spring into its flowering quarters; it would do equally well if sown at the same time of the year in the position in which it is intended to flower. *C. depressa* is a showy annual with fine blue flowers, having crimson centres. It is rather like the common Cornflower, but has brighter flowers, and is much dwarfer, growing only 1ft. high. *C. suaveolens*, more generally known as Sweet Sultan, is an effective plant,

with showy thistle-shaped flowers, useful for cutting for bouquets; they are very fragrant, and last a long time in water. There are three varieties with white, purple, and yellow flowers, the last-mentioned being much the prettiest. If sown in autumn the plants produce larger flowers and also blossom longer than if sown in spring. They grow to a height of 1½ft.

CHRYSANTHEMUMS.—

These form a lovely set of plants, and should be grown in every garden, whether large or small. They are exceedingly free flowering, of neat, robust habit, and are very useful decorative subjects, whether grown in beds by themselves, in large

patches in the mixed flower-border, or in bold groups in the wild garden. The cut flowers are also highly appreciated for bouquets. *C. carinatum* (Tricolor Chrysanthemum, or Summer

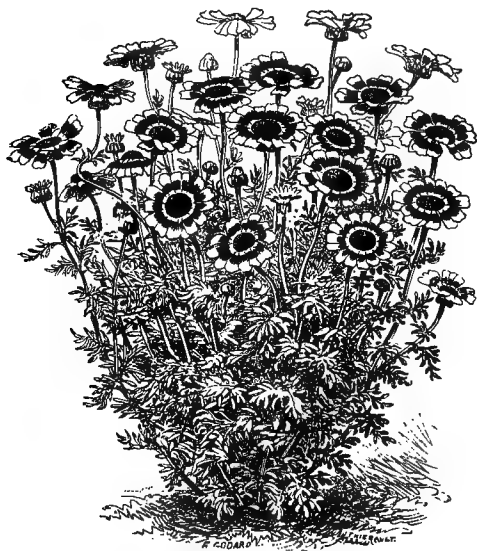


FIG. 116.—CHRYSANTHEMUM CARINATUM
BURRIDGEANUM.

Marguerite, as it is often called) is extensively grown in beds and borders, and is also valuable for cut flowers. It attains a height of 2ft., producing its purple and white flowers during August. Numerous varieties of it are now in cultivation, one of the best being *Burridgeanum* (Fig. 116), a compact-growing plant, bearing white or yellow flowers, with crimson or purplish-brown rings, enclosing a purple disk, and growing to a height of 18in.; Lord Beaconsfield, a form with mauve and yellow flowers growing 2ft. high, is also very good. There are numerous others, some with large handsome double flowers of many beautiful shades; others with double fringed flowers in white, rose, orange, scarlet, crimson, &c.; others, again, with bright single flowers; whilst a further section have golden leaves. These will be noted in the "Appendix."

C. coronarium (Crown Daisy) is a useful border-plant, thriving well under the influence of smoke. It is, therefore, a favourite in town gardens, growing to a height of 2½ft., and flowering continuously from July to September. The typical flower is yellow, but under cultivation, and in the hands of the hybridist, several forms have originated, so that we now have varieties with double yellow, white, and lemon flowers. It is best sown in April or early in May. *C. segetum* (Corn Marigold), although a British plant, is worthy of a position in the flower-border. It grows to a height of 18in., and produces its yellow flowers from June to August. The variety *grandiflorum* is a first-rate border-plant, growing 2ft. high, and bearing very large rich yellow flowers, which are greatly valued for cutting.

CLARKIAS are free-flowering border plants, of light, graceful habit, and very easy of culture. The seed may be sown outside in September, either in permanent positions or in beds for transplanting into the open border as soon as large enough; these will flower well in the early spring. The first sowing in spring should take place in March, thinning the plants to about 9in. apart; these will flower in July, when the autumn-sown plants are past their best. Other sowings for succession should be made until about the beginning of June, these keeping up a supply of flowers until the end of October. *Clarkia elegans* is an erect-growing much-branched annual, 2ft. high, bearing numerous purple or rose-coloured flowers on long leafy racemes. There are now many forms of this species, with different coloured flowers. These form strong branching plants, very profuse flowering, and are very effective subjects when grown as border plants; they are also extremely useful when grown in beds by themselves—whether the kinds are kept separate or mixed. The variety Tom Thumb, with rose-coloured flowers, grows only 1ft. high, and is an excellent plant for sunny spots in the rockery, or in the front of the herbaceous border. *C. pulchella* grows 2ft. in height, producing its flowers in June; it is easily distinguished from *C. elegans* by

its deeply trilobed petals, those of *elegans* being entire. The typical flower is deep rose-coloured, but plants now exist with flowers varying from pure white to dark purple, some being single, others double. All are exceedingly showy, and should be grouped in mixed borders where their bright colours will be highly appreciated. As cut flowers, they are also in great demand.

COLLINSIA.—*C. bicolor* (Fig. 117) is a pretty, profuse-flowering plant, 1ft. high, the upper lip of the corolla being white, whilst the lower lip is of a purplish colour. It will stand smoke well, and consequently is very useful for growing in the neighbour-



FIG. 117.—COLLINSIA BICOLOR.

hood of large towns. The seed may be sown in autumn, and the plants protected slightly during severe weather in winter, when they will flower freely in May. If sown in March and April they will flower in about three months from the time of sowing. A white variety is also in cultivation under the name of *alba* or *candidissima*. *C. verna*, a species growing 1ft. high, and flowering early in May, has white flowers, with the lower lip of a beautiful blue colour. Although this plant is so handsome, it is seldom seen in gardens, and very rarely met with in nurserymen's catalogues. It ought to be a plant very widely grown, seeing that it produces its flowers at a time when annuals are rather scarce.

The length of time the display lasts—from six to eight weeks—ought also to recommend it as a plant worthy of a place in every garden. The seed must be sown in August or early in September in pans of light soil, and the seedlings, when large enough to be handled, should be pricked off into other pans or boxes, and kept cool and damp in a light airy position, so as not to force the growth, afterwards transferring to the open border in time to establish themselves before winter sets in. When treated in this manner they very often flower in April. Altogether there are upwards of a dozen species of *Collinsia*, including *C. corymbosa*, with the upper lip of a greyish-blue,

whilst the lower one is white. These are suitable for growing in large patches, sowing the seed in March, and thinning the seedlings to a distance of 3in.

COLLOMIA COCCINEA is a showy border plant, varying in height from 12in. to 18in., and producing its bright scarlet flowers during June, July, and August. It is a useful bee-plant, and in light warm soils it sows itself every year, the plants so obtained being quite equal to the cultivated ones.

CONVOLVULUS TRICOLOR (*C. minor*) (Dwarf Garden Convolvulus) is a well-known plant, 1ft. high, bearing numerous large richly-coloured flowers, which are white, with a blue limb and a yellowish throat. There are several varieties with white, rose, crimson, and blue flowers; these are fine bedding plants and are also useful when grown in clumps in the border. They require a good warm soil, and should be kept in a medium moist condition.

COREOPSIS is a genus containing several annuals which are largely grown for summer decoration, under the name of *Calliopsis*; they are very graceful border plants, supplying, during summer an abundance of elegant showy flowers, which are greatly appreciated for vases and bouquets. They thrive almost anywhere, even in town gardens; and the bright colours of their flowers render them objects of remarkable beauty and general garden favourites.



FIG. 118.—*COREOPSIS DRUMMONDI*.

Coreopsis Drummondii (Fig. 118) is a lovely plant for beds and borders; it has golden-yellow flowers, with a rich crimson-brown ring surrounding the eye; it is a much-branched species, growing 18in. in height, and flowering in July. *Coreopsis tinctoria*, also known as *C. bicolor*, is a slender annual, growing to a height of 2ft., and opening its flowers in June; they are yellow, with a crimson-brown blotch in the centre. Several varieties, differing in the colour of their flowers, are now grown, the best of which is undoubtedly *nana*. It is very effective for bedding purposes, lasting for a long time in blossom. The following also deserve a place in the garden: *coronata*, a good border plant, 18in. high, with a rich yellow centre, spotted with brownish-crimson, flowers in July;

Engelmanni, with bright yellow flowers, elegant in flower and foliage, 1ft. high.

DIANTHUS.—Here, again, we have a genus containing several hardy annuals which are amongst the most decorative of border plants, their brilliant colours rendering them indispensable for summer bedding and also for cut-flower purposes. *D. chinensis* (Chinese Pink) is a plant which has given rise to numerous single and double varieties, and although classed as an annual, it will live for two or three years if the winters are mild. The seed should be sown in February in a cool house, pricking off



FIG. 119.—DIANTHUS CHINENSIS
HEDDEWIGII FLORE-PLENO.

the seedlings when large enough into boxes, and transplanting to the open border in April. The plants will commence flowering about July, and will keep on until late in the autumn; they grow to a height of 1ft., and bear red flowers. The various forms are usually classed under two heads, viz. :

The *Heddewigii* section, containing *Crimson Belle*, with large handsome flowers of a beautiful blood-crimson colour; height 1ft. *Eastern Queen*, with large flowers, marbled rose and white; height 1ft. *Heddewigii (diadematus) flore-pleno* (Fig. 119), a Japanese variety

of dwarf and compact habit, with large, very double flowers. Mixed seed of this section may also be procured.

The *laciniatus* section comprises *Salmon Queen*, a new and fine addition to the annual Pinks, with large, single, beautifully-fringed flowers of a soft salmon colour; height 1ft. *Snowflake*, with single fringed flowers, varying from pure white to blush; height 1ft. *Midnight*, with deep rich maroon double flowers, shaded with black. Choice mixed seed may also be obtained of the *laciniatus* section, from which a batch of plants may be raised, producing flowers of rich and varied colours, with fringed petals. Seeds of the single and double forms may be obtained separately.

ERYSIMUMS are effective border plants, succeeding well in any ordinary garden soil. *Erysimum arkansanum* (Western Wallflower) has fine, showy, clear sulphur-coloured flowers, much resembling those of the common Wallflower; it grows from 12in. to 18in. high. *E. Perofskianum* has dense racemes of brilliant orange-coloured flowers, and is a desirable plant for beds, borders, rockwork, edgings, &c.; 1ft. high. For spring decoration, the seed should be sown in September; whilst for summer display it is best sown in March or April.

EUCCHARIDIUMS are free-flowering annuals of the Evening Primrose family, and somewhat resemble the Clarkias in appearance. If sown out-of-doors in the autumn they are a lovely sight in early summer. The spring-sown seed will come into flower in about eight weeks from the time of sowing, and remain in flower for a long time. *E. Breweri* has light rose-coloured fragrant flowers, is early and of elegant form, and grows only 6in. high. *E. concinnum* has lilac-purple flowers on long stalks. The plant known as *grandiflorum* is merely a variety of *E. concinnum* with larger flowers; a white variety is also in cultivation.

EUTOCA VISCIDA (also known as *Phacelia viscida*) is a lovely little plant, 1ft. high, with intense blue flowers; it is free-flowering, very effective in beds and borders, as well as a good bee-plant.

GAILLARDIA.—*G. amblyodon* grows 2ft. in height, and bears flower-heads of a deep red colour. *G. pulchella* has flower-heads rather larger than the last-mentioned, the ray-florets being of a crimson hue and tipped with bright yellow; flowers in autumn. There are now several forms in cultivation, amongst which are: *Lorenziana*, with large handsome heads, the florets developing into tubular, funnel-shaped structures, in rich shades of red and yellow; height 1½ft. There is a form of *Lorenziana* with double flowers of a beautiful golden shade. *Drummondii* or *picta*, with large red and yellow flowers, and somewhat succulent leaves; height 1½ft. *Drummondii coccinea*, with blood-red flowers having a golden margin; height 1ft.

Mixed seed of the foregoing and other forms may be obtained from the nurserymen. Some people make a practice of putting in cuttings of such kinds as *pulchella* and *Drummondii* in autumn, either inside or under hand-lights, and the plants thus obtained are far superior to those raised from seed. In some catalogues they are classed as biennials, but as they will flower the same year as sown, they have a just claim to the title of annuals. Whether known as annuals or biennials, they certainly take a prominent place amongst our summer bedding-plants on account of their rich and brilliant-coloured flowers, the long duration of the flowering period, and also for the value of the flowers for

bouquets and vases. Large masses in the border or small beds of these annual kinds are very effective.

GILIAS are gay little plants, profusely covered with flowers of various shades of colour; they are very attractive when grown in masses in the border, and the cut flowers are useful for vase work—lasting a long time in water; they are also valuable bee-plants. For spring flowering the seed should be sown in autumn, whilst for summer and autumn flowering, the best time to sow is towards the end of March or beginning of April; they require a rather light rich soil. *G. achilleæfolia* (Milfoil-leaved Gilia) has purplish-blue flowers, several together on long peduncles; it grows from 1ft. to 1½ft. high, and flowers in August;



FIG. 120.—GILIA ANDROSACEA.

there is also a form with white and another with red flowers, both of them very good. *G. androsacea* (Fig. 120) has lilac, pink, or nearly white flowers, with dark yellow throats; it grows from 9in. to 12in., and flowers during August; it is also known as *Leptosiphon androsaceus*, under which name it is generally described in catalogues. *G. capitata* bears blue sessile flowers in dense heads in July; 18in. to 2ft. high. *G. densiflora* (*Leptosiphon densiflorus*) has soft lilac-coloured flowers; this and the white variety grow 1ft. high, and are plants of chaste beauty, in both flower and foliage; flowers in June. *G. dianthoides*, a showy little plant, 3in. or 4in. high, with lilac flowers; flowers in July.

G. laciniata has deep lavender-blue flowers, borne in July; only 6in. high; makes a fine bedding plant; also useful for rockwork and edgings. *G. micrantha* (*Leptosiphon roseus*) produces an abundance of brilliant rose-coloured flowers, with slender tubes an inch long; height 9in.; flowers in July; the plant is covered with numerous long, weak hairs. *G. micrantha aurea* (*Leptosiphon aureus*) is a good form, with bright golden-yellow flowers. *G. nivalis* (Snow Queen) is a lovely little plant, 8in. high, bearing snowy-white flowers with golden centres. *G. tricolor* is a favourite spring- and summer-flowering annual; the typical form has a yellow flower with a lavender or whitish margin, these colours being separated by a deep purple ring; it grows from 9in. to 12in. high. There are several pretty forms including *alba*, with pure white flowers,

and *rubra violacea*, having rose-purple flowers, with a central maroon ring. Mixed seed can also be obtained, producing plants of various shades—lavender, blue, white, orange, &c.

GODETIAS are amongst the most beautiful of hardy annuals for bedding purposes; they are of easy culture, and form sturdy little bushes covered with large and handsome flowers of brilliant and delicate shades; the cut flowers last long in water. They are now classed under *Cenothera* by several authorities. Many useful garden hybrids are described under *Godetia* in catalogues, viz.: The Bride, 1½ ft. high, of light, elegant habit, with a long spike of flowers, white, blotched with crimson. Duchess of Albany, 1 ft. high, with pure white flowers, produced in pyramidal clusters. Duke of York, 1 ft. high, having rich crimson flowers, with a large white centre; Princess of Wales, 1 ft. high, a rather old yet good variety, with rosy-crimson flowers. Princess Henry, 1 ft. high, with satiny blush flowers; each petal blotched with crimson. Lady Albemarle, 1 ft. high, with deep crimson flowers; very showy. Whitneyi, blush-coloured, spotted with crimson. Marchioness of Salisbury, 1 ft. high; one of the most attractive, bearing a profusion of large bright crimson flowers, with a broad white margin; a very effective bedding plant. Gloriosa, 1 ft. high; the darkest-coloured *Godetia*, with deep blood-red flowers; a handsome plant of compact habit; useful for bedding.

GYPSOPHILA ELEGANS is a graceful plant of light, fairy-like growth, covered with small lilac flowers; it grows about 18 in. high, and is much in demand for cutting. *G. muralis*, 6 in. high, is a lovely little plant with rose-pink flowers; it is useful in the rockery or as an edging plant.

HELIANTHUS (the Sunflower genus) contains several hardy annuals of majestic growth, producing large showy flowers. These are suitable for wild and sub-tropical gar-

dening; the dwarfer kinds, with smaller flowers, are useful for grouping in mixed flower borders. *Helianthus annuus* (common

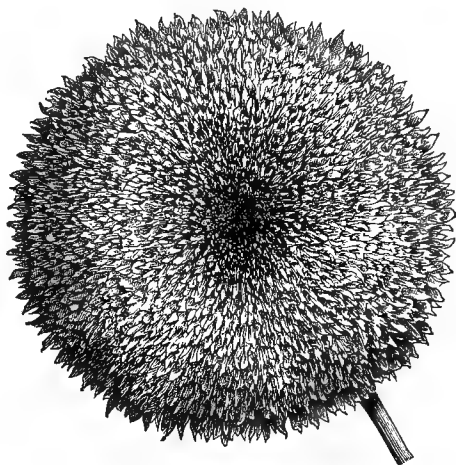


FIG. 121.—HELIANTHUS ANNUUS GLOBOSUS FISTULOSUS.

Sunflower) grows 6ft. high, and produces its large yellowish flowers in July. The seed should be sown in a slight hot-bed or in pots in February, transplanting into the open ground when large enough; it may also be sown outside in March. It likes a strong, rich soil, with a quantity of old cow-manure added, and in this compost it will often produce flowers a foot across. There are numerous varieties now in cultivation, one of the best being *H. a. globosus fistulosus* (Fig. 121), with large handsome double yellow flowers, which, when fully developed, assume a globular form.

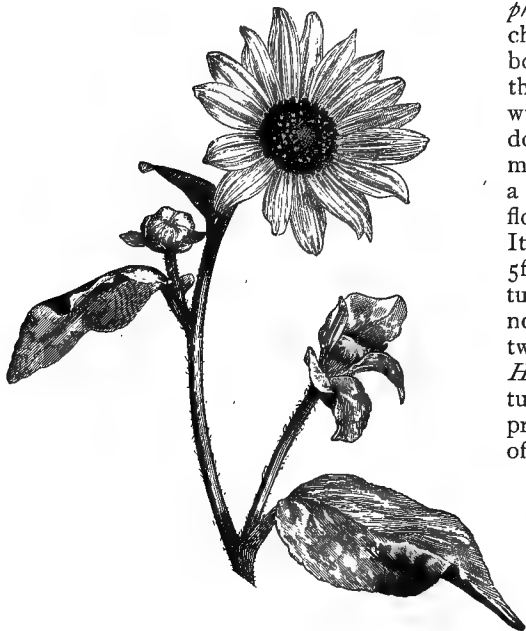


FIG. 122.—*HELIANTHUS ARGOPHYLLUS*.

Helianthus argophyllus (Fig. 122) is a charming plant for mixed borders, wild gardens, &c.; the whole plant is covered with a soft, silky, silvery down; the flowers are medium-sized, yellow with a dark centre, the ray florets being very broad. It grows to a height of 5ft., and flowers in autumn. There is really not much difference between this and *H. annuus*. *H. cucumerifolius* (Miniature-flowered Sunflower) produces an abundance of small rich yellow flowers, set off with a brownish-black centre; about 3in. across; the plant grows about 3ft. high, and the stem is much branched and often marked with purplish spots; the

leaves are thin and bright green. The form known as *Stella* is new; it bears an abundance of golden-yellow dark-centred flowers, about 4in. across, the petals of which are elegantly twisted. Henry Wilde is a distinct variety, bearing branching heads of single flowers, 5in. across, golden-yellow, with dark centres; height 6ft. *H. a. californicus* has heads of large handsome double flowers of a rich yellow; it is more robust in habit than the typical *H. annuus*, and the flowers are darker coloured. The form of this known as *plenissimus* is one of the best of the annual Sunflowers, and ought to find a place in every mixed border of any pretensions.

HELICHRYSUMS (Everlastings) are splendid border plants, producing an abundance of flowers, which are very valuable for the winter decoration of vases. They should be sown inside during the autumn, and planted out in April, or else sown very early in the year (about February) under glass, and planted out during favourable weather in April, so that they may have a chance of making plenty of flowers before the autumn frosts cut them down. They are sometimes sown rather late in the open border, and are consequently just approaching their best when they are spoiled by the early frosts in the autumn. *H. bracteatum* (Fig. 123) is the one generally grown. It reaches a height of 3ft., and produces its pale yellowish flowers in August and September. The variety *compositum* is a grand double form, with various coloured flower-heads. There are now numerous forms of *H. bracteatum* in cultivation, the following being amongst the best: Golden King, with large golden-yellow flowers, having orange centres; 2ft. high. Silver Queen; this has large handsome snowy-white flowers, with centre of orange. Fireball has double fiery crimson flowers; grows 15in. high. Mixed seed can also be obtained producing plants of various colours, viz., white, yellow, orange-scarlet, dark maroon, salmon, purple-rose, &c.



FIG. 123.—HELICHRYSUM BRACTEATUM.

HIERACIUM AURANTIACUM (Hawkweed) is a common plant, succeeding in any soil, and growing from 12in. to 18in. high, producing eight to ten flowers in each corymb. It begins to flower about June, and keeps up a continuous display for several weeks. For naturalising in the wild garden it is well adapted, and when grown in a large batch proves very effective. There are now several forms of it—one with bright rose-coloured semi-double flowers, another with pure white semi-double flowers, and another with light yellow single flowers with a crimson-brown centre, all of them about 1ft. in height.

HUMULUS JAPONICUS (Japanese Hop) is a quick-growing twiner, 12ft. high, and bears yellowish flowers in July. It is very

suitable for covering trellises, &c., or for hiding unsightly objects. There is a variegated form, with cream, silver, and green foliage.

HYMENOXYS CALIFORNICA, also known as *Shortia californica*, has a tufted habit. It grows 6in. high, and produces sheets of Daisy-like, bright-yellow flowers, with rich golden centres. An autumn sowing in light dry soil will produce a brilliant display in spring, whilst a batch of spring-sown plants are charming during the summer.

IONOPSIDIUM ACAULE (Violet Cress) is a lovely miniature annual, 2in. high, and forming dense tufts of foliage, literally smothered with tiny pale lilac flowers. It is very neat in habit, and thrives best in damp or shady situations, such as the foot of rockwork, on old shady walls, &c.; for sowing near rugged steps it is particularly suitable. It flowers in eight or nine weeks from the time of sowing, and very often reproduces itself year after year by self-sowing.

KAULFUSSIA AMELLOIDES is a compact annual, suitable for edgings, fronts of borders, rockwork, &c.; it also forms a "carpet" plant for beds of taller subjects. It grows about 6in. high, and produces its pretty Aster-like flowers in June. In the typical plant they are of a soft azure-blue tint, but in the varieties they differ in colour, some being white, others rose, scarlet, and violet. Although this plant goes under the name of *Kaulfussia amelloides* in nurserymen's catalogues, its proper name is *Charieis heterophylla*, *Kaulfussia* being a genus of Ferns.

LARKSPURS (Delphiniums).—The annual Larkspurs are attractive summer bedding-plants, producing a wealth of beauty in their bright-coloured flowers; they are very effective in borders, and when planted amongst shrubs, their flowers of various shades of white, rose, blue, and purple show off to advantage. They vary much in habit, some being from 3ft. to 4ft. high, whilst others do not exceed 1ft. in height; the flowers last for a long time, and are much valued for vase-work.

The seed should be sown in March or April, in the positions where the plants are intended to remain, and the seedlings thinned out to 4in. or 5in. apart. The branching kinds are often sown in the autumn in a light border, and transplanted into their flowering quarters about March, taking care to lift with as good balls as possible. Slugs seem very fond of Larkspurs, and consequently a constant look-out must be kept for them; this is especially needful in the case of the autumn-sown seedlings, or they will all disappear before spring. These annual Delphiniums are divided into several groups; for instance, we have the Ranunculus-flowered, the Hyacinth-flowered, the Stock-flowered, and the branching-stemmed kind. The Ranunculus- and Stock-flowered may be obtained in mixed double varieties,

growing only 1ft. high; the double Stock-flowered, mixed, 2ft. high; the dwarf Hyacinth-flowered—the very compact growth of which renders it the best adapted for summer bedding—may also be obtained in various colours. In this latter group the flowers are set on a more tapering spike, and are farther apart than in the Ranunculus- and Stock-flowered.

The branching-stemmed kinds may be obtained in colours of white, carmine, deep blue, &c., the plants growing to a height of 2ft. or 2½ft. They have originated from *D. consolidum*, a species with branching stems and deep blue flowers. It is a native of Britain, growing 1½ft. to 2ft. high, and producing its flowers from April onwards throughout the summer. There is a form of this, known as *candelabrum*, which bears pyramidal spikes of variously-coloured flowers, and is especially worthy of extended cultivation.

The Common Larkspur (*Delphinium Ajacis*) is one of the species which is responsible for the large number of beautiful forms now in cultivation. It has showy blue flowers, sometimes red or white, borne in long, loose racemes. It is an erect, hairy annual, growing from 1ft. to 1½ft. high, and producing its flowers about June.

LASTHENIA CALIFORNICA, a small form of *L. glabrata*, is a composite plant, and valuable for beds, borders, &c., when grown in broad tufts. If sown in September and October, it produces a sheet of rich deep golden flowers in spring, just when the Candytufts and early Phloxes are at their best; whilst if sown in April, it is very effective in June and July. It grows from 9in. to 18in. high.

LATHYRUS ODORATUS (Sweet Pea) is a hardy annual climber, growing to the height of 5ft. or 6ft., and is such a universal favourite that its merits scarcely need description. It is certainly one of the very best of our hardy annuals, and whether grown as a floral screen to shut out unsightly objects, as an ornamental plant in the mixed border, or as a source for yielding cut flowers, its position is simply invaluable. Many people grow a hedge of Sweet Peas entirely for this latter purpose, and, at the same time, the hedge forms a very attractive object in the garden. A common practice is that of sowing small patches of seed of mixed varieties towards the back of the herbaceous border, and placing tall, stout bushy stakes around them, so that the Peas may climb up, and in this way form objects of great beauty. When they reach the top of the supports, the points of the stems should be pinched out.

The best time for sowing is in the early spring—March or beginning of April—in soil which has been deeply dug and plentifully manured. Some gardeners make another sowing about the end of May for late autumn work, but this is

unnecessary, as when the earlier sown batches get overgrown and untidy, all that is required is to cut the long growths off with the hedge-shears, and in the course of a few days, new growths, bearing an abundance of flower, will be produced. During hot, dry weather they must not be allowed to suffer from want of water, and at this time, occasional applications of weak liquid manure will prove advantageous.

Varieties of the Sweet Pea are now innumerable, and may be obtained either separately or in mixed colours varying from pure white, as in *Emily Henderson*, to dark maroon, shaded with black, as in *Stanley*. *Captain of the Blues* produces large handsome flowers, and is said to be the finest Blue in existence. *Cupid* is a very dwarf variety of Sweet Pea, growing only about 5 in. in height; it is a wonderfully free blossomer, bearing large waxy pure white flowers. There are several other species of *Lathyrus* that are annual, and although none of them rival the Sweet Pea in point of beauty, some of them form very pretty border plants, such for instance as *L. tingitanus*, with red and purple flowers, growing 3 ft. high, and flowering in June and July.



FIG. 124.—LAVATERA TRIMESTRIS.

LAVATERA TRIMESTRIS (Fig. 124) is an annual, growing from 2 ft. to 3 ft. high, producing an abundance of large rose-coloured flowers in June. It thrives well in a rich, light soil. The seed may be sown in the open border either in the autumn or in early spring. It is a valuable subject for large borders, and for planting in wild gardens, &c. There is also a variety known as

alba, with beautiful snowy-white flowers.

LAVIA ELEGANS is a composite annual, growing 1 ft. high, and flowering from May to August; it has yellow flowers, bordered with white. *L. glandulosa* has beautiful pure white flowers, and forms a profuse-flowering plant for beds and borders, remaining for a long time in blossom.

LEPTOSIPHON.—The plants usually found under this name are dealt with under “*Gilias*.”

LIMNANTHES DOUGLASI is a dwarf annual, growing from 6 in. to 8 in. high, and producing yellow flowers shaded to white, and

very sweet-scented. It is of a spreading, prostrate habit, and proves of great value for spring and summer decoration on banks and rockwork, and as an edging in borders. Being extremely hardy, it is suitable for autumn sowing, and may thus be had in flower very early in spring; if required for summer-blossoming, the best time to sow is in March. This is a plant that should be sown by all bee-keepers, as bees are very fond of the flowers. A white variety is also in cultivation.

LINARIA.—This genus yields several pretty annuals—charming free-flowering plants, useful for beds and borders, the flowers being much prized for bouquets and vases. *L. bipartita* has violet-purple flowers, resembling those of a Snapdragon; it grows from 6in. to 12in. high, and flowers from June to September. The variety *alba* has snow-white flowers, with a golden blotch. *L. maritima* has pale yellow flowers, with an orange palate. It is of the same height as the last-mentioned species, and proves to be an exceedingly free blossomer. *L. reticulata* has deep purplish flowers, grows from 1ft. to 2ft. high, and flowers in June and July. The variety *aureo-purpurea* has deep purplish flowers, with a golden blotch; it is a very striking plant, growing about 1ft. high. *L. tristis* is a charming plant, growing about 9in. high, and flowering in July; it has yellow flowers, blotched with crimson, and forms a suitable subject for edging, bedding, or for rockwork.

LINUM GRANDIFLORUM (Red Flax) is a useful annual, growing 1ft. in height, and producing its crimson flowers in June and July. The seed may either be sown in February or March under glass, and the seedlings transferred to the open border as soon as large enough; or it may be sown in April in the position where the plants are intended to flower. *L. grandiflorum coccineum (rubrum)* is one of the most brilliantly coloured of summer annuals, producing flowers of a glowing crimson hue. It may be had in flower from May to October by successive sowings, and as it is very free-flowering it forms an exceedingly ornamental plant for beds and borders.

LUPINUS (Lupin) is a genus containing several handsome annual species, and from which have sprung innumerable beautiful hybrids. They are all graceful plants, the elegant racemes being much prized for cutting. The dwarf varieties form capital beds by themselves, whilst the taller-growing ones are effective in mixed borders. *L. Hartwegii* has blue and pink flowers; it grows from 1½ft. to 2ft. high, and flowers in July. *L. luteus* is the well-known dwarf yellow Lupin; it grows 1ft. high, and produces its fragrant flowers in July and August. *L. Menziesii* is a handsome bushy plant, covered with racemes of showy bright yellow flowers, and grows 1½ft. high. *L. hybridus atro-coccineus* is one of the best, growing 2½ft.

high, and producing elegant racemes of crimson-rose-coloured flowers, tipped with white. *L. nanus* (common Dwarf Lupin) is a lovely plant for beds and the fronts of borders; it grows only 1ft. high, and produces its lilac and blue flowers in July. The variety *albus* has pure white flowers. *L. subcarnosus* has handsome deep blue flowers, with white eyes; it grows 1ft. high, and is much prized for cutting. *L. Cruikshankii* is an erect-branched annual, growing 3ft., and bearing blue, white, and pink flowers during July and August. It is a splendid border plant, and goes by the name of *Mutabilis versicolor* in some nurserymen's catalogues.

MALOPE TRIFIDA. GRANDIFLORA is a showy plant for large mixed flower-borders and for shrubberies. It grows to a height of 2ft., and bears dark glossy rose-crimson flowers in June and July. There are two varieties: *alba*, with pure white flowers, and *rosea*, with flowers of a pretty blush shade.

MATHIOLA BICORNIS (Night-Scented Stock) has lilac flowers, which in the morning and evening, and also after a shower of rain, emit a delightful fragrance perceptible at a considerable distance.³ It grows 1ft. high, and flowers in spring.

MIGNONETTE (*Reseda odorata*) is a universal favourite, being grown in almost every garden, however small. It grows about 1ft. high, and may be had in flower outdoors from May to October. The flowers are yellowish-white in colour, with saf-



FIG. 125.—NEMOPHILA INSIGNIS.

ron anthers. The seed may be sown in the borders in April and May for flowering in June and July; another sowing might be made in June for flowering in late autumn. It is always advisable to thin the seedlings early to a suitable distance apart, as they then grow much stronger, and flower much freer than if left crowded. The plants like a rich, moderately-heavy soil, and especially delight in a cool, moist situation; but seed might

with advantage be sown on dry banks, the margins of gravel-paths, and in any dry, sunny situations, as although the plants do not grow so freely, the fragrance of the flowers is more powerful. They are suitable for either border or pot-culture, and the flowers are much prized for cutting, as they emit such a delightful perfume, and last so long in water. Numerous varieties are now offered by the trade.

NEMOPHILAS are charming little annuals, very uniform in height, comprising colours of strong contrast; they are of the easiest culture in any ordinary garden soil, and are very useful for the adornment of rockeries, small beds, or for ribbon borders and edgings. Some pretty combinations may be produced by arranging masses of them in harmonising colours. For a spring display seed should be sown early in August, preferably where the plants are intended to flower, and for summer-flowering the best time to sow is in April. *Nemophila insignis* (Fig. 125) has bright blue flowers with white eyes; it grows to a height of 18in. Several fine varieties have originated from it, viz., *grandiflora*, with large clear light blue flowers having white centres, more than an inch across; it grows only 9in. high, and for beds, borders, and ribbons is very effective. *N. insignis alba* has pure white flowers, and forms a charming companion to *grandiflora*. *N. i. marginata* has blue flowers with a white edge. *N. maculata* is a species growing 6in. high, and is to be seen at its best about June. It is a hairy plant, and bears large handsome white flowers, with a violet blotch on each lobe of the corolla. *N. atomaria* (*Menziesii*) has white flowers with purple spots.

NIGELLAS are graceful border plants, with Larkspur-like foliage, the flowers being partially hidden by the curious fine feathery green bracts. The seed should be sown towards the end of March or in April, in light warm soil in the open border, and the seedlings thinned out to 6in. apart. *N. damascena* (Love-in-a-Mist) is the one most generally grown; it has bright-green finely-cut foliage, and bears large white or blue flowers surrounded by mossy bracts. It attains a height of from 12in. to 18in., and flowers in July. The double-flowered variety, *flore-pleno* (Fig. 126), is very good. *N. hispanica* (Devil-in-a-Bush) has showy blue flowers, with blood-coloured stamens; the varieties *alba* and *atropurpurea*, with white and purple-violet flowers respectively, are worth growing.



FIG. 126.—NIGELLA DAMASCENA FLORE-PLENO.

NOLANAS are trailing plants with Convolvulus-like flowers, suitable for rockeries or mixed borders. *N. atriplicifolia*, has blue, white, or yellow flowers; it grows 6in. high, and flowers in July. The seed should be sown in the open border in April, and the plants well thinned out.

PAPAVER (the Poppy genus) contains several annual species which are valuable decorative border plants; the flowers are produced in great abundance, and are much prized for vase-work. The seed should be sown in March or April, where the plants are intended to flower.



FIG. 127.—PAPAVER RHŒAS
FLORE-PLENO.

sprinkled over with a little finely-sifted soil, afterwards thinning out to 6in. apart. They grow about 1ft. in height. Carnation-flowered, with large handsome double-fringed flowers, of various brilliant colours; grows about 2½ft. in height. Ranunculus-flowered, or French Poppies, have fine double flowers, with thin petals; flowers of various colours; height 1ft. *Papaver setigerum* is a species with white or violet-coloured flowers, growing from 1ft. to 2ft. high, and flowering in July. It is very like the Opium Poppy, but differs in having the teeth of the leaves ending in stiff bristles, and in the stem, as

Papaver Hookeri is an ornamental bushy plant, 3ft. to 4ft. high, flowering in autumn. The flowers vary in colour from pale rose to crimson, each petal having a white or black spot at the base. *P. Rhœas* (common Corn Poppy) has scarlet flowers, which are produced in June. It grows about 1ft. in height. Under cultivation it has produced many varieties with both single and double flowers, amongst which is *flore-pleno* (Fig. 127), with double flowers. The following garden strains have also originated from this species, viz: the Shirley Poppy, the Carnation-flowered, and the Ranunculus-flowered. Shirley Poppies, an exceedingly popular race of single Poppies, raised during recent years by the Rev. W. Wilks, are all graceful plants, yielding flowers of various colours, embracing delicate shades of rose, pink, and blush. By sowing in spring and early summer for succession, they may be had in flower from May to October. The seed is very fine, and should, on this account, be sown quite thinly, and merely

well as the leaves being hairy. *P. somniferum* is the Opium Poppy, and produces in July variously coloured flowers from white to crimson; it grows from 2½ft. to 4ft. in height, and has given rise to a number of garden forms, of which the Pæony flowered is very distinct, with double Pæony-like flowers, having broad petals, varying in colour from white to crimson. Danebrog (Victoria Cross Poppy, Fig. 128) grows from 1ft. to 2ft. high, and has scarlet flowers with a white spot at the base of each of the petals. Murselli (Mikado Poppy) is another strain of *P. somniferum*, growing 2ft. high, and producing flowers in white and scarlet. Seed of these poppies may be obtained in either named or mixed varieties; they ought to be grown largely in shrubberies, wild gardens, and woodlands, and for distant effect generally.

PHACELIAS are showy little plants with white, blue, or violet flowers; they are of easy culture in any ordinary garden soil. *P. congesta* is one of the best, growing from 9in. to 18in. high, and producing numerous blue flowers in dense heads during June. *P. tanacetifolia* has bluish-pink flowers; it grows to a height of 2ft., and flowers in June.



FIG. 128.—PAPAVER DANEBROG.

PLATYSTEMON CALIFORNICUM (Californian Poppy) is a beautiful plant on rockwork and in flower-borders, and is quite easily grown in any ordinary garden soil; it grows 1ft. high, and bears numerous pale cream-coloured flowers during summer. It may be sown in either spring or autumn.

SANVITALIA PROCUMBENS is a free-flowering, trailing plant, very effective for small beds, edgings, and for rockwork. It grows only 6in. high, and yields its miniature Sunflower-like blossoms in July. The ray-florets are of a rich yellow colour, whilst those of the disk are brown. The double-flowered variety, *flore-pleno*, is by far the showiest, and has rich golden-yellow flowers resembling those of a small Ranunculus.

SAPONARIAS (Soapworts) are dwarf hardy annuals, &c., of the Pink family, very useful for beds and edgings in summer, and when sown in autumn are valuable for spring gardening:

S. calabrica has pink star-shaped flowers; it grows 6in. high, and flowers in August. There is also a variety, *alba*, with pure white flowers.

SCABIOSA (Scabious) is a genus containing several annuals which produce a fine effect in beds and borders, whilst the handsome heads of flowers are much prized for vases and bouquets. If sown in February under glass and again in March or April in the open border, the plants will flower the same year; it is, however, often treated as a biennial by sowing in May or June, for flowering early the following summer. *S. atropurpurea* has deep crimson flower-heads, and is sweetly scented. It grows from 2ft. to 3ft. high, and flowers in July and August. There are numerous varieties, some with double, and others with single flowers in various shades of crimson, purple, and yellow. Then there are forms with distinctly margined foliage as well as those with flowers both margined and sheathed. *S. atropurpurea*, as well as being grown extensively for the embellishment of the outdoor flower garden, is also sometimes cultivated in pots for flowering in winter. For this purpose seed should be sown during early summer, and the young plants potted off singly when large enough, and housed in a cool frame.

SILENES (Catchflies) are free-flowering annuals, suitable for growing in beds, borders, or on rockwork; for spring gardening they are of great value. If required for spring gardening the seed should be sown early in autumn, and for general summer decoration, March or April is the best time to sow. *S. pendula* is a species growing 1ft. high and producing an abundance of bright rose-coloured flowers; the variety *compacta* is one of the best and most useful of the annual *Silenes*, forming tufts not more than 6in. high, smothered with numerous bright pink flowers; a white variety is also in cultivation.

SPHENOGYNE SPECIOSA, now known as *Ursinia pulchra*, is a showy annual of dwarf, spreading habit, with rich golden-yellow Marguerite-like flowers. It grows from 6in. to 1ft. high, and forms a charming plant for beds and borders, and is also useful for cutting.

VENUS' LOOKING GLASS (*Specularia Speculum*) is a pretty free-flowering annual, suitable for beds or for rockwork. It grows 1ft. high, and in July is covered with bright purple bell-shaped flowers, somewhat resembling those of a Campanula. It is one of the showiest of our hardy annuals. There is also a white variety in cultivation.

VERONICA SYRIACA is a dwarf hardy species, growing 6in. high, and bearing bright blue flowers. It is best sown in autumn for spring flowering. The variety *alba* is also

useful for the same purpose, the plants being literally covered with flowers in the spring.

VIRGINIAN STOCKS.—*Malcolmia maritima* is a well-known free-flowering annual, easy of culture in any ordinary garden soil. If sown in April, it will flower in June, and by successional sowings it may be had in flower from then until September. It grows from 6in. to 12in. high, and has lilac, rose, red, and white flowers.

VISCARIA (now included under *Lychnis*) is a genus which yields several beautiful plants suitable for small beds or for masses in the border. In nurserymen's catalogues they are described as hardy annuals, whilst some authorities prefer to class them as perennials. Seed may be sown in autumn for spring flowering, and again in spring for summer display.

V. cardinalis has brilliant magenta flowers, and grows 1ft. in height. *V. oculata* has bright pink flowers, with a purple eye. It grows from 8in. to 12in. high, and flowers in July. A form having scarlet flowers striped with white is known as the "Carnation-striped." It grows 1½ft. high.

WHITLAVIA GRANDIFLORA (Fig. 129) is a profuse-blossoming annual, with pretty Gloxinia-like flowers, and is charming in beds and borders during spring and summer. It grows 1ft. high, and has numerous violet-purple flowers. The variety *alba* differs only from the type in having pure white flowers. The variety



FIG. 129.—WHITLAVIA GRANDIFLORA
(PHACELIA WHITLAVIA).

known as *gloxinioides* has deep lavender-blue flowers, with white throats. The species *W. grandiflora* is now known as *Phacelia Whitlavia*.

XERANTHEMUM ANNUUM is one of the prettiest of hardy everlasting annuals. It grows to a height of 2ft., and flowers in July; the seed should be sown in April, in a light rich soil. Although the typical plant has purple flowers, there are now white, yellow, and rich rose-coloured forms; these are not only ornamental as border plants, but the cut flowers are also highly valued when dried for the winter decoration of vases, &c.

Half-hardy Annuals.

These are plants that cannot stand our winters outside, and consequently have to be sown in spring. In favoured localities as to soil and climate, nearly all this class of plants may be sown in light rich soil in the open border when all fear of frost is gone, say about the end of April. If wanted in flower early, the assistance of glass and a slight bottom-heat is necessary. Make up a slight hot-bed frame with fresh stable manure in March, and place several inches of light rich soil over; when the heat is on the decline the seed may be sown thinly, and the frame kept close and shaded until the seedlings appear. As they burst through the soil, they should be gradually inured to light and air, so as to avoid a weak, spindly growth. If time will permit, it is best to transplant into a gentle hotbed for a few weeks before removing to the open border; if not, they ought to be thinned, and attention paid to weeding and watering during their stay in the seed-bed.

RAISING UNDER GLASS.—Another system very often followed in raising half-hardy annuals, is to sow the seed in pans, pots, or boxes in the greenhouse, always using good rich light soil, composed of fine loam and well-decayed leaf-mould, with a fair sprinkling of sand added to keep it open. The pans or boxes should be well drained, the seeds sown broadcast, and covered with the finest soil. It is a recognised rule when sowing seeds of this class of plants, or as a matter of fact any seeds under glass, that they should not be covered with more than their own depth of soil; for outside sowing, however, they are usually covered a little deeper. The soil should then be kept in a uniform moist condition: a sheet of glass placed over the pan or box will tend to keep it moist by preventing excessive

evaporation, and consequently less water will be required. When watering is necessary, it should be done with a fine rose, and with great care, remembering that a strong flow of water will disturb the seed, probably washing it all to one side of the pan, if not washing it away altogether. A good plan when watering very fine seeds, and also the seedlings when they appear, is to stand the pots in water up to their rims, so that the water moistens the soil from below; when doing this, care must be taken that the water does not flow over the side of the pot, or serious consequences will follow. The glass must be removed from the pots as soon as the seedlings appear. The young seedlings should have plenty of light, but be shaded from strong sunlight. As soon as they are strong enough, they should be pricked off to give them more room. This may be done into pans, boxes, or even into frames, and when they are thus established, they may be gradually hardened off, and planted out into the open border about the end of May or beginning of June. The following is a select list of kinds, and an extended list of other desirable varieties will be found in the "Appendix."

AGERATUMS are useful bedders, flowering continuously until destroyed by frost; the dwarf forms are charming for edgings and for small beds. *A. mexicanum* is of free, branching habit, growing 1ft. high; it has lavender-blue flowers. When grown for bedding purposes it may be either pegged down like the Verbena or allowed to grow to its full height. Several forms of Ageratum have originated under cultivation, amongst which are: Imperial Dwarf, 6in. to 9in. high, with porcelain-blue flowers. Blue Perfection, 9in. high; a compact variety with dark blue flowers. Snowflake, 9in. high; a free-flowering showy variety, with pure white flowers. *luteum*, 1½ft. high; a new yellow Ageratum, useful for cut flowers. There is also a variety with variegated leaves.

ALONSOA LINIFOLIA is a charming little annual, 1½ft. high, with graceful dark green foliage and bright orange-scarlet flowers. *A. Warscewiczii*, 1½ft. to 2ft. high, has bright crimson flowers. These are the best of the species, and are quite easy to grow, either in the borders or in pots. The seed may be sown in March, and the plants will flower in June and July.

AMARANTHUS is a genus containing several effective ornamental foliage plants invaluable for bedding purposes. The seed should be sown in a hotbed frame in April, and the seedlings transplanted when large enough into another hotbed, finally transferring to the open border early in June. *A. caudatus* (Love-Lies-Bleeding) (Fig. 130), 2ft. to 3ft. high, has dark, pendent

racemes of purplish flowers; it is an effective plant in the flower border, and when grown in large vases, its peculiar drooping habit shows off to advantage. A creamy-white variety

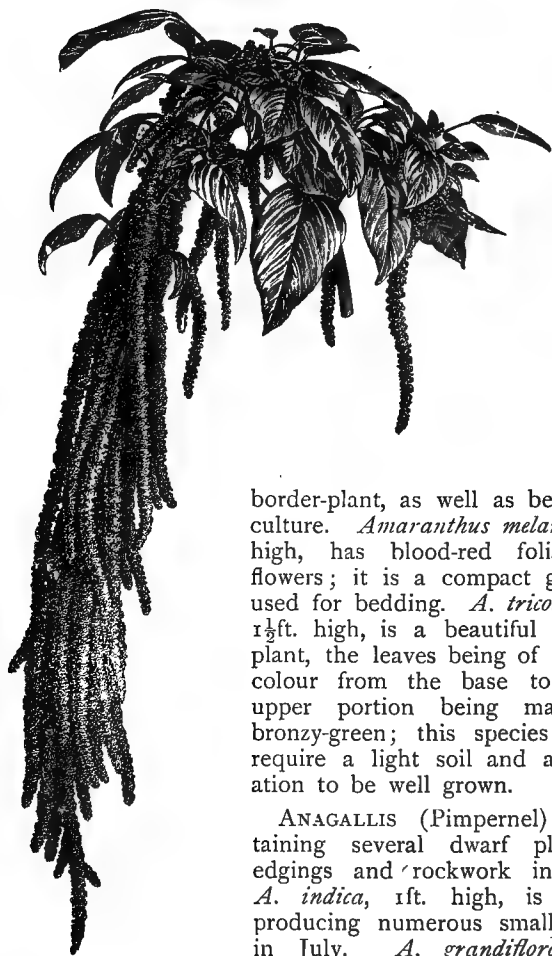


FIG. 130. — AMARANTHUS CAUDATUS.

is also in cultivation, and although not so ornamental as the type, it forms a nice contrast. They usually flower about August. *A. hypochondriacus* (Prince's Feather), 3ft. to 4ft. high, has purple foliage, and large dark crimson erect flower-spikes. It flowers in July, and forms a very ornamental

border-plant, as well as being useful for pot-culture. *Amaranthus melancholicus ruber*, 1ft. high, has blood-red foliage and crimson flowers; it is a compact grower, and largely used for bedding. *A. tricolor* (Joseph's Coat), 1½ft. high, is a beautiful ornamental-foliaged plant, the leaves being of a glowing crimson colour from the base to the middle, the upper portion being marked yellow and bronzy-green; this species and its varieties require a light soil and a rather warm situation to be well grown.

ANAGALLIS (Pimpernel) is a genus containing several dwarf plants, suitable for edgings and rockwork in sunny situations. *A. indica*, 1ft. high, is a trailing plant, producing numerous small deep blue flowers in July. *A. grandiflora*, 6in. high, has various coloured flowers—blue, deep red, &c.—and is seen at its best from May onwards until the end of summer; it is very compact and neat in habit. *A. linifolia*, 9in. to 12in.

high, has large brilliant blue flowers, ½in. across; flowers in July. There are numerous varieties, including *Breweri*, 6in. high, with rich scarlet flowers; *sanguinea*, 6in. high, with beautiful

ruby-coloured flowers; *Wilmoreaana*, 6in. high, with bright purple flowers and yellow eyes.

ASTERS (CHINA), known botanically by the name of *Callistephus chinensis*, form a splendid class of plants, the decorative value of which cannot be over-estimated. For grouping in flower borders, or for filling beds, they are indispensable, whilst for pot culture and cut flowers they are also much prized. To see them in their full beauty, however, they require to be grown in masses, and when well cultivated, they produce an abundance of fine flowers. To have a succession of Asters, the seed should be sown at intervals, from the end of February to the end of May. The first sowing should be made in a slight hotbed frame, pricking out the seedlings into another frame when large enough, gradually hardening them off, and transferring to the open ground in May. The second sowing should be made two or three weeks later in a cold frame, treating the seedlings in the same manner as the first-sown batch. As soon as the seeds germinate in the frames, they must have a plentiful supply of air, being careful to avoid chills, or a weak batch of plants will be the result. Attention must also be paid to shading during hot sunshine, or the tiny seedlings will be scorched. For succession, a sowing might be made in the open ground in April, and again in May, in a good, rich, loamy soil, and this batch will flower after the earlier sowings are over. In transplanting from the frames to the open borders, the plants should be lifted with good balls of earth attached; choose showery weather for the operation, and plant in good soil, which ought to have been previously enriched by the application of well-rotted farmyard manure. If the weather turns dry, watering must be attended to, so as to avoid, as far as possible, checking the plants in their growth. They should be planted from 9in. to 12in. apart each way, and this will admit of the hoe being used for keeping the surface open and free from weeds. When the plants are well established, and have made a mass of roots, it is a good plan to give them a good mulching of rotten manure from an old hotbed; this



FIG. 131.—TRUFFAUT'S PÆONY-FLOWERED ASTER.

be scorched. For succession, a sowing might be made in the open ground in April, and again in May, in a good, rich, loamy soil, and this batch will flower after the earlier sowings are over. In transplanting from the frames to the open borders, the plants should be lifted with good balls of earth attached; choose showery weather for the operation, and plant in good soil, which ought to have been previously enriched by the application of well-rotted farmyard manure. If the weather turns dry, watering must be attended to, so as to avoid, as far as possible, checking the plants in their growth. They should be planted from 9in. to 12in. apart each way, and this will admit of the hoe being used for keeping the surface open and free from weeds. When the plants are well established, and have made a mass of roots, it is a good plan to give them a good mulching of rotten manure from an old hotbed; this

will materially help them at a time when they are in need of nourishment, viz., when they are producing their flowers.

The varieties are very numerous, all of which have originated from the one Chinese species, *Callistephus chinensis*; they are divided into several sections, according to height, habit, kind of flower, suitability for bedding, pot-culture, &c. The Pæony-flowered Asters (Fig. 131) are vigorous plants, growing upwards of 2ft. in height, and producing large incurved flowers of various colours; useful for bedding and for flower borders. Victoria Asters (Fig. 132) are amongst the most popular for either bedding or pot-culture; they are of pyramidal habit, 1ft. in height, producing an abundance of large



FIG. 132.—VICTORIA ASTER.

globular flowers, perfectly double and reflexed. There is also a dwarf form of Victoria resembling the type in everything but size. Dwarf Chrysanthemum-flowered Asters (Fig. 133), if sown at the same time as the Victorias, will flower later, forming a nice succession; they are of dwarf, compact habit, and for the size and brilliancy of the flowers are equal to the taller sections; the flowers are full and reflexed, and produced in such abundance as almost to hide the foliage; height 1ft. Betteridge's Prize Quilled, though not such effective border-plants, are splendid for exhibition purposes; they are globular, each petal forming a perfect quill, with a curious outer ring of guard-petals at the base of the flowers. Comet Asters, 1ft. to 1½ft. high, have curled petals like Japanese Chrysanthemums; useful for beds or for cut-flowers. Crown, or Cockade Asters, 1½ft. to 2ft. high, are suitable for bouquets and bedding; the flowers are large, flat, and produced in abundance; the centre of each flower is white, surrounded by



FIG. 133.—CHRYSANTHEMUM-FLOWERED ASTER.

a distinct belt of lavender, bright crimson, violet, or rose. Dwarf Queen Asters, 9in. high, are of spreading growth, exceedingly free-flowering, and very useful for cutting. These are the most important kinds of China Asters grown in our gardens. Seeds of each section may be obtained either in named varieties or in choice mixtures, the latter producing plants of many beautiful shades of colour.

BALSAMS (*Impatiens*) are amongst the most showy of summer- and autumn-flowering half-hardy annuals, suitable either for filling beds and borders, or for pot-plants. The seed should be sown about the middle of March in sandy soil under glass, pricking out the seedlings into thumb-pots when large enough, and removing into larger sizes as required—never allowing them to become pot-bound; they should be grown as near the light as possible, and be gradually hardened off by removing to a frame about May, finally planting out in the open during June. Balsams require a lot of water, and if the supply is short, they will suffer in consequence; a sharp look-out must also be kept for slugs and snails, or they will very soon play sad havoc amongst these tender subjects. There are several sections of Balsams, amongst which are the Camellia-flowered, with handsome double flowers, resembling Camellias in form and in the arrangement of the petals; these grow 1½ft. high, and may be procured in several varieties. The Rose- and Carnation-flowered differ only in the flowers, which resemble, more or less, those of the Rose and Carnation respectively. There is also a miniature Balsam, growing only 9in. high, suitable for pot-culture and bedding. This, as well as the kinds mentioned above, may be obtained in many beautiful varieties.

BRACHYCOME IBERIDIFOLIA (Swan River Daisy) (Fig. 134) is a plant growing 9in. high, flowering during summer and autumn, and producing an abundance of beautiful Cineraria-like blue flowers. It is admirably adapted for small beds, edgings, and rockwork. A white variety is also grown.



FIG. 134.—BRACHYCOME IBERIDIFOLIA.

BROWALLIA ELATA, 1½ft., is often grown as a half-hardy annual, and forms a charming plant for flowering in July and

August in warm localities. The typical plant has deep blue flowers, but forms with white and pale blue flowers are also known.

CLINTONIA PULCHELLA, properly called *Downingia*, is a charming little plant, 6in. high, admirable for rockwork, bedding, or for edgings; it has blue, white, and yellow flowers, produced during the late summer.

COSMOS BIPINNATUS (Fig. 135), 2ft. to 3ft., is a graceful plant, with fine feathery foliage and large flowers like single Dahlias; they are rose or purple in colour, with yellow disks. Several varieties have originated with white, pink, and rose-coloured



FIG. 135.—*COSMOS BIPINNATUS*.

flowers, whilst the form *sulphureus* has rich clear yellow flowers, and does not grow quite so tall as the others.

DATURAS.—See "Sub-Tropical Bedding."

GRAMMANTHES GENTIANOIDES, 3in. high, forms a little tuft of fleshy leaves, and is covered with numerous star-shaped flowers, varying in colour from pale yellow to deep red. It flowers in July. The seed should be sown in heat, during March, and the seedlings planted out in May in a dry, warm, sunny situation. It is suitable for rockwork, edgings, and also for pot culture.

HELIPTERUM SANDFORDI (*Humboldtianum*) is a dwarf, branched everlasting, growing from 12in. to 18in. high, and flowering about July; it has dense corymbs of golden-yellow flowers which are

prized for bouquets in both summer and winter. The plant in a young state is quite woolly.

JACOBÆA.—See *Senecio elegans*.

LOBELIA is a genus containing several half-hardy annuals that are indispensable for bedding purposes. For cultivation, kinds, &c., see "Summer Bedding Plants."

MARIGOLDS (FRENCH and AFRICAN) are favourite half-hardy annuals, and have been for years extensively used for the embellishment of mixed flower-borders, and also for summer-bedding. The seed should be sown during the month of April in a frame (cold or heated), pricking out the seedlings into another frame before finally transferring to the beds or borders about the end of May. Seed may also be sown in May, in the place where the plants are intended to flower, thinning the seedlings to 8in. or 9in. apart, keeping a sharp look-out for slugs; and also keeping them free from weeds. Mari-

golds should be grown in a fairly rich, light soil, and they will produce an abundance of brilliantly coloured flowers from July right on into autumn.

The African Marigold (*Tagetes erecta*) (Fig. 136) is very effective for large beds, the fronts of shrubberies, &c. It is of fine, bold aspect, 2ft. in height, and produces large, handsome flowers, chiefly in shades of lemon and orange. There is also a dwarf variety, growing 1ft. high, and producing large, handsome flowers. The French Marigold (*Tagetes patula*) (Fig. 137) is splendid for bedding, for general mixed borders, and also for cutting. The taller varieties produce the most perfect flowers, but the dwarf ones are the best for beds and for small gardens. The flowers are produced

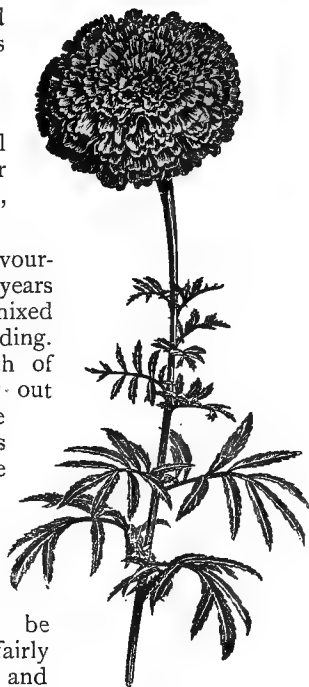


FIG. 136.—TAGETES ERECTA (AFRICAN MARIGOLD).



FIG. 137.—TAGETES PATULA (FRENCH MARIGOLD).

in shades of yellow and brown, beautifully striped and marked. Several named varieties may be procured, including Dwarf Golden, a fine yellow form; 1ft. high. Liliput, 6in. high, with rich brown flowers, edged with golden-yellow. Miniature Queen, 6in. high, with crimson and yellow flowers. The last two form lovely little bushes, and are valuable for small beds, edgings, &c. In growing these double varieties, a few are almost sure to come single, and these should be pulled up. Seeds of each section, selected from fine strains with double flowers, may be obtained from any of our seedsmen, either in named varieties or in mixed shades of colour.

MARTYNIA FRAGRANS, 1½ft. to 2ft. high, thrives in a warm, sheltered position. It has large crimson Gloxinia-like flowers, sweetly-scented, and followed by curious horned fruit. It flowers in June.



FIG. 138.—NEMESIA STRUMOSA SUTTONI.

MESEMBRYANTHEMUM CRYSTALLINUM (Ice Plant) is a trailing annual, having ornamental foliage covered with ice-like globules. It will trail 3ft. or 4ft. in the season, and produce its inconspicuous white flowers from May to August. The seed should be sown in heat in March, and the seedlings planted out from 6in. to 9in. apart during June. It is a valuable plant for dry, sunny banks, rockwork, carpet-bedding, &c., and is sometimes grown for garnishing purposes. There are also varieties with yellow and purple flowers. *M. tricolor* is a dwarf-growing annual, from 4in. to 6in., suitable for sunny

banks and warm nooks in the rock garden. It has Daisy-like flowers, rosy-pink in colour, with purple centres. It does not like transplantation, and should therefore be sown in the open in sandy soil. The variety *album* has white flowers, with purple centres.

MINA LOBATA (*Ipomœa versicolor*) is a fine climber, suitable for pillars, trellises, &c. The flowers are borne in twin-like

racemes, and are, at first, of a scarlet shade, afterwards changing to orange, and then to pale yellow. They appear about June. The seed should be sown in February or March in a warm house, and the seedlings potted off singly into small pots, ready for planting outside as soon as the weather is favourable

NEMESIA STRUMOSA SUTTONI (Fig. 138) is a comparatively new half-hardy annual from South Africa. It grows about 1ft. high, and produces numerous flowers of various shades of colour from white to crimson. It commences to flower in June or July, and continues until late in the autumn. The seed should be sown in March, and the seedlings planted out about May.

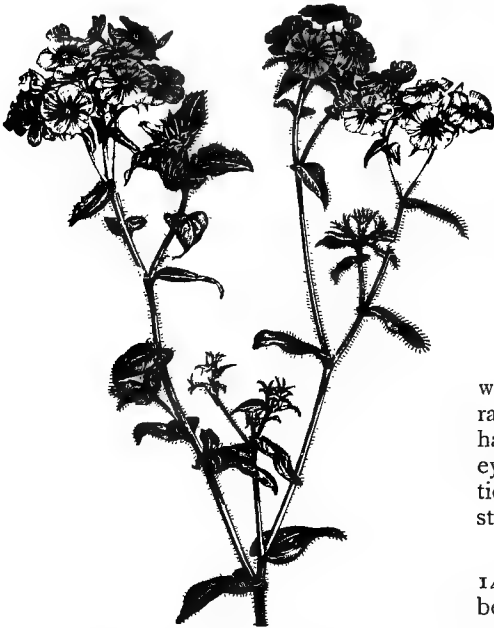


FIG. 139.—*NICOTIANA WIGANDIODES*.

NICOTIANAS (Tobacco Plants) are vigorous, ornamental-foliaged plants, suitable for sub-tropical gardening. They grow rapidly in rich, deep soils, in sheltered and somewhat moist situations. Theseed should be sown in February in a warm house, and the seedlings pricked off, potted when they require it, and finally transplanted into the open ground early in June. *Nicotiana affinis*, 3ft. high, is a valuable pot- and border-plant; it has

large pure white flowers, which during the day are partially closed, but in the evening open, and emit a delicious fragrance; they are produced from July onwards. *N. atropurpurea grandiflora* grows 5ft. high, and has reddish-purple flowers. *N. wigandioides* (Fig. 139) is a stately plant, growing 5ft. high, and is especially suitable for sub-tropical bedding; it has immense

handsome leaves and yellowish-white flowers, produced in large drooping panicles.



[FIG. 140.—PHLOX DRUMMONDII.

NYCTERINIA (ZALUZIANSKIA) SELAGINOIDES, 4in. high, is a charming little plant for pots, edgings, or rockwork. The seed may either be sown under glass in March, or in the open air in April. It bears clusters of star-shaped flowers in May—white, with a yellow eye, very fragrant at night. *N. capensis* has white flowers with brown eyes; it is like the last-mentioned species in habit and stature.

PHLOX DRUMMONDII (Fig. 140) is certainly one of the best of our half-hardy annuals, producing an abundance of flowers of various hues, commencing in July and continuing a blaze of beauty until cut off by the late autumn frosts. It may be either grown in beds by itself, or used as a carpeting plant for other taller-growing subjects, such as Standard Roses, &c. The seed should be sown early in March, in a gentle heat, and the seedlings planted out in May or June. There are now numerous varieties, varying in the colour of their flowers from white to purple, and growing about 1ft. in height; the variety *cuspidata* and its named forms grow only 6in. high, and produce white, rose, red, violet, and scarlet flowers.

PORTULACAS are brilliantly-coloured annuals, requiring a dry, warm, sunny situation, and a light soil; they are excellent for small beds, rockwork, and for edgings. *P. grandiflora* (Sun Plant) grows 6in. high, and in June and July produces its flowers

in shades varying from white to purple. They are borne three or four together. Mixed seed is now offered by our seedsmen, producing plants with various coloured flowers.

RHODANTHE MANGLESII is a charming everlasting annual, excellent either for beds or for pots in the conservatory; the dried flowers are also much decoration. It grows about 1ft., and produces its bright rose coloured flowers in June.

RICINUS COMMUNIS (Castor-oil Plant) and its varieties are remarkable for their large and picturesque foliage, which makes them excellent subjects for subtropical gardening. The seed should be sown singly in small pots in March, and placed in heat. As the seedlings fill the pots with roots, they should be potted on and kept growing freely, finally hardening off, and planting out in June. They reach a height of from 3ft. to 5ft., and produce their greenish flowers in July. *Gibsoni* has bronzy-purplish leaves. *zanzibariensis* is a noble plant, 6ft. to 8ft. high, having handsome light green leaves, 2ft. across, with whitish ribs. Its variety *enormis* has large brown purple foliage, changing to dark green or red when older.

SALPIGLOSSIS SINUATA (or *variabilis*) (Fig. 141) is a splendid annual, 2ft. high, flowering in August. The flowers are somewhat after the fashion of the Petunia, and are curiously pencilled. There are now numerous varieties varying in the colour of their flowers from white to purple. All are of great beauty, and in beds and borders their brilliant flowers at once attract the eye; as pot-plants they are excellent, whilst the cut flowers are highly prized for vases and bouquets.



FIG. 141.—*SALPIGLOSSIS SINUATA*.

SCHIZANTHUS GRAHAMI RETUSUS (Fig. 142) is an elegant autumn-flowering annual, suitable for beds and borders; its deep rose-coloured flowers, tipped with crimson, are produced from June to October. Grows 2ft. high. *S. pinnatus*, 2ft. high, has rosy-purple and yellow flowers, spotted with purple or violet. It flowers from May to October, and is the hardier of the two species. They make excellent pot plants.



FIG. 142.—*SCHIZANTHUS GRAHAMI RETUSUS*.

SCHIZOPETALON WALKERI is a pretty annual, bearing white flowers, which are delightfully fragrant in the morning and evening, or after a shower. It grows 1ft. high, and flowers from May to August.

SENECIO (JACOBÆA) ELEGANS (Double Groundsel) has long been a favourite bedding-plant, flowering in July and onwards till October; there are three or four varieties, with crimson, purple, and white flowers; also several dwarf varieties, growing only 9in. high; these produce a brilliant effect in beds and mixed borders.

STOCKS form a useful and very ornamental class of plants for flower-garden decoration, and are, or ought to be, grown in every garden. The varieties are now very numerous, and may be divided as follows: The Ten-weeks, Intermediate, and Biennial groups. The Ten-weeks Stocks should be sown in March or April in pans or boxes under glass, affording air when the plants are quite young, and watering carefully so as to prevent mildew from attacking them. The seedlings, when large enough to handle, should be pricked off into an old hotbed frame, or into boxes, keeping them as near the glass as possible to prevent drawing, and finally transplanting into the beds or borders during showery weather. The seed may also be sown in the open border about the end of April, in good soil, well dug and manured. Plants from this will flower when the earlier-sown batches have finished, keeping up a supply until late autumn.

There are several varieties, including the large-flowered dwarf Bedding Stock, growing 1ft. high, and forming a most

useful subject for general bedding; the plants are branching and of robust growth, whilst the flowers are large, of various colours, and are produced in great profusion. The Dwarf Bouquet Stock, 9in. high, forms a dwarf, compact plant, smothered in flower, and is suitable for small beds and edgings. The Giant Globe Pyramidal Stock is $1\frac{1}{2}$ ft. high, with long pyramidal flower-spikes covered with large globular flowers 2in. in diameter. It may be had in various colours, and is an effective plant in large beds and borders.

The Intermediate is a valuable section largely used by market growers. If sown in March or early in April in heat, it flowers in autumn and keeps on until cut down by frost. It may also be treated as a half-hardy biennial by sowing in July and August, wintering in a cold frame, and transplanting in early spring for May and June flowering. This group is also used largely for growing in pots. There are several subdivisions, such as the East Lothian, a branching Stock, 18in. high, with handsome trusses of flowers, in various colours, and the Covent Garden, a dwarf kind, growing about 1ft. in height. The biennial group will be treated under "Biennials."

TAGETES SIGNATA, $1\frac{1}{2}$ ft. high, is a profuse-blossoming branched Marigold, with yellow flowers. *T. signata pumila* is much dwarfer than the type, and more compact in habit;

the form known as Golden Ring grows into a sturdy little bush, 1ft. high, and for bedding purposes is superior to the yellow *Calceolaria*, being literally smothered in golden-yellow flowers during summer and late autumn.

TROPÆOLUMS (Nasturtiums) are exceedingly showy plants, and very popular. *Tropæolum canariense* (Canary Creeper) is a half-hardy annual, with bright yellow flowers and elegant foliage;



FIG. 143.—*TROPÆOLUM MAJUS*.

it is a climber, growing 6ft. high, and is very suitable for growing over arches, over the sides of flower-boxes, &c. It is also known as *T. peregrinum* and *T. aduncum*. *T. Lobbianum* is a superb climber, flowering more freely on a poor dry soil. There are several named varieties, differing only in the colour of their flowers; all are graceful climbers, bearing a great profusion of blossom, in rich and brilliant colours. They are suitable for covering arbours, rustic fences, trellis-work, &c. *T. majus* (Indian Cress) (Fig. 143) is the species from which the numerous forms of Tom Thumb Nasturtiums have originated. Few plants are so

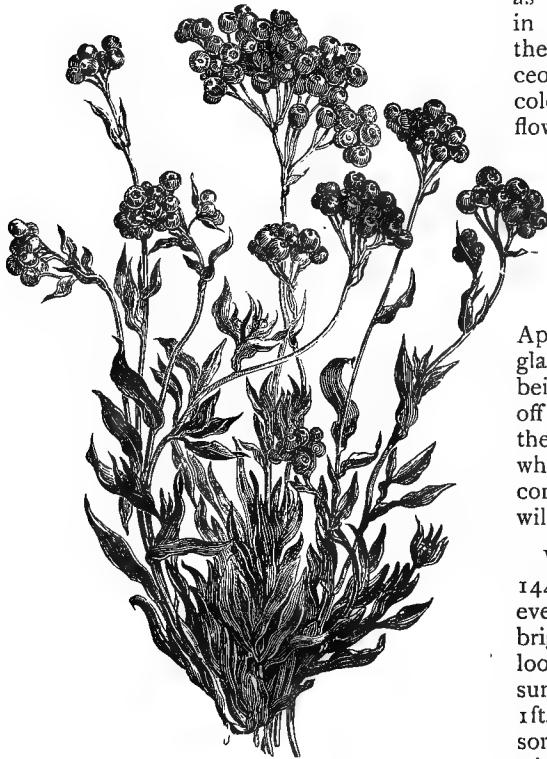


FIG. 144.—WAITZIA AUREA.

useful or rich in colour as these Nasturtiums, for in dry soils they surpass the Geranium and Calceolaria in brilliancy of colour and profusion of flower. Seeds may be

had either in named varieties or in mixed colours. All the annual *Tropæolums* may be easily raised from seed sown in the open ground in April, or in pots under glass, the young plants being gradually hardened off and planted out about the beginning of June, when they will soon commence to flower and will keep on until October.

WAITZIA AUREA (Fig. 144) is a very showy everlasting, producing its bright yellow flowers in loose corymbs during the summer. It grows about 1ft. in height, and is sometimes called *Morna nitida*.

ZINNIAS are exceedingly handsome autumn-flowering annuals, producing richly-coloured flowers in great profusion; for filling flower-beds and borders, and for cutting, few flowers are more useful. The seed should be sown in a gentle hotbed in March or April, pricking out the seedlings into frames,

and finally transferring to their flowering quarters in June. They like a deep rich soil and a sunny position. *Zinnia elegans* is the one from which most of our garden forms have originated. The typical plant grows 2ft. high, and produces its scarlet flowers in July. There are now numerous double and single forms in various shades of colour, all of which are well worth growing. The Zebrinas, or striped Zinnias, grow from 1ft. to 1½ft. high; they have beautifully-striped double flowers, and about half of them come true from seed.

Biennials.

These are plants very closely allied to annuals, the distinction lying in the fact that they do not flower the same year as sown, but must have two years to come to maturity, whilst annuals, both hardy and half-hardy, may be had in flower the same year. Biennials are grown from seed one year, and flower, fruit, and die the next; or if they do manage to live over the second year they are of little use afterwards. From June till August is the usual time to sow—the earlier the better, as they then stand a good chance of making nice plants before winter sets in. For sowing, a border should be chosen, with an aspect other than a south one, so that the seedlings do not receive the full rays of the scorching summer sun; the soil should be moderately rich, deeply dug, and free from weeds. The seeds are best sown in drills, as the hoe can then be used for keeping down weeds, and also for keeping the surface open—a point which is often greatly overlooked in the cultivation of plants of all kinds. After sowing, a good watering should be given them—through a fine rose, so as not to disturb the seeds—and a thin shading of tiffany or other light material should be thrown over, to keep the soil from drying up too quickly; great care, however, must be taken to remove this as soon as the seedlings break through the soil. When large enough, they should be transplanted into rows a few inches apart; this must be done before they get overcrowded in the seed-bed, and they will then make strong sturdy plants, and will lift with good balls of soil when removed to their permanent quarters.

The time for permanent planting varies from the end of September to March, some preferring to plant in the autumn, because then the weather is usually much milder than in early spring, and if carefully planted they get a good hold of the new soil before winter sets in. On the other hand, those who wait until spring before planting, have this advantage, viz., that the

plants are all kept together, and if a spell of exceptionally hard weather is experienced, they may be much more easily protected by having some dry leaves or other light material thrown lightly amongst them, than if scattered about the beds and borders.

With regard to the after-treatment of biennials—uses, &c.—the remarks under the head of “Annuals” may be taken as applying equally to biennials, and will therefore not be repeated here. A large number of hardy annuals are very often treated as “biennials” by being sown in the autumn of one year for flowering the following spring, and seeing that these have been described under the head of “Hardy Annuals,” only those plants of strictly biennial duration—and they are far from numerous—are left for description here.

ANCHUSA CAPENSIS (Cape Forget-me-Not) has intense blue flowers; it is a half-hardy biennial, requiring greenhouse protection in winter. It grows from 12in. to 18in. high, and flowers in June.

BETA is a genus containing several ornamental-foliaged biennials which are invaluable for summer-bedding. *Beta Cicla variegata* (Chilian Beet) has very handsome variegated leaves, and forms an effective plant in sub-tropical bedding. Dell's Crimson-leaved Beet grows from 6in. to 12in. high, and is beautiful as an edging or in the mixed flower-border. It has crimson leaves.

CAMPANULA MEDIUM (Canterbury Bell) (Fig. 145) is a handsome decorative border plant, especially when grown as a single specimen. It grows 3ft. or 4ft. high, and in July produces an abundance of flowers in shades of colour varying from white to purple. The single forms are popularly known as Cup-and-Saucer Canterbury Bells, whilst the double ones are known as the Hose-within-Hose Campanulas.

CELSIA CRETICA is a popular biennial, growing 3ft. or 4ft. high, and flowering in June and July. It has bright yellow flowers marked with two rusty spots at the bottom of the corolla on the inner side.



FIG. 145.—*CAMPANULA MEDIUM*.

CHAMÆPEUCE DIACANTHA and C. CASABONÆ (Fish-bone Thistle) are ornamental Thistle-like plants, with handsome spiny foliage; they are used in sub-tropical and carpet-bedding arrangements, being grown expressly for the sake of their ornamental foliage. These plants are usually treated as half-hardy annuals.

GLAUCIUM LUTEUM (Horned Poppy) has ornamental glaucous-grey foliage and showy scarlet or yellow flowers. It makes a fine plant for borders and for the wild garden, and delights in a poor sandy soil. It flowers in August.

HEDYSARUM CORONARIUM (French Honey-suckle) is usually treated as a biennial. It has crimson and white flowers, which are produced in June. It forms a showy plant for shrubberies, wild gardens, &c., growing to a height of 2ft., and bearing dense spikes of blossom.

HUMEA ELEGANS is a half-hardy biennial, suitable for sub-tropical gardening. It has graceful, feathery panicles of brownish-red flowers, and powerfully-scented foliage. It grows from 4ft. to 6ft. high, and flowers from July to October. A white variety is also in cultivation. The seed should be sown in July or August, and the plants kept in a frame or cool house throughout the winter, during which period they must be very carefully watered or they will lose all their bottom leaves. They should not be planted out before June, as they are tender subjects, and being tall-growing, they need to be staked to protect them from rough winds.



FIG. 146.—LUNARIA ANNUA.

HONESTY (*Lunaria annua*) (Fig. 146) is a handsome spring-flowering border plant, thriving in almost any soil. The type has purple flowers, but there are two or three varieties, one having white flowers. It grows from 1½ft. to 2ft. high, and flowers from May to July. The pods, which are elliptic in shape, but blunt at the ends, are very ornamental for winter decoration when stripped of their outer coverings. Synonymous with *L. biennis*.

LAVATERA ARBŌREA VARIEGATA is a strikingly handsome foliage plant, with leaves beautifully variegated; it grows from 4ft. to 6ft. high, and makes a noble specimen plant for lawns or for sub-tropical bedding. It has large pale purple flowers, 2in. across, which are produced during August and late autumn.

MECONOPSIS.—*M. nepalensis* is a grand plant, 4ft. high, with handsome foliage and large golden-yellow saucer-shaped flowers, 2in. to 3in. across, produced in abundance in June and July on the tall flower-stem. It thrives best in a cool, moist, shady situation, planted in rough, peaty soil. *M. Wallichii* (Blue Himalayan Poppy) is a handsome biennial, 4ft. to 6ft. high, producing its pale blue flowers in June.

PAPAVER NUDICAULE (Iceland Poppy) is usually grown as a biennial, being sown in late summer for flowering the following season. It grows from 12in. to 18in. high, and produces flowers in very delicate shades of white, yellow, orange, and scarlet. It is an admirable subject for rockwork or the front of borders, the cut flowers being also highly prized.



FIG. 147.—DIANTHUS
BARBATUS.

STOCKS, grown as biennials, are generally the "Bromptons" and the "Queens." The seed should be sown in July for flowering the following May or June; the seedlings should be wintered on a dry border, or preferably in a cold frame or greenhouse, and transplanted into their flowering quarters about March or early April. The Giant Brompton is remarkable for its robust growth and immense spikes of large double flowers, in various shades of white, scarlet, and purple. It grows to a height of 2ft. The Queen Stock is very like the Brompton, but as a rule the underside of the leaf is rough and woolly, whilst that of the Brompton is smooth on both sides. It grows 1½ft. high, and, like the Brompton, produces flowers in shades of white, scarlet, and purple. Both the Brompton and Queen Stocks have originated from the same species—*Mathiola incana*, a species with purplish flowers which grows wild on the cliffs in the Isle

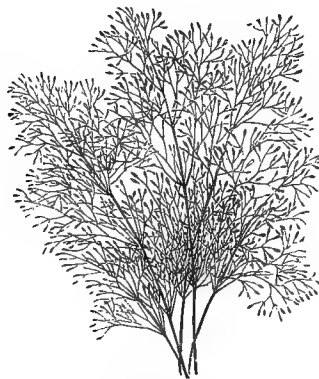
of Wight. It is known as the Wallflower-leaved Stock.

SWEET WILLIAM (*Dianthus barbatus*) (Fig. 147) is usually treated as a biennial, and, when well grown, forms an excellent border plant. It attains a height of 18in., and about July produces a mass of flowers of various colours. The Auricula-eyed have crimson

flowers with white eyes. The seed may be sown in May, and the young plants transferred to their permanent quarters in September or October for flowering the following season.

VERBASCUMS are grand plants for shrubberies, or for growing in back positions in large flower borders where they show off to advantage. *V. olympicum* is one of the best, with large silvery leaves and tall branched flower-spikes, 6ft. in height; these are covered with numerous rich yellow flowers, 1in. across. Flowers from May to August. *V. phlomoides* grows 5ft. high. It has massive green foliage and bright yellow flowers, which are produced successively from May to August, as in the last-mentioned species.

WALLFLOWERS (*Cheiranthus Cheiri*) are exceedingly showy and effective sweet-scented border plants; no garden, however small, should be without a clump of these old-fashioned and decidedly popular plants. The seed should be sown in April and May—the earlier the better—for flowering the following spring. There are numerous varieties in cultivation, some with double and others with single flowers. Harbinger, 1½ft. high, has very large single flowers, varying from brown to orange-red. Primrose Dame has sulphur-yellow flowers. Golden Tom Thumb is very fine, producing an abundance of rich orange-yellow flowers. It is also a single and grows about 1ft. high. Ruby Gem is from 12in. to 15in. high, with extra large single flowers of a ruby-violet colour. The double-flowered German Wallflowers produce massive spikes of large, sweet-scented flowers, which are remarkable for the variety of their colours, and are highly appreciated for the embellishment of flower-beds and borders.



AGROSTIS NEBULOSA.



8.—On Hardy *Herbaceous Perennials.*

By J. M. ABBOTT.

UNDER the above heading are grouped plants having soft and succulent stems, which die down to the ground each year; whilst the roots live for more than two years, are able to endure our English winters in the open border, and send up new stems each spring. It will thus be seen that they are quite distinct from other hardy plants grown in our gardens, from trees and shrubs on account of the soft and succulent (not woody) nature of their stems, and from annuals and biennials because of their more or less indefinite period of existence.

At the present day the number of hardy herbaceous perennials suitable for growing in our gardens is endless, as a cursory glance through the catalogues of nurserymen making a speciality of these plants will show. A large proportion of plants so catalogued are of interest to the botanist only, but, at the same time, quite numbers are of service to the gardener, and indispensable for the embellishment of the flower garden throughout the greater part of the year. Hardy herbaceous perennials are a very popular set of plants. Many of them are old-fashioned, having been grown in our gardens for a great number of years, whilst others are comparatively new, and have soon become universal favourites.

USES.—The first and most important use to which perennials are put is undoubtedly the embellishment of the mixed flower-

border, of which they may be said to form the backbone, for at the present time, in gardens both large and small, are to be found borders set apart chiefly for the cultivation of this class of plants, supplemented by a free use of annuals and biennials. Then again, the tall and vigorous-growing perennials are extremely useful for the decoration of shrubberies, wild gardens, &c., in which positions they prove quite attractive, and at the same time do not require much attention. There is yet another way in which these plants may be profitably utilised, and that is in providing a supply of cut-flowers suitable for table decoration, bouquets, &c., and at a time when there is a dearth of flowers adapted for cutting under glass, viz., during the early autumn.

CULTIVATION.—The majority of hardy herbaceous perennials thrive well in any ordinary garden soil, though a rather heavy loam, made moderately rich by the application of manure, is best suited for their culture, especially for those of tall and vigorous growth.

If the situation is too wet, draining must be resorted to; and if the soil is too tenacious and heavy, it must be either dug out and replaced by a more suitable compost, or made lighter in texture by adding a quantity of leaf-mould, &c. If, on the other hand, it is naturally too light and sandy, it is advisable to apply a dressing of heavy loam, incorporating it well with the original soil. In preparing a new border for the reception of these plants, it is imperative that it should be trenched to a depth of 2ft. the autumn previous to planting, and at the same time manure, if required, should be added, so as to admit of its being thoroughly mixed with the soil. If these operations are carried out in the autumn, the border will be in fine condition for planting the following spring, as the soil will then have had time to consolidate.

The operation of planting is one that requires an intimate knowledge of the subjects being dealt with, especially with regard to their height, colour, and flowering period, so as to find suitable positions for them, the object being to dispose of them so that the whole border may be equally interesting at all seasons of the year. It would be a mistake to have all the early-flowering subjects at one end of the border, and all the late ones at the other; or to have all the plants with red flowers at one end and all those with white ones at the other. The spring-flowering subjects should occupy positions throughout the entire border, and so should the summer- and autumn-

flowering plants. In the same way each colour should be spread throughout the border in such a way that perfect harmony prevails. Of course, if half-a-dozen plants of one kind are to be employed, by all means plant them together in a group, or in two groups, as this is much more satisfactory than dotting them about singly all over the border. Generally the position of the flower-border is against the side of a house or wall of some kind, and when this is the case, it is an invariable rule to plant the tall, vigorous-growing subjects towards the back, reserving the front positions for the dwarf and weakly sorts. If, however, the border is of a good width, this plan ought not be adhered to too strictly. Here and there the tall plants might be allowed to come towards the front, so as to break the formality which otherwise would be evident.

This naturally leads us to the question, "When is the best time to plant?" And this may be answered by saying that, providing the weather is favourable, hardy herbaceous perennials may be planted any time between ripening their summer growth and commencing to grow again in the spring, though weakly-growing subjects are best left until the last-mentioned period. When once planted, perennials are often allowed to remain undisturbed for years, receiving no other treatment than being dug amongst annually, chopping off portions from the outside of clumps that have become too large, and giving an occasional dressing of manure. More satisfactory results could be obtained in the majority of cases by lifting the plants bodily every second or third year, trenching and manuring the border previous to replanting. The strong, vigorous growers should then be divided, and smaller portions replanted. When the strong growers burst into growth in the spring, they generally produce far more shoots than are required, and it is an excellent plan to thin these out, leaving only a moderate proportion. They will well repay for this judicious thinning by a prolonged period of flowering and also by producing flowers of better quality.

Staking and training are operations that require to be seen to in good time, and, in performing these, the peculiarities of the individual plants must not be interfered with, all tight lumping must be avoided, and the stakes must be placed so as to be hidden as much as possible by the foliage. Cleanliness must always be aimed at, for nothing detracts more from the general beauty of the border than weeds. These must have no quarter, and, at the same time, flowers and foliage that are decayed and

no longer serve any useful purpose, must be removed. If alpine are grown in the mixed border, they must be planted at the front, and care must be taken that they are not overrun by stronger growers. It is a good plan to place a few stones round them, so as to keep the collar of the plant from off the soil; otherwise, in mild, wet winters they are apt to damp off.

When a large number of cut-flowers are required, it is best to grow plants, especially for furnishing these, in the reserve garden.

PROPAGATION.—By Division.—This is a method which consists in dividing up the old root-stock into two or more portions, each of which is furnished with roots and forms a separate plant. Many of the strong-growing kinds lend themselves admirably to this method of increase. In fact, division of the crowns often has to be resorted to in order to keep them within bounds—with Michaelmas Daisies, to quote a familiar example. In dividing the root-stock, it is always best, where practicable, to break or pull it asunder, rather than to chop it with the spade, a process which is responsible for the loss of many valuable roots. Of course, this only applies to the moderate growers; the stronger ones do not mind the loss of a few roots.

By Seeds.—Seeds may be sown at any time of the year under glass, and in the open from March to September. The best time to sow outside is during April or May, as then the seedlings have time to form strong plants before winter sets in. The seeds should be sown in beds in the reserve garden, and when large enough, the seedlings should be planted in nursery rows, in good soil and sheltered situations, in the reserve garden, and kept growing on until of a size suitable for transferring to the open border.

By Cuttings.—This is an easy way of working up a stock of many kinds, and is often resorted to when other methods fail or are carried on with difficulty. It has one great advantage, and that is the plants so obtained are bound to be true to name, and such is not always the case when they are raised from seed. Cuttings of the young shoots taken off in spring and inserted in pots or pans of light sandy soil, will root readily if they are placed in close frames and kept shaded from strong sunlight; while if a little bottom-heat is available, that will prove an advantage and materially assist the cuttings in the formation of roots. After rooting, the cuttings must be gradually inured to light and air, and kept

growing freely all the summer. If flowers appear they must be pinched out in the bud state, so that the whole energy of the plant may be directed towards making a good strong specimen, able to withstand the winter.

In the following list of species and varieties all the more popular florists' flowers, as well as bulbs and tubers, have been intentionally omitted, as these have been separately treated in chapters devoted to those plants; while further enumeration of species and varieties will be found in the "Appendix."

ACHILLEA PTARMICA FLORE-PLENO (Double Sneezewort) is a useful border plant, growing 2ft. high, and producing an abundance of double white flowers in corymbs; these are invaluable for cutting, and may be had from July to September. Propagation by seeds, cuttings, or division.

ACONITUM NAPELLUS (Common Monk's Hood) is a tall Larkspur-like plant, growing from 3ft. to 4ft. high, and bearing numerous



FIG. 148.—**AQUILEGIA STUARTII.**

blue helmet-shaped flowers on large terminal racemes. It is of easy culture, and forms a very effective border plant, suitable also for shrubberies, wild gardens, &c.; it must, however, be planted where there is no fear of cattle getting at the roots, which are extremely poisonous, and although quite distinct, have sometimes been mistaken for Horse-radish, with fatal results. The variety *album* has white flowers, and *bicolor* blue and white. Both varieties, as well as the type, flower from June to September. Propagated by seeds or division.

AGROSTEMMA CORONARIA.—A synonym of *Lychnis coronaria*.

AQUILEGIA (Columbine) is a genus of free-flowering subjects of easy culture in ordinary garden soil. They are suitable for beds, borders, shrubberies, &c., and thrive in shady situations. They are also very

beautiful when naturalised in grass; and the flowers are also prized for cutting. Aquilegias are propagated by seeds or by division, the latter method being the only safe way to

perpetuate any distinct variety, as they do not reproduce themselves entirely true from seeds. A sowing of seeds will, however, yield a fair proportion true to name, or at any rate of good colour and habit, and the inferior ones may be pulled up and thrown away. *A. cærulea* (Rocky Mountain Columbine) is one of the best; it grows from 1½ ft. to 2 ft. high, and bears large sky-blue flowers, with white cups and long spurs, from May to July. Numerous others are also grown, including *A. chrysantha*, with bright golden-yellow flowers; *A. glandulosa*, with deep azure-blue flowers and white corollas; *A. pyrenaica*, with delicate fern-like foliage, and bright lilac or blue flowers; this last is suitable for the rockery; and the beautiful hybrid, *A. Stuartii* (Fig. 148), purple, blue, and white.



FIG. 149.—*ASTER AMELLUS BESSARABICUS*.

ASTERS (Michaelmas Daisies) are handsome plants of easy culture, suitable for either borders, shrubberies, or wild gardens;

and, as the flowers are produced in great profusion in the late autumn, when few hardy plants are in flower, they are very much prized for cutting. The species and varieties are very numerous, and are propagated by either seeds, cuttings, or division. In dividing the plants (which is best done in the spring, although autumn may be selected), only the outside portions should be utilised. The old stools are best thrown away. *Aster acris* is an attractive plant, of neat, bushy habit, reaching a height of 2ft., and bearing an abundance of bright blue flowers during August and September. *A. Amellus* grows 2ft. high, and bears numerous violet-purple flowers in August and September. Its variety *bessarabicus* (Fig. 149) is one of the best in the whole genus. It has purplish flowers, much larger than those of the type. *A. diffusus horizontalis* is of curious habit, growing 2ft. high. It is an exceedingly effective border plant, its numerous branching stems being literally smothered with small white flowers edged with red. It flowers during September and October. *A. ericoides* has long graceful sprays of small white flowers. *A. grandiflorus* (2ft. to 2½ft. high) bears an abundance of large violet or blue flowers during September and October. *A. Novæ-Angliæ* bears purple flowers with orange centres, in terminal clusters, on stems varying from 3ft. to 5ft. high. Two or three varieties are also grown. *A. Novæ-Belgii* grows 3ft. or 4ft. high, and produces its pale blue flowers in the late autumn. Numerous garden varieties are in cultivation, differing from the type chiefly in the colour of their flowers. *A. undulatus* grows 3ft. high, and produces an abundance of soft lilac-coloured flowers. *A. vimineus* (3ft.), small white, star-shaped flowers, or graceful sprays. See also "Appendix."

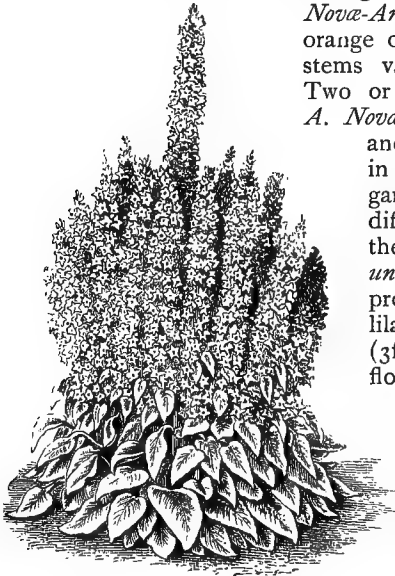


FIG. 150.—*CAMPANULA PYRAMIDALIS*.

August. For shrubberies, beds, or back positions in the mixed border, it is well suited; but it is especially adapted for the wild garden, as it "runs" considerably. Increased by division or cuttings taken by off with a heel in spring.

BOCCONIA CORDATA (Plume Poppy) is a handsome foliage plant, having large roundish leaves, which are deeply lobed. It grows from 5ft. to 7ft. high, and bears terminal panicles of creamy-white flowers during July and

CAMPANULAS are handsome subjects, with bell-shaped flowers. The tall-growing kinds will be found invaluable for large borders. Propagation by seeds, cuttings, or division. *Campanula persicifolia* and its variety *maxima* have blue flowers. A white variety (*alba*) is also grown. These plants attain a height of 2ft. or more, and flower from June to August. *C. pyramidalis* (Chimney Bell-flower) (Fig. 150) is a noble plant, forming a bushy pyramid, composed of numerous stems, 4ft. or 5ft. high. These, during June and July, are crowded with large blue salver-shaped flowers. Its white variety (*alba*) is similar in habit, differing only in the colour of its flowers. The species and its variety are splendid plants, either for the border or for pot-culture. Numerous others are also grown. An excellent plant is *C. glomerata* (Fig. 151). It grows some 2ft. high, and varies considerably as to colour from bluish-violet to white. As the specific name implies, the flowers are produced in clusters.



FIG. 151.—*CAMPANULA GLOMERATA*.

CENTAUREAS are useful border plants, of easy culture in ordinary garden soil. They are increased by either seeds or cuttings. *C. dealbata* grows 1½ft. high, and bears rose-coloured flowers from July to September. *C. glastifolia* produces pale yellow flowers from June to September, on stems 3ft. to 4ft. high. *C. macrocephala* is a useful plant for the back of the herbaceous border. It grows from 3ft. to 4ft. high, and bears large heads of yellow Thistle-like flowers during July and August. *C. montana* is an early summer-flowering species, growing 2ft. high, and producing large bright blue flowers; the varieties *alba* and *rosea* differ only in the colour of their flowers. *C. pulchra* grows 1ft. high, and bears purple flowers during August; its variety *major* has bright rosy-purple flowers and beautifully cut silvery-grey foliage. *C. ruthenica* grows about 3ft. high; it has graceful foliage, and bears pale yellow flowers in July.

CHELONE BARBATA. — This is synonymous with *Pentstemon barbatus*.

CHRYSANTHEMUMS are useful border plants, the cut flowers being also much appreciated for decorative purposes. They are readily increased by either seeds, cuttings, suckers, or root

division. *Chrysanthemum maximum* grows 2½ ft. high, and forms a large bush, which, from June to September, is covered with white flowers of great size and substance. *C. uliginosum* (syn. *Pyrethrum uliginosum*) grows 5 ft. high, and is a valuable plant for autumn decoration, either in back positions in the herbaceous border, in shrubberies, or in beds in semi-wild parts of the pleasure-ground. It has large Daisy-like flowers,

pure white, with yellow centres, from 2 in. to 3 in. across, and produced during September and October.

COLUMBINE. — See Aquilegia.

COREOPSIS is a genus containing several perennials which form graceful border plants. They produce an abundance of showy flowers, which are highly prized for room decoration, &c. Propagated by seeds, cuttings, or division. *C. grandiflora* (syn. *C. longipes*) (Fig. 152) is one of the finest of hardy border plants, and of which someone has said that "a whole page would not adequately describe the merits of this plant; it is simply indispensable." It grows about 2 ft. high, and from June to September bears a profusion of large



FIG. 152.—COREOPSIS GRANDIFLORA.

golden-yellow flowers. *C. lanceolata* has also bright golden-yellow flowers, and grows upwards of 3 ft. in height. *C. verticillata* is a distinct slender-growing kind, reaching 2 ft. in height, and bearing yellow flowers.

DELPHINIUMS (Larkspurs) are noble plants, producing large spikes of beautiful flowers. They are useful subjects for the herbaceous border. The taller-growing kinds are also suitable for shrubberies, &c. Propagated by seeds, cuttings, or division. *D. cardinale* is a species of elegant branching habit, growing

3ft. high, and yielding bright scarlet flowers, with yellow centres, during July and August. *D. grandiflorum* grows 2ft. high, and in July produces panicles of dark blue flowers. *D. nudicaule* is a dwarf kind, growing only 18in. high, and bearing a profusion of bright orange-red flowers with yellow centres; it is an excellent rock-garden plant, and delights in sunny positions. Spring-sown seedlings will flower the first season.

DICENTRAS (DIELYTRAS) are lovely spring- or early summer-flowering plants. Propagated by cuttings or by division of the crowns in early spring. *D. formosa* has delicate fern-like foliage, and umbels of drooping red flowers, produced during May and June; it grows 1ft. high. *D. spectabilis* (Bleeding



FIG. 153.—DIELYTRA SPECTABILIS.

Heart) (Fig. 153) is a well-known forcing plant, and also one of the best for border culture; it grows 2ft. high, and flowers during May, June, and July. The flowers are produced on drooping racemes, and are white and rosy-crimson.

DICTAMNUS.—*D. albus* (Fraxinella) (Fig. 154) is a favourite old border plant, forming a neat bush from 18in. to 3ft. high. It is said that the Fraxinella has outlived father, son, and grandson in the same position. It is sometimes known as the "Burning Bush," because of a resinous exudation from the stems, which, when a light is applied, has a luminous appearance at

night. The foliage, when bruised, emits a strong balsamic perfume. The flowers are produced in long terminal erect racemes during June and July, and are white in colour. A form is also grown with reddish flowers; this is generally known as *D. Fraxinella*, whilst the white one is given as a variety. Propagated by seeds or by division.



FIG. 154.—DICTAMNUS
ALBUS.

E. Dodonæi grows from 12in. to 18in. high, and bears large rose-coloured flowers; it is also known as *E. Fleischeri*.

ERIGERONS are summer-flowering composites with beautiful star-shaped flowers; they are increased by either seeds or division. *E. aurantiacus* grows from 6in. to 18in. high, and bears large orange-coloured flowers during August. *E. speciosus* is a showy plant for the mixed border; the flowers are lavender-coloured, and have yellow centres; they are produced during July and August on stems 2ft. high. Its variety *superbus* has large purple flowers, and is a very free and continuous flowerer.

ERYNGIUMS are handsome plants with peculiar spiny foliage, and large branching heads of Thistle-like flowers; they are

DIELYTRAS.—See *Dicentras*.

DORONICUMS are handsome spring- and summer-flowering subjects, with large yellow Daisy-like flowers; they are suitable for bed and border culture, and are propagated either by seeds or by division. *D. austriacum* forms a mass of deep glistening green foliage, and bears numerous large golden-yellow flowers from March to May; it grows 18in. high. *D. plantagineum excelsum* (syn. Harpur Crewe) is more robust in habit than the last-mentioned, reaching a height of from 2½ft. to 3ft. It flowers from May to August, the flowers being deep yellow, and upwards of 4in. across.

EPILOBIUMS are showy plants of easy culture, suitable for large borders or for naturalising on the margin of water. Increased by seeds or by division. *E. angustifolium* is a tall plant, growing from 3ft. to 5ft. high, and producing showy crimson flowers during June, July, and August. The variety *album*, with white flowers, is also grown.

suitable for almost any position, being very effective in mixed borders, shrubberies, and sub-tropical and wild gardens, whilst the flower-heads are prized for winter decoration; they prefer a deep sandy soil, and are propagated by either seeds or division. *E. alpinum* grows from 2ft. to 3ft. high, and forms a distinct and noble border plant, with spiny foliage; the involucre and bracts are deeply cut, and together with the flower-heads and upper portion of the stems are of a glistening metallic-blue colour. *E. giganteum* (Ivory Thistle) (Fig. 155) grows from 2ft. to 4ft. high, and flowers during July and August; the stems, leaves, and bracts are of a shining white colour, and the whole plant is rigid and spiny. *E. Oliverianum* is a beautiful plant, 3ft. high, having handsome lacinated foliage and large heads of bluish flowers, produced during July, August, and September; the bracts, &c., are also blue.



FIG. 155.—ERYNGIUM GIGANTEUM.

GAILLARDIAS are exceedingly handsome border plants, having large showy flowers, which are much valued for the making of bouquets and the decoration of vases. They may be propagated by either seeds, cuttings, or division. *G. aristata* bears large yellow flowers during August, and attains a height of 18in. The varieties *grandiflora* and *maxima* are strong-growing plants with larger flowers than the type. An endless variety of named sorts are now sent out by nurserymen, and in point of beauty these far exceed the plants mentioned above. A selection of these will be found in the "Appendix."

GALEGA OFFICINALIS COMPACTA is a neat-growing perennial, attaining a height of from 2ft. to 3ft. It is a free-flowering plant, producing numerous racemes of pea-shaped lilac-coloured flowers from July to September.

GEUMS are showy perennials suitable for the mixed border; the flowers are very rich in colour, and are excellent for cutting purposes. Propagation is effected by seeds or by division.

G. chiloëns (syn. *G. coccineum*) grows 2ft. high, and bears numerous bright scarlet flowers from May to September; the variety *grandiflorum plenum* has large semi-double flowers. *Heldreichii* (1ft.), orange-red, is a recent addition that should not be omitted.

GYPSOPHILA PANICULATA is a striking plant of gauze-like appearance, and worthy of a place in the best herbaceous border. It forms a dense mass, 2ft. high, and during July and the late summer is covered with myriads of small whitish flowers, which are invaluable for cutting purposes.



FIG. 156.—HELIANTHUS
MULTIFLORUS.

HARPALIUM.—See *Helianthus*.

HELIENIUMS are valuable composite plants for back positions in mixed borders, or for planting in shrubberies; they have large yellow flowers, which remain in full beauty for a long time, and are therefore much in demand for cutting. Increased by seeds or by division. *H. autumnale* grows 3ft. high, and flowers during July, August, and September; the golden-yellow flowers, which are 3in. across, are produced in abundance. The variety *grandiflorum* is similar in habit to the type, but has much larger flowers. *H. Bolanderi* grows 2½ft. high, and is a showy plant producing rich yellow flowers with dark brown disks. It flowers in July and August. *H. Hoopesii* is a grand border plant, 2ft. high, and bearing clustered heads of bright yellow flowers, each of which is 2in. across.

HELIANTHUS (Sunflower). This genus contains several showy perennials suitable for the back of the herbaceous border or for shrubberies, &c. Increased by seeds or by division. *H. multiflorus* (Fig. 156) is an old garden plant with large yellow flowers; it reaches a height of 4ft., and flowers from July to September. The plant generally grown in gardens is the double one—*flore-pleno*. *H. rigidus*, formerly known as *Harpalium rigidum*, is a well-known and attractive plant, growing from 3ft. to 4ft. high,

and flowering from July to September; the flowers are bright yellow, with dark disks, and are upwards of 4in. across.

HELIOPSIS LÆVIS is a handsome composite plant, suitable for the back of the flower border; it grows from 3ft. to 6ft. high, and produces terminal heads of deep orange-yellow flowers from July to September.

HESPERIS MATRONALIS (Rocket, or Dame's Violet) is a free-flowering plant, suitable for the mixed border. It has whitish or purplish flowers, produced in June and July. The variety *flore-pleno* is the old double white Rocket. Increased by seeds, cuttings, or division.

HEUCHERA SANGUINEA (Alum Root) is a splendid plant for borders and rock-work. It grows from 9in. to 18in. high, and produces long graceful spikes of crimson-scarlet flowers from June to August. These, when seen in a mass, in full sunshine, produce a dazzling effect. The flowers are invaluable for cutting purposes. Increased by seeds or by division.



FIG. 157.—*INULA GLANDULOSA*.

INULAS are well-known composites with large showy yellow flowers, suitable for borders, shrubberies, wild gardens, &c. Increased by seeds or by division. *Inula glandulosa* (Fig. 157) is a plant which is greatly admired. It grows about 2ft. in height, is of neat habit, and during July and August produces large golden-yellow flowers 4in. across. *I. Helenium* (Elecampane) is a strong-growing species, from 3ft. to 5ft. high, producing large leaves and gigantic heads of showy yellow flowers. Its flowering period is from July to September. *I. Hookeri* grows from 1ft. to 2ft. high, and bears large yellow flowers during August and September.

LARKSPURS.—See Delphiniums.

LATHYRUS is a large genus of the Pea family, and comprises numerous perennial, as well as annual, plants. The perennials are handsome climbers, suitable for growing over pyramids of twiggy sticks in the mixed border, or for trailing over trellises, verandahs, &c. Increased by seeds or by division. *L. latifolius* (syn. *L. sylvestris platyphyllus*) is the Perennial Pea. It grows



FIG. 158.—LIATRIS SPICATA.

from 5ft. to 6ft. high, and produces its flowers from July to September. They are of a bright rose colour, and are much valued for cutting purposes. Several varieties are also grown, including *albus*, with white, and *splendens*, with rosy-carmine, flowers, borne in large clusters. *L. rotundifolius* grows 18in. high, and has beautiful rose-coloured flowers. It is an excellent plant for the rock garden or for stony banks.

LIATRIS (Blazing Star) is a genus of North American plants, of easy culture in any good garden soil. They are increased by seeds or by division. *L. spicata* (Fig. 158) is the best of the

genus, and produces long spikes of purple flowers during August and September. It grows from 1ft. to 2ft. high, and forms an excellent border plant.

LINARIAS are handsome annual and perennial plants, of easy culture, suitable for front positions in the border. The perennials are increased by seeds or by division. *L. triornithophora* grows 18in. high, and produces purple flowers with yellow throats, generally three together, in a whorl, like three birds perched on a spur. The flowering season is from June to September. If seeds are sown early in spring, the plants so obtained will flower the same summer.

LINUMS (Alpine Flaxes) are excellent plants for the border. Propagated by seeds or by cuttings. *L. perenne* is the best of the genus, light and elegant in habit, and very effective, whether grown in mixed borders or in the rock garden. It reaches a

height of 18in., and from June to August produces an abundance of beautiful pale blue flowers of a shade of colour not often met with.

LUPINUS (Lupin) is a genus of the Pea family. The species form very effective border plants, with elegant racemes of flowers, highly prized for cutting. Increased by seeds or by division. *L. nootkatensis* is a handsome plant growing 18in. high, and producing racemes of dark blue flowers, mixed with purple, white, or yellow. Its flowering period is from May to July. *L. polyphyllus* grows 3ft. high, and flowers from June to September. The flowers are very showy, bluish-purple in colour, and arranged in whorls on a handsome spike. Although one of the commonest, it is one of the best of the Lupins, and forms an excellent subject for the mixed border. The flowers are also used for indoor decoration.

LYCHNIS.—In this we have a genus of showy, free-flowering subjects, of easy culture, suitable for the mixed border. Propagated by seeds or by division. *L. chalconica* grows 3ft. high, and produces large heads of dazzling scarlet flowers from June to August. A white variety, and one with double flowers, are also grown. *L. coronaria* grows from 2ft. to 3ft. high, and during July bears red flowers, which are much prized for cutting purposes. The varieties *grandiflora* and *hybrida splendens* are well worth growing. *L. Haageana* grows 1ft. high, and flowers from June to August; it is a very showy plant, bearing large scarlet flowers, 2in. across. Numerous varieties are now grown with flowers embracing almost every shade of colour, from brilliant scarlet to pure white; these are valuable subjects for select positions in the mixed border or for beds. *L. Viscaria splendens flore-pleno* is one of the showiest of our dwarf hardy perennials, and suitable alike for the mixed border or for forming beds in the flower garden. It grows from 12in. to 18in. high, and flowers from June to August; the rich rosy-crimson flowers are large and double, and closely arranged on erect wiry stems, after the fashion of the flowers of a Stock.

MALVA MOSCHATA (Musk Mallow) is a favourite border perennial, growing 2ft. high, and producing an abundance of fragrant rose-coloured flowers, 2in. across. Its flowering period is from June to August. A white variety is also grown. These are wonderfully effective border plants, and the flowers are suitable for cutting. Increased by seeds or cuttings.

MIMULUS (Monkey Flower).—In this genus are several herbaceous perennials which delight in warm, damp positions, and are deserving of culture in mixed borders, vases, or hanging baskets. They are noted for their richly-marked and brightly-coloured flowers. Increased by seeds, cuttings, or division. *M. cardinalis* is a profuse-flowering species, reaching a height of

18in.; the flowers in the typical plant are of a bright scarlet colour, but other forms are grown with various coloured flowers, some being crimson, others flesh-coloured, orange, yellow, &c. Flowers from June to August. *M. moschatus* (Musk) is a well-known plant, growing 6in. high, and producing small yellow flowers from June to September; it is very sweet-scented, and on this account is largely grown in the conservatory and sitting-room. The variety known as *Harrisonii* is also a popular favourite; it has larger flowers, and grows much stronger than the type.

MONARDA DIDYMA (Bergamot or Oswego Tea) is an attractive plant for the mixed border, being particularly effective when grown in a mass; it reaches a height of 2ft. or 3ft., and its foliage is sweetly scented. Its flowers, which are borne in whorls, are bright crimson, whilst the bracts are also tinged with red. Flowers from June to August.

MORINA LONGIFOLIA is a handsome border plant, with deep green Thistle-like foliage, and spikes of flowers in crowded whorls. In the bud state the flowers are white; when they open they change to a delicate pink, and afterwards assume a crimson colour. As flowers in all three stages are to be found on the



FIG. 159.—*CÆNOTHERA CÆSPITOSA*.

same whorl, at the same time, a very pretty effect is produced. It grows 2ft. high, and flowers during June and July. Propagated by careful division.

CÆNOTHERAS (Evening Primroses) are most attractive and free-flowering plants, ranging in height from a few inches to 3ft. or 4ft.,

and yielding large showy flowers, which are closed during the day and open in the evening. They are suitable subjects for the mixed herbaceous border, or for shrubberies, wild gardens, &c. The perennials are increased by either seeds, cuttings, or division. *C. cæspitosa* (Fig. 159), known also as *C. eximia* and *C. marginata*, is a dwarf-growing species, 6in. to

12in. high, and bearing large snowy-white flowers, deliciously fragrant, and changing with age to a delicate rose-colour. It increases rapidly by means of underground shoots. Flowers from July to September. *Æ. Fraseri*, a variety of *Æ. glauca*, forms a bushy plant, 18in. high; it is a beautiful plant, with reddish stems and dark foliage, speckled with yellow. Its flowers are yellow, and are produced in abundance from June to September. *Æ. speciosa* is a grand border plant, attaining a height of from 1½ft. to 3ft., and producing a succession of large fragrant flowers, 2in. across, from June to September; when they first open they are pure white, but as they grow older they assume a reddish hue.

OROBUS (Bitter Vetch).—These are small plants, formerly kept up as a distinct genus, but now included under that of *Lathyrus*. They differ from the plants generally known as *Lathyrus* in having no tendril at the end of the leaf. Increased by seeds or by division of the root-stock. *O. luteus* (now known as *Lathyrus montanus*) is an elegant bushy plant, growing from 1½ft. to 2ft. high, and producing numerous racemes of bright yellow flowers during the month of June. *O. vernus* (*Lathyrus vernus*) (Spring Vetch) is a showy plant, growing 1ft. high, and forming compact tufts of light green foliage. The flowers are borne in racemes during April and May, and are of a rich blue or purple colour. A white variety is also in cultivation.

PÆONIA is a large and well-known genus of hardy perennials, suitable for either beds or the mixed border; they are of easy culture, and delight in a good loamy soil, enriched with plenty of farmyard manure. Their flowering period is during May and June. Increased either by seeds or by division. *P. albiflora* is a handsome species, growing from 2ft. to 3ft. high, and bearing large white flowers. *P. anomala* has beautifully cut foliage and solitary crimson flowers. *P. arietina* grows 2ft. high, and has dark red flowers. *P. decora* has purple flowers; it grows from 2ft. to 3ft. high. *P. officinalis* has large red flowers; several varieties of it are in cultivation. *P. tenuifolia* grows from 1½ft. to 2ft. high, has graceful feathery foliage, and dark crimson flowers; the variety *flore-pleno* differs only in having double flowers. The genus has been largely worked upon by the hybridist, with the result that there are now innumerable named garden forms in cultivation. A selection of these will be found in the "Appendix."

PAPAVER (the Poppy genus) contains several hardy perennials of easy culture in ordinary garden soil. Propagated by seeds or by division. *P. orientale* (Giant Oriental Poppy) is an old-fashioned border-plant, growing 3ft. high, and producing its flowers from May to August. It is a very showy plant, with enormous crimson-scarlet flowers, upwards of 6in. across. There is a dark

blotch at the base of each petal. Its variety (*P. bracteatum*, Fig. 160), sometimes described as a distinct species, is also a charming plant, differing from the type in having deep blood-

crimson flowers, but with the characteristic black blotch at the base of each of the petals. Numerous named forms of the Oriental Poppy are now grown; their bold aspect, and large showy flowers in all shades of crimson and scarlet,

render them magnificent plants for mixed borders, shrubberies, wild gardens, &c. *P. pilosum* is a distinct species, growing upwards of 2ft. in height. It has woolly foliage, and bears numerous flowers of a peculiar brick-red colour. Each petal has a white mark at the base. Its time of flowering is from May to July.

PENTSTEMON BARBATUS (syn. *Chelone barbata*) is a showy plant, bearing spikes of attractive scarlet flowers. It grows upwards of 3ft. high, and flowers from June to September, or even later. It is an excellent plant for the mixed border or for forming beds in the flower-garden. Easily increased by seeds or by cuttings. Numerous florists' varieties of Pentstemons are now grown in gardens. See "Appendix."

PHLOX is a genus containing several annual as well as perennial plants, many of which are very effective in flower-beds and borders. They are easily

propagated by either seeds, cuttings, or division. *P. paniculata* grows 3ft. high, and produces large terminal panicles of pink,

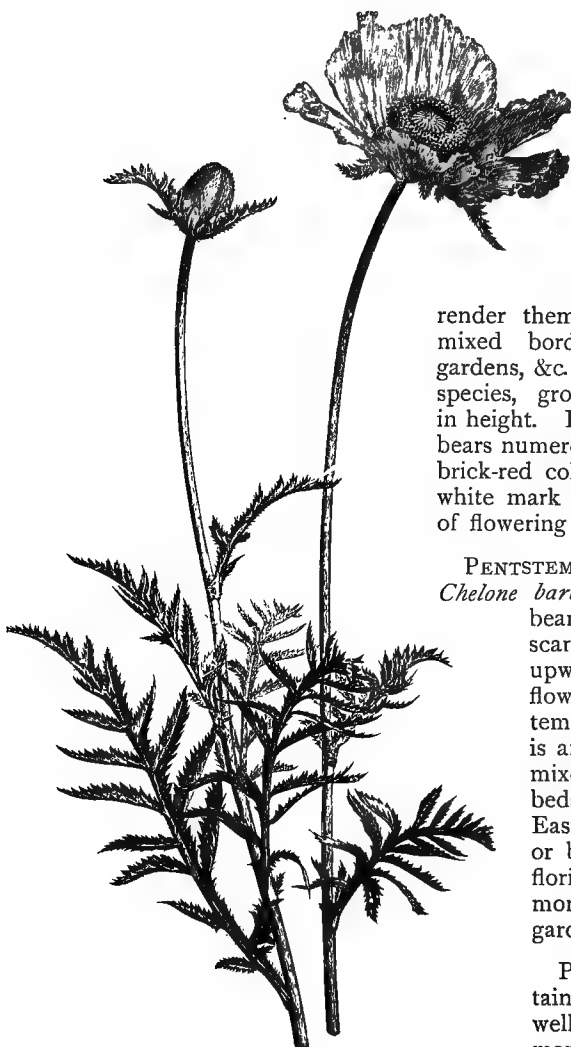


FIG. 160.—PAPAVER BRACTEATUM.

purple, or white flowers during August. *P. pilosa* is an elegant species, growing from 12in. to 18in. high, and bearing lilac-purple flowers on slender, erect stems, during May and June. The genus is one which has lent itself admirably to the hand of the hybridist, with the result that we have now an endless variety of "florists'" forms, derived chiefly from *P. maculata*, *P. paniculata*, and *P. glaberrima suffruticosa*. Some excellent kinds are: Avalanche, white, 2ft.; Leonardo da Vinci, white, 2½ft.; Jourdan, rose-pink, 1½ft.; William Robinson, cerise, 3ft.; Etna, orange-red, 2ft.; Moliere, salmon-pink, 2ft.; Eugene Danzanvilliers, soft lilac, 1ft. For a more extended list, see "Appendix."

PHYGELIUS CAPENSIS (Cape Figwort) is an attractive plant, growing 2½ft. high, and producing tubular scarlet flowers on pyramidal spikes during August and September. Increased by seeds or by cuttings. Prefers a sheltered situation.

PHYSALIS is a small genus containing two or three ornamental perennials suitable for growing in the front of the herbaceous border. They are easily increased by division. *P. Alkekengi* (Winter Cherry, or Chinese Lantern) grows from 12in. to 18in. high, and bears numerous inconspicuous white flowers, succeeded in autumn by scarlet berries, enclosed in the inflated orange-scarlet calyx. *P. Franchetti* is a very ornamental species, taller growing than *P. Alkekengi*, and producing a larger bladder-like calyx of a bright orange-red colour. The fruits enclosed in the inflated calyx are useful for winter decoration when they are cut and dried.

POLEMONIUMS are free-flowering plants, suitable for border or rock-culture, and are readily propagated by seeds or by division. *P. cœruleum*, commonly known as Jacob's Ladder, grows from 1ft. to 2ft. high, and bears heads of blue flowers from May to July. Several varieties are now grown, including one with variegated foliage, and another with white flowers. *P. himalay-anum* is a bold-growing plant, 2ft. high, having fern-like foliage, and large heads of azure-blue flowers with yellow eyes. *P. reptans* is a neat-growing species, 6in. to 12in. high, with a creeping rootstock; it has graceful foliage, and produces an abundance of pale blue flowers during April and May.

POLYGONUMS are plants of easy culture in ordinary garden soil, and are readily increased by division. *P. polystachyum* is a strong-growing species, reaching a height of 5ft., and having fragrant white flowers; it is suitable for naturalising in the shrubbery or wild garden. *P. vacciniifolium* is a trailing species; it produces long spikes of rose-coloured flowers in the autumn.

POTENTILLAS (Cinquefoils) are free-flowering plants, of easy culture in the mixed border. Readily increased by seeds or by division. *P. argyrophylla*, known also as *insignis*, is an excellent border-plant, attaining a height of 2ft.; it has fine silvery foliage, and yellow flowers 1in. in diameter. The variety *atrosanguinea* has dark crimson flowers, produced from May onwards during the summer. *P. nepalensis* (syn. *P. formosa*) is a plant growing from 18in. to 2ft. high, and yielding an abundance of flowers from June to August; they are rosy-pink in colour, with dark centres. This is an excellent plant for the mixed border or for back positions in the rock garden. Numerous florists' varieties are also grown (see "Appendix").

PYRETHRUMS are effective border plants, thriving in any good garden soil. They are now included under *Chrysanthemum*.



FIG. 161.—PYRETHRUM ROSEUM FLORE-PLENO.

Easily increased by either seeds, cuttings, or division. *P. partheniifolium aureum* is well known under the name of "Golden Feather," and is largely used in summer-bedding arrangements, as described in the Chapter "On Bedding Plants." *P. Parthenium* (Common Feverfew) is a fine border plant, growing 2ft. high, and producing its white flowers with yellow disks during June. The whole plant has a very strong smell. Its variety *flore-pleno* is a handsome plant, and differs only in having double white flowers. *P. roseum* is a plant, growing from 1ft. to 2ft. high, and flowering during June and July; the florets of the disk are yellow, whilst those of the ray are rose-coloured. *P. roseum flore-pleno* (Fig. 161) grows upwards of 2ft. high, and produces an abundance of showy semi-double rose-coloured flowers, which are greatly prized for cutting purposes. *P. Tchihatchewii* (Russian Daisy) is a valuable plant for dry banks and slopes, or for growing under trees, in which position it retains its green colour, even during dry weather. The leaves are very much divided; the stems grow 9in. high, and bear small white flowers with yellow disks. *P. uliginosum* (see *Chrysanthemum uliginosum*). A large number of florists' varieties of Pyrethrums are now in cultivation, and these form splendid subjects for the mixed border.

ROMNEYA COULTERI (Californian Bush Poppy) is a very charming plant, delighting in a warm, sunny position, and a light, deep soil. It grows from 2ft. to 4ft. high, and has deeply-cut foliage of a glaucous hue. The flowers are snowy-white, and Poppy-like in appearance (Fig. 162), often 4in. to 6in. across, with crinkled petals and golden-yellow stamens.

RUDBECKIAS (Cone Flowers) are showy, free-flowering, composite plants, suitable for back positions in the mixed border, or for growing in semi-wild situations, &c. The flowers are prized for cutting purposes. Increased either by seeds or by division. *R. californica* is a noble plant with large plantain-like leaves, and golden-yellow flowers, having brown Acorn-like centres. It grows from 4ft. to 6ft. high, and flowers during July, August, and September.

R. laciniata has stems 5ft. or 6ft. high, and large leaves, which are deeply cut. The flowers are yellow, and have a dark conical disk. *R. l. flore-pleno* is a very fine double form of the above, with long, graceful, branching stems, and beautiful yellow flowers, having rather long petals. *R. maxima* is a vigorous-growing plant, upwards of 7ft. in height, which from July to September bears large yellow flowers, with black disks. The flowers are 3in. or 4in. across. *R. speciosa*, known also as *R. Newmanii*, is one of the handsomest in the whole genus, growing from 2ft. to 3ft. high, and producing large yellow flowers with black disks. Its season of flowering is July and August.

SENECIO is a genus of composite plants of annual, biennial, and perennial duration, and of easy culture in any ordinary garden soil. The perennials are readily increased by means of seeds, cuttings, or division of the old plants. A good many



FIG. 162.—ROMNEYA COULTERI.

of them are weedy subjects, but the two following, along with a few others, might with advantage find a place in the mixed border. *S. doronicum* forms a dense mass of dark green foliage, and bears large golden-yellow flowers on stems 12 in. high; these are produced from June to August, and are very showy and useful for cutting. *S. pulcher* (Fig.



FIG. 163.—*SENECIO PULCHER*.

163) is a handsome border-plant, flowering in the late autumn; it has purplish-crimson flowers with yellow disks, borne on a branched flower-stem. It grows about 2 ft. high.

SIDALCEAS are free-flowering showy plants, suitable for the mixed border. *S. candida* grows from 2 ft. to 3 ft. high, and flowers from June to August; the flowers are pure white, and are borne in long terminal racemes. *S. Listeri* is a showy perennial of recent introduction; it grows about 3 ft. high, and from July to September bears an abundance of satiny-pink flowers, with beautifully-fringed sepals. *S. malvæflora* produces racemes of rosy-purple flowers on stems 1½ ft. high.

SOLIDAGO (Golden Rod).—

This genus contains several coarse-growing plants, suitable for naturalising in semi wild parts of the garden, or for back positions in the mixed border. Increased by seeds or by division. *S. rugosa* (syn. *S. altissima*) grows from 4 ft. to 5 ft. high, and bears yellow flowers from July to October. *S. Virgaurea nana* is a dwarf and compact form of the common Golden Rod, suitable for the mixed border; it grows 2 ft. high, and bears golden-yellow flowers in late autumn. *S. canadensis*, *S. gigantea*, *S. grandiflora*, &c., are advertised in nurserymen's catalogues; they are coarse-growing plants, reaching a height of 4 ft. or 5 ft., and bearing large yellow flowers.

SPIRÆAS (Meadow Sweets) are plants of easy culture, very ornamental when grown in mixed borders, shrubberies, or in moist situations, such as the margins of lakes, ponds, &c. They are readily increased by division. *S. Aruncus* (Goat's Beard) (Fig. 164) is a majestic plant, growing from 3 ft. to 5 ft. high, and producing long feathery plumes of white flowers during June and July. *S. astilboides* is an excellent plant for either pot

or border culture; it grows upwards of 3ft. high, and from June to August produces dense plumes of feathery white flowers. The variety *floribunda* is rather dwarf in habit, but bears larger plumes. *S. Filipendula flore-pleno* (Double Dropwort) is a low-growing plant with fern-like foliage and branching panicles of creamy-white double flowers, which are suitable for cutting. It reaches a height of 2ft., and is to be seen at its best during June and July. *S. palmata* (Fig.

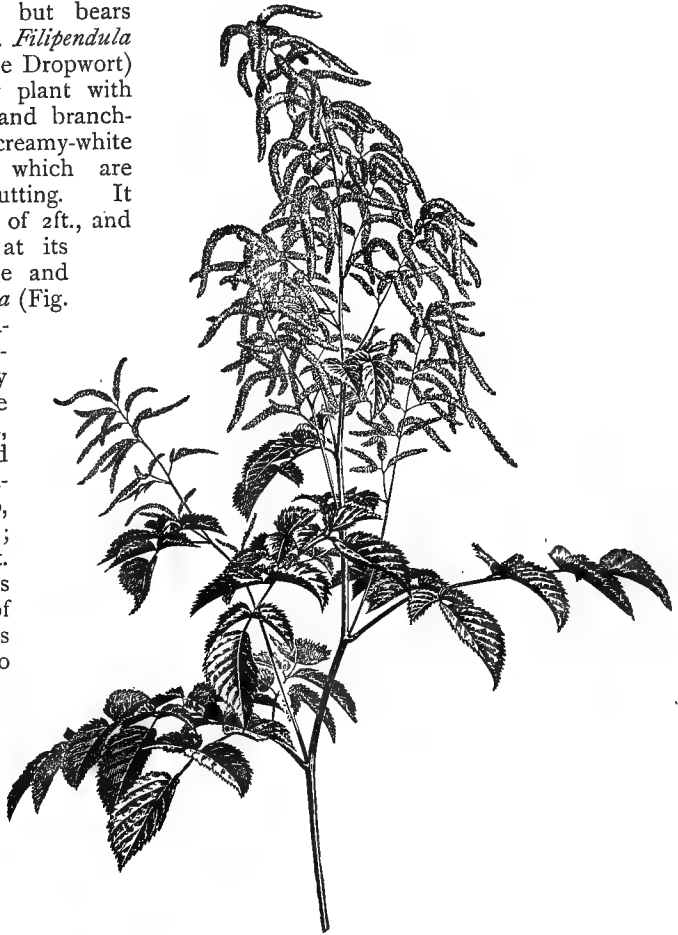


FIG. 164.—SPIRÆA ARUNCUS.

165) is a handsome plant, delighting in marshy ground, near the banks of streams, ponds, &c., and also growing luxuriantly in damp, shady borders; it grows 2ft. high, and bears large heads of crimson flowers from June to August. A white variety is also grown. *S. Ulmaria* (Common Meadowsweet) is a plant enjoying similar situations to the last-mentioned species; it grows 2ft. and upwards in height, and yields heads of white flowers from June to August. The variety *flore-pleno* has sweet-scented double white flowers, whilst *aurea* or *aureo-variegata* has golden variegated foliage and creamy-white flowers.

STATICE is a genus of very graceful plants suitable for the rockery or mixed border. *S. Gmelini* grows from 1½ft. to 2ft.

high, and produces spreading panicles of small dark blue flowers. *S. latifolia* (Great Sea Lavender) grows upwards of 2½ ft. high, and forms large heads nearly 2 ft. across, composed of deep lavender blue flowers; these are invaluable for winter decoration, as they last for months after being cut. *S. Limonium* also grows about 2 ft. in height, and yields panicles of deep blue flowers. *S. spathulata* and *S. tatarica* are described under "Rock Plants."



FIG. 165.—SPIRÆA PALMATA.

THALICTRUMS are ornamental plants, of easy culture. Propagated by seed or by division. *T. aquilegifolium* is a fine decorative plant, having large feathery heads of white or cream-coloured flowers, and foliage reminding one of that of the Columbine. It grows from 2 ft. to 3 ft. high, and flowers during June and July.



FIG. 166.—THERMOPSIS MONTANA.

THERMOPSIS MONTANA (syn. *T. fabacea*) (Fig. 166) is an attractive plant, growing 2 ft. high, and flowering during June and July; the yellow Lupin-like flowers are borne in terminal racemes. It is best propagated by seeds, as the roots do not stand division well.

TRADESCANTIA VIRGINICA (Common Spiderwort) is a showy plant with purplish-blue flowers. It grows upwards of 2ft. high, and produces its flowers from May onwards. It is suitable for mixed borders or for naturalising in shrubberies, wild gardens, woodland walks, &c. Several varieties are also grown, and are readily increased by division.

TROLLIUS (Globe Flower) is a genus of elegant border plants, with luxuriant foliage and handsome yellow flowers. They prefer rather moist situations. Propagated by seeds or by division of the old plants in the autumn.

T. asiaticus grows from 1ft. to 2ft. high, and produces bright orange-coloured flowers during May and June. *T. europæus* (Common Globe Flower) grows from 12in. to 18in. high, produces large globular pale yellow flowers from

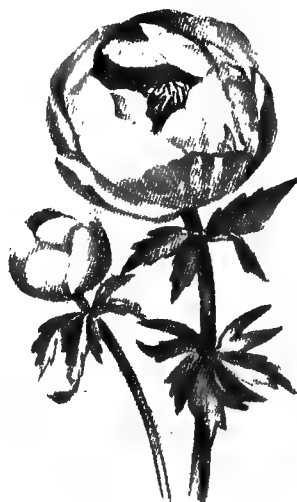


FIG. 167.—TROLLIUS ORANGE GLOBE.

April to June, and is an excellent subject for naturalising near ponds or streams. Orange Globe (Fig. 167) is a beautiful variety, with golden-yellow flowers, and grows 2ft. high.



FIG. 168.—VERONICA LONGIFOLIA SUBSESSILIS.

VERONICAS (Speedwells) are fine border plants, easily cultivated in any ordinary garden soil. The herbaceous perennial kinds may

be increased by either seeds or by division. *Veronica gentianoides* grows from 9in. to 18in. high, and produces long racemes of pale blue or violet-coloured flowers during May and June. There is also a white-flowered variety, and one with variegated leaves. *V. longifolia* grows about 2ft. high, and bears racemes of lilac or blue flowers from July to September. Several varieties are in cultivation; the one known as *subsessilis* (Fig. 168) is an extremely pretty border-plant, growing from 2ft. to 4ft. high, having serrated leaves and long massive spikes of beautiful blue flowers. *V. spicata* is a good border-plant, producing dense spikes of bright blue flowers upwards of 3in. long. It grows from 9in. to 18in. high, and flowers during July and August.



STATICE TATARICA.



9.—*On Rock Plants.*

BY
J. M. ABBOTT.

TYPICAL rock plants are such as are found in the mountainous regions of the earth, and these are invariably subjects of dwarf stature ; the plants now grown in rock gardens, however, include not only those above mentioned, but also dwarf species coming from much lower elevations. At the present day the beauty of this very interesting and popular class of plants is too well known to need comment.

Although numerous alpiners may be grown in the open border without a particle of rock near them, yet they succeed much better in the rock garden ; whilst for the cultivation of the rarer kinds a well-constructed rockery is absolutely essential, and the effect of such a one tastefully arranged is delightful in garden scenery.

In choosing a site it must be borne in mind that a free, airy, somewhat-elevated position is best, as many alpiners, and especially the rarer kinds, are difficult to keep through the winter on level, wet soils. The site and extent will, however, depend largely on the surroundings and on the number of plants intended to be grown. If an elevated position cannot be obtained, and the rock garden has to be formed in a more or

less flat situation, it is best done by cutting a path through the middle of the intended rockery, throwing the soil up on each side so as to form mounds and depressions. When the rough outline has thus been formed, and the bulk of soil placed in position, it must be left for several weeks to solidify before the rockwork is used. The quality of this foundation soil is immaterial so long as it is sufficiently porous to allow of the free passage of water through it; nevertheless, if this soil is good, so much the better for the plants, as many of them are deep-rooting subjects, and their roots will descend beyond the prepared soil placed in the crevices between the rocks.

Natural stone is to be preferred when it can be procured, and the kind used will depend upon that found in the neighbourhood, as it will be expensive to convey it from a distance. If limestone is obtainable, it should be used, as this gives a very artistic appearance to the rock garden. In some districts it is impossible to obtain natural stone of any description, and when this is the case the use of artificial stone has to be resorted to. This may be made as rough as possible out of brick-rubble and concrete. Carved stones of all kinds should be avoided. The object of the rock is to assist in keeping the roots moist, to help in their healthy development, to prevent undue evaporation from the soil, to form the framework of the rockery, and at the same time to provide picturesque growing sites for the plants.

In making rock gardens, and in disposing of the rocks, it is usual to imitate Nature, but it must be borne in mind that the plants are, or ought to be, the first consideration, and suitable positions must be formed for their reception. The rocks should stand out boldly here and there so as to give variation to the scene, as well as to provide various aspects for the plants. In arranging steep rockwork each piece of stone should slightly recede from the one below it, so that the rain falling on the face of the rocks may find its way into the intervening fissures, and thus supply the roots of the plants with moisture. These fissures must be filled with soil when the rockwork is being built up, so that the plants may have an abundance of soil in which to grow. In arranging ordinary rockwork, pockets and crevices should be left of sufficient size to admit of plenty of soil, and these should be filled with the kind suitable for the particular plants intended to be grown therein. Some alpinses, including the rarer ones, delight in narrow crevices, but in all



ROCK GARDEN AT HOLLAND HOUSE, KENSINGTON, II:
The Residence of the Earl of Kintore.

cases the soil in these crevices, or fissures, should be in connection with the bulk underneath, so that the roots may descend to any depth. Vertical crevices should always be narrower at the bottom than at the top, so that when the soil settles down it will fall against the sides of the rocks without leaving hollows.

A few alpines, such as the thick, fleshy-leaved *Sempervivums*, will hold on almost to the bare rock and grow with very little soil, but these are the exception: the majority prefer a deep-rooting medium, so that the roots may run down by the sides of the rocks to a good depth; they are thereby kept cool and moist, and are better able to withstand the occasional droughts experienced during our variable summers. Many of them are not fastidious as to soil, and a good turfy loam intermixed with plenty of smashed sandstone to keep it porous will be found suitable for the majority of kinds. Of course those requiring special mixtures can easily be supplied by filling up the spaces set apart for them with the kind of soil needed, instead of with the ordinary soil.

Great difficulty is often experienced in keeping through the winter plants which have their leaves covered with "down," such as the silky-leaved *Androsaces*, for the water collects in the down and rots them away. With such subjects it is a good plan to plant them so as to be overhung by ledges of rock; or they might be planted in a dry, airy situation, and have squares of glass elevated over them during the winter, so as to keep off the rain. The majority of alpines prefer a position fully exposed to the sun; such situations suit the rare and minute species, whilst a stony surface is also beneficial, for the particles of stone prevent excessive evaporation and tend to keep the roots cool and moist. A well-constructed rockery should provide all aspects, so that both sun- and shade-loving plants may be accommodated. A knowledge of the various plants and their requirements is essential before suitable positions can be chosen for them. A great point is to insert each firmly and right up to the collar of the plant.

When once planted, the after-management is simple enough, and consists mainly in keeping free from weeds, in preventing the strong-growing kinds from overrunning and smothering the weaker and more diminutive ones, and in giving them an abundance of water during hot dry weather in the summer. Slugs and mice must also be trapped, or many of the delicate little alpines will soon disappear. Plants which raise their collars will require top-dressing or replanting annually or they will soon become leggy, as is the case with many of the *Primulas*.

The methods of raising alpine plants are the same as those practised in raising hardy herbaceous perennials, and are mentioned under that heading.

The following is a good selection of rock plants :

ACANTHOLIMON GLUMACEUM (*Statice Ararati*) grows from 3in. to 6in. high, and bears six to eight rose-coloured flowers in a head much after the fashion of the Thrift (Sea Pink). It is of tufted habit, forming cushions of dark green prickly foliage.

ACHILLEA RUPESTRIS forms cushions of evergreen foliage, and from June to September produces heads of pure white flowers on stems 6in. high. *A. tomentosa* (Fig. 169) is an attractive plant, growing from 6in. to 12in. high, and having flat heads of bright yellow flowers. *A. umbellata* is a fine rock plant, 6in. high, having silvery foliage and heads of white flowers.



FIG. 169.—*ACHILLEA*
TOMENTOSA.

ADONIS is a genus of ornamental herbaceous plants, suitable alike for the rockery or for the mixed border. *A. pyrenaica* is a somewhat rare species, producing numerous stems from 12in. to 18in. high, and forming a mass of Fennel-like foliage. The flowers resemble those of the Anemone. They are upwards of 2in. across, of a beautiful yellow colour, and are borne in June and July. *A. vernalis* is a handsome plant, growing from 8in. to 12in. high, and bearing large yellow flowers during March and April.

ALYSSUM.—See "Spring-Bedding Plants."

ANDROSACES are small, interesting alpine plants, suitable for either rockwork or pot culture. The woolly-leaved species must be protected from the rain during winter. Propagation is effected by seeds or division. *A. carnea* forms dense tufts 3in. to 4in. high, covered with clusters of pink or rose-coloured flowers with yellow eyes. *A. lanuginosa* has greyish foliage on trailing stems, and is a suitable subject for planting so that the shoots may hang over the face of the rockwork. This has also umbels of rose-coloured flowers with yellow centres, borne during July and August. *A. sarmentosa* (Fig. 170) is one of the most beautiful of the genus, producing rosettes of downy foliage, and large umbels of rose-coloured flowers with white eyes. It grows about 6in. high, and flowers during May and June. A position in a chink of the rockwork and a sandy loam suit it admirably.

ARABIS.—See “Spring-Bedding Plants.”

ARENARIA BALEARICA is a handsome, close-growing species, suitable for creeping over damp stones. It has dark green foliage, and in May and June, when covered with its small white star-like flowers, is very attractive. *A. graminifolia* grows about 6in. high, and forms grass-like patches, covered during June and July with small white flowers.

ASTER ALPINUS is a dwarf species, growing 9in. high, and flowering in June and July. The flowers, which are useful for cutting, are bright purple, and upwards of 2in. across. Several varieties are also grown.

AUBRIETIA. — See “Spring Bedding Plants.”

CAMPANULA CARPATICA is suitable either for the rock garden or for the mixed border. It grows 1ft. high, and produces numerous light blue flowers from May to August. Its variety *alba* has pure white flowers, and *turbinata*, a plant growing about 6in. high, has large purplish-blue flowers.

C. garganica produces masses of blue flowers with white centres, and is only 6in. high. G. F. Wilson is a hybrid growing only 3in. high, and bearing numerous dark blue salver-shaped flowers from June to August. *C. pulla* is an excellent rock plant, only 3in. high, and bearing deep purple drooping flowers from May to July. *C. pusilla* grows 6in. high, and produces its pale blue flowers in abundance from May to September. The variety *alba* is also grown.

CERASTIUM TOMENTOSUM.—See “Spring-Bedding Plants.”

CORYDALIS is a genus of early-flowering plants, suitable either for the rockery or for the open border. They are of easy culture, and may be increased by seeds or division. *C. capnoides* is a plant growing from 12in. to 18in. high, and bearing white



FIG. 170.—ANDROSACE SARMENTOSA.

flowers with yellow markings during July. *C. Kolpakowskyana* grows about 6in. high, and yields its pink or purple flowers with long spurs during April. *C. lutea* is an excellent species for dry situations; it reaches a height of 1ft., and bears a profusion of yellow flowers during May and June. *C. nobilis* grows about 1ft. high, and in May produces masses of yellow flowers with long spurs; it prefers a moist, shady situation.

DIANTHUS (the Pink genus) contains several perennials which are very ornamental rock-garden as well as border-plants. They are increased by seeds, cuttings (known as pipings), and layers. *D. alpinus* is a charming little alpine, with dark green foliage, and large crimson flowers 1in. across; it grows only about 4in. high, and flowers in June and July. *D. cæsius* (*D. pulchellus*), the Cheddar Pink, is a plant with glaucous foliage and rosy-pink flowers; it grows from 3in. to 6in. high, and is generally in blossom during May and June. *D. plumarius* (Common Pink) grows 1ft. high, and during June and July bear numerous white or pink sweet-scented flowers, fringed at the margin; it is from this plant that our garden Pinks have sprung. Other dwarf species suitable for the rock garden are *D. glacialis* and *D. petraeus*, with rose-coloured, and *D. neglectus*, with pink flowers.

DRABAS are charming spring-flowering plants suitable for the rockery. *D. aizoides* is a pretty alpine, forming compact tufts

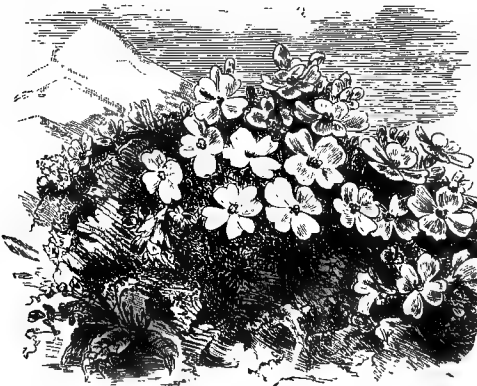


FIG. 171.—DRABA MAWII.

3in. high, and producing bright yellow flowers during March and April. *D. brunia-folia* forms dense, moss-like tufts from 2in. to 4in. high; it also has yellow flowers, produced about June. *D. Mawii* (Fig. 171) is a dwarf rock plant, forming dense tufts of foliage, and bearing an abundance of pure white flowers in spring. *D. pyrenaica* is a gem, growing 3in. high; the flowers, which are borne in May, are

first white, but afterwards change to a soft rose-colour.

DRYAS OCTOPETALA is a beautiful alpine, with small, Oak-like leaves and large, white, solitary flowers, each with eight petals; it grows only about 3in. high, and flowers in May and June.

EDELWEISS.—See *Leontopodium alpinum*

EPILOBIUM OBCORDATUM is an alpine species suitable for a moist position in the rockery; it grows about 4in. high, and from May to July produces an abundance of bright rose-coloured flowers upwards of 1in. in diameter.

EPIMEDIUMS are useful plants for shady positions, and they thrive best in a light peat soil. *E. alpinum* grows upwards of 1ft. high, and flowers in May and June. The outer sepals are greyish, the inner ones crimson, whilst the petals are of a yellow colour; several flowers are borne on the same stem in a loose panicle.

ERINUS ALPINUS is a charming little alpine, suitable for dry places in the rockery, whilst it also grows well on old walls. It forms compact cushions 3in. high, covered during May and June with rose or purple flowers.

ERYSIMUM PULCHELLUM is a fine plant for a sunny position. It grows from 6in. to 12in. high, and blossoms during May and June. The flowers are of a lemon-yellow colour, and produced in great abundance.

ERYTHRÆA DIFFUSA grows 3in. high, and bears bright rose-coloured flowers during June and July.

GALAX APHYLLA (*Blandfordia cordata*) is a neat little plant (Fig. 172), delighting in a moist, sandy, peat soil. It is an evergreen, with round, notched leaves, which in the autumn assume a reddish hue.

The flower-stems rise to a height of 9in., and bear numerous small white flowers in July. It is propagated by division.

GENTIANAS are lovely plants for the rockery; the dwarf kinds are sometimes used as edging plants, but, unfortunately, in many localities they are very shy at flowering. Propagation is effected by carefully-made divisions; plants may also be raised from seed, but it is a very slow process, especially if the seed is old. *G. acaulis*, the Gentianella, forms cushions of glossy-green

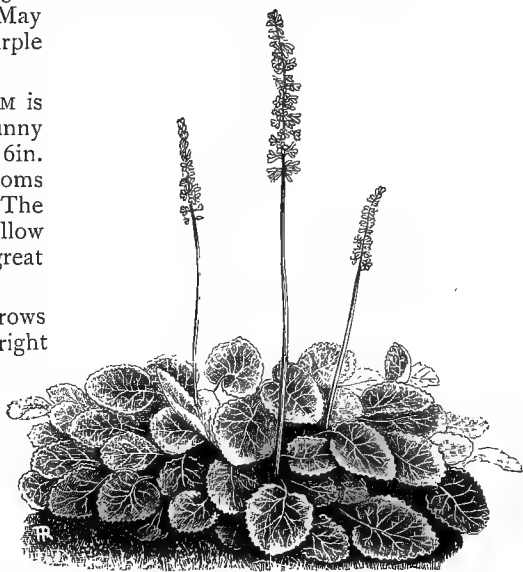


FIG. 172.—GALAX APHYLLA.

foliage, and bears erect bell-shaped flowers with yellow marks inside; it grows from 3in. to 6in. high, and flowers between March and June. *G. asclepiadea* grows 18in. high, and produces long terminal clusters of purplish-blue flowers



FIG. 173.—*GEUM MONTANUM*.

during July and August. It succeeds in a moist, shady situation of either the rockery or the open border. A white variety of this is also cultivated. *G. verna* is a gem, and in districts where it does well, forms dense tufts of glistening green foliage, covered with flowers of a brilliant blue colour. It grows only 3in. high, and flowers in April and May.

GEUM MONTANUM (Fig. 173) is an excellent rock plant, growing from 6in. to 15in. high, and producing an abundance of golden-yellow flowers from June to August.

GNAPHALIUM LEONTOPODIUM.—See *Leontopodium alpinum*.

GYPSOPHILA CERASTOIDES is a dwarf, though handsome, rock plant, growing from 3in. to 6in. high, and flowering during May and June; the flowers are white, veined with pink. Propagated by seeds, cuttings, or division.

IBERIS.—See “Spring-Bedding Plants.”

LEONTOPODIUM ALPINUM (*Gnaphalium Leontopodium*), the Edelweiss, is a remarkable alpine, growing 6in. high, and producing terminal heads of flowers enveloped in white, woolly bracts (Fig. 174) in June and July. It should be planted in sandy, stony soil, in exposed positions. Propagation is effected by seeds or by careful division of the old plants.



FIG. 174.—*LEONTOPODIUM ALPINUM*.

LINARIA ALPINA is a charming little rock plant of neat, trailing habit, growing from 3in. to 6in. high, and flowering from June to September. The flowers are of a purple colour, with orange centres.

LINUM FLAVUM is a handsome plant, of neat habit, growing from 12in. to 18in. high, and bearing an abundance of showy yellow flowers from June to August.

LITHOSPERMUMS are showy rockwork plants. They prefer a light, sandy loam, and are easily increased by either seeds, cuttings, or division. *L. Gastoni* is a rare plant from the Pyrenees, and now said to be scarce in its native habitat. It varies in height from 9in. to 18in., and is somewhat shrubby in habit. During June and July it produces spikes of bright blue flowers. *L. graminifolium* is a choice alpine, growing from 6in. to 12in. high, and bearing clusters of rich blue flowers. *L. prostratum* is a showy evergreen plant of dwarf habit, producing numerous prostrate stems. It is essentially a rock-garden subject, yet does fairly well in the open border. It has flowers of a deep blue Gentian-like hue, but with red or violet stripes. The best way to propagate it is by cuttings, placed in sandy peat in a cool frame, in the autumn.



FIG. 175.—LYCHNIS ALPINA.

LYCHNIS ALPINA (Fig. 175) is a charming plant, growing 6in. high, and yielding clusters of rose-coloured flowers during May and June. *L. Lagasæ* grows only 3in. high, and bears large bright rose-coloured flowers with white centres. It flowers from June to August.

MECONOPSIS CAMBRICA, the pretty Welsh Poppy, is a desirable plant for the rock garden; it grows 1ft. in height, and bears bright yellow flowers on long stems from June to August. It is easily grown from seed, and very often establishes itself on old walls. Unlike the Himalayan species, it prefers a dry situation.

MEGASEA.—See *Saxifraga*.

MERTENSIA ALPINA is a lovely alpine, growing from 6in. to 9in. high, and bearing clusters of light blue flowers. *M. sibirica* is a handsome free-flowering plant, growing from 12in. to 18in. high, and producing its purplish-blue flowers from May to July. The variety *alba* has pendent clusters of white flowers.

MORISIA HYPOGÆA is a dwarf Sardinian alpine about which much has lately been written. It grows only 3in. high, and for

several weeks in the early summer is covered with clear bright yellow flowers; these are produced singly on short stalks, and are much enhanced by the dark, finely-cut foliage. It is an excellent subject for a select sunny position in the rockery, and delights in a good sandy loam. It may be increased by seeds or by division.

MYOSOTIS (Forget-me-not) is a genus containing several well-known perennials suitable for the rock garden or for spring bedding. They delight in moist, shady positions. Propagated by seeds, by cuttings, or by division. *M. alpestris* (*M. rupicola*), the alpine Forget-me-not, is an attractive little plant, growing from 2in. to 6in. high, and covered during summer with deep blue flowers having yellow eyes. *M. dissitiflora* is excellent for spring bedding. *M. semperflorens* grows 1ft. high, and during summer and autumn is covered with rich blue flowers. *M. sylvatica* is a profuse spring and early summer flowering species, growing from 12in. to 18in. high, and bearing pretty blue flowers with yellow throats.

ENOOTHERA MISSOURIENSIS LATIFOLIA, known also as *E. macrocarpa*, is a showy plant growing about 9in. high, and bearing large yellow flowers, on red trailing stems, from June to September.



FIG. 176.—ONOSMA ECHINOIDES.

OMPHALODES VERNA is a spring-flowering plant, somewhat resembling a Forget-me-not; it grows 6in. high, and bears loose racemes of small brilliant blue flowers. It is a fine plant for a shaded position in the rockery, and is also suitable for naturalising in the wild garden; when once established it soon forms a dense tuft, and increases rapidly by means of runners. A white variety is also in cultivation, which, like the type, flowers from March to June.

ONOSMA ECHINOIDES (Fig. 176), known also as *O. tauricum*, is a charming evergreen, bearing clusters of drooping tubular flowers, on arching stems

1ft. high; the flowers are bright yellow, very fragrant, and are produced from May to August.

PHLOX is a genus yielding several dwarf perennial species suitable for the rock garden, such as *P. amœna* and *P. subulata*, which are treated under "Spring-Bedding Plants."



FIG. 177.—PHYTEUMA
CHARMELII.

PHYTEUMAS are charming plants for sunny situations; they are increased by seeds or by division. *P. Michelii* grows 6in. high, and bears heads of reddish flowers during June and July. *P. orbiculare* grows 1ft. high, and produces violet-purple flowers, in spherical heads, from June to August. *P. Scheuchzeri* produces blue flowers in May, and grows from 6in. to 12in. high; its variety *Charmelii*, generally known as *P. Charmelii* (Fig. 177), also has blue flowers, in round heads,

and is an excellent plant for a well-drained position on the rockery.

PRIMULA is an extensive genus of alpine perennials, containing many species suitable for rock-garden culture. Propagation is usually effected by seeds, though sometimes the old plants may be carefully divided. *P. cortusoides* produces umbels of rose-coloured flowers during May; the scapes are 9in. high. *P. denticulata* is a handsome species, thriving well in a light moist soil. The leaves are covered underneath with a white mealy substance; the flowers are lilac, and are produced in large globular heads on scapes upwards of 12in. high. Its variety *cashmeriana* is a splendid form, having violet-purple flowers with yellow eyes. *P. floribunda* has small golden-yellow flowers produced



FIG. 178.—PRIMULA MARGINATA.

in whorls; the scapes reach a height of from 6in. to 8in. *P. japonica*, the Japanese Primrose, is a well-known and ornamental species, with massive whorls of rose-coloured flowers produced during spring on scapes varying from 12in. to 18in. high. It prefers damp and shady places, in which, if planted in good rich loam, it will make vigorous growth. *P. marginata* (Fig. 178) has bluish-lilac flowers with mealy centres; it grows about 3in. high, and flowers during April and May. *P. rosea* is a charming plant for moist situations; in early spring it produces numerous scapes from 4in. to 6in. high, each terminating in a head of bright rose-coloured flowers having yellow eyes. *P. sikkimensis* also delights in damp, shady situations; it sends up strong scapes from 1ft. to 2ft. high, each bearing a large umbel of fragrant, drooping, pale yellow flowers.

PRUNELLA GRANDIFLORA grows from 6in. to 12in. high, and bears violet-purple flowers in dense terminal spikes during July and August. It thrives in any good light soil, and is suitable either for the rockery or for the front of borders. It may easily be increased by division of the old plants.

RAMONDIA PYRENAICA is a charming little alpine suitable for damp, shady nooks between the rocks; it prefers a sharp, peaty soil. The leaves are borne in rosettes, and lie close to the soil; they are dark green, crimped, and covered with reddish-brown hairs. The flower-stalks grow 5in. or 6in. high, and each usually bears two or three violet-purple flowers with yellow eyes during May and June. There is also a white variety known as *alba*, which is a handsome plant, though somewhat rare. Increased by seed or by division.

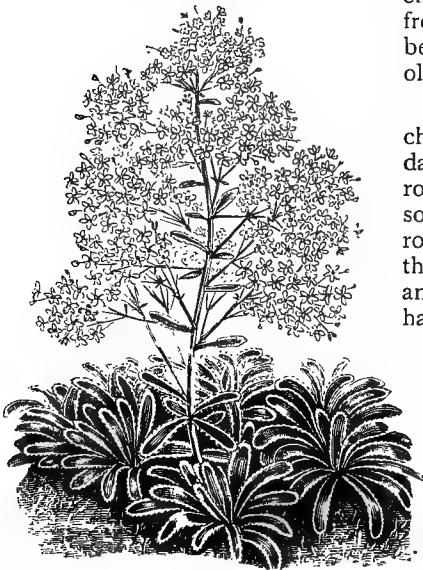


FIG. 179.—*SAXIFRAGA COTYLEDON*.

SAXIFRAGA is a large genus of interesting and ornamental perennials adapted for rock-garden culture. Increased by offsets or division. The numerous species may be roughly divided into five sections, viz.:

(1) *The Encrusted Section*, comprising plants with rosettes of silvery-tufted foliage. To this section belongs *S. Cotyledon* (Fig. 179), a large silvery-leaved kind, sending up a branched

pyramidal flower stem, 1ft. to 2ft. high, and covered from May to July with large white flowers. *S. longifolia* has large rosettes of silvery leaves, 6in. long, and bears white flowers, dotted with red, on much-branched flower-stems 1ft. high. *S. pyramidalis* is merely a robust variety of *S. Cotyledon*.

(2) *The Mossy Section* contains the dense, moss- or cushion-like Saxifrages; of these *S. hypnoides* and *S. muscoides* are examples. The former bears small white flowers, on stems 6in. to 12in. long, from May to July; the latter, known also as *S. moschata*, bears racemes of pale yellow or purple flowers during May and June.

(3) *The Oppositifolia Section* comprises those with small opposite leaves. The typical plant, *S. oppositifolia*, has leafy, creeping stems, 6in. to 8in. long, and produces solitary bright purple flowers during April and May. Its variety *pyrenaica* also has purple flowers, and is an excellent rock-garden plant. Several other varieties are also grown.

(4) *The Round-leaved Section* includes such kinds as *S. sarmentosa*, *S. umbrosa*, and *S. rotundifolia*. The first, however, is only half-hardy. *S. umbrosa* (London Pride) is a well-known plant, sending up a leafless flower-stalk 6in. to 12in. high; the flowers, which are borne in a paniced cyme, are white, but often spotted with red. *S. rotundifolia* has white flowers marked with scarlet dots.

(5) *The Large-leaved Section* comprises the species with large leaves, commonly known in gardens as Megaseas. Of these the following are best known: *S. cordifolia* (*Megasea cordifolia*), with large cordate leaves and clusters of bright rose-coloured flowers; it grows 1ft. high, and flowers from March to May. *S. crassifolia* has large oval leaves, which are fleshy and shining; in April and May it bears clusters of reddish flowers on stalks 1ft. in height. *S. (Megasea) purpurascens* has large, smooth, purple leaves; the flower-stems are 12in. high, and are surmounted with clusters of bright purple flowers in June. *S. Stracheyi* has large shining green leaves, and lovely pink flowers upwards of 1in. across, produced in March and April on stems 9in. high.

SEDUMS (Stonecrops) are essentially rock-garden plants, and also succeed well on old walls, ruins, &c. Some, such as *S. glaucum* and *S. lydium*, are also useful for carpet-bedding. They thrive in almost any position, and are easily increased either by seeds, by cuttings, or by division. *S. acre*, although a British plant, is much grown; it sends out numerous barren, creeping shoots, from which rise dwarf erect branches bearing yellow flowers; its variety *aureum* has the tips of the leaves of a bright golden-yellow during the spring. *S. album* grows 6in. high, and produces its cymes of white flowers on pinkish stems during June and July. *S. glaucum* grows from 3in. to 4in. high, and bears cymes of white flowers. *S. kamtschaticum* has prostrate

stems, 6in. to 8in. long, of a greenish or purplish colour; the flower-stems are erect, from 4in. to 6in. high, and bear cymes of yellow flowers. *S. lydium* produces white flowers in June and July; the flowering stems are from 4in. to 5in. long, and the barren ones from 2in. to 3in. *S. spectabile* is a tall-growing species, from 12in. to 18in. high, suitable either for the rockery or for the mixed border; it bears flat-topped cymes of pinkish flowers during September.

SEMPERVIVUMS (House Leeks) comprise a number of interesting rockery plants, very varied in form and flower; they delight in a dry, sandy soil, and are easily propagated by offsets taken from the old plants. *S. arach-*



FIG. 180.—SEMPERVIVUM ARACHNOIDEUM
LAGGERI.

noideum bears upwards of fifty succulent leaves in a rosette, the tips of which are connected by long white hairs; the flowering-stems are from 3in. to 4in. long, leafy, and bear several pink flowers upwards of 1in. in diameter. The variety *Laggeri* (Fig. 180) is a robust form of the above, producing large rosettes of leaves. *S. fimbriatum* has fifty to sixty leaves in a rosette, the outer ones turning green; the flower-stem rises from 6in. to 9in. high, and bears bright red or purple flowers in July and August. *S. montanum* has from

sixty to eighty leaves closely packed in a rosette; the flower-stems are about 6in. high, and bear crimson flowers in June.

SHORTIA GALACIFOLIA is a beautiful plant for the rock garden. It grows from 3in. to 5in. high, and flowers during March and April. The flowers are large, solitary, and somewhat bell-shaped; the petals are fimbriated at the edge, are first white, but as they grow older they become tinged with red. The leaves are evergreen, long-stalked, and roundish; at first they are deep green, but in late summer they assume a beautiful bronzy-crimson hue.

SILENE is an extensive genus of annual, biennial, and perennial plants, some of which are natives of Britain. The perennials are propagated either by seeds, cuttings, or by division; they may be grown in the rockery or in the mixed border. *S. acaulis*, the Cushion Pink, forms moss-like tufts of foliage, 2in. high, and covered with numerous pink flowers from June to August. *S. alpestris* is a neat little alpine growing from 3in. to 6in. high, and producing, during May and June, a sheet of glistening white flowers. *S. maritima flore-pleno* is a fine rock plant, growing 6in. high, and forming prostrate tufts of glaucous foliage. It has double white flowers, as large as those of the garden Pinks, and produced in abundance from May to August. *S. Schafta* forms a compact bushy tuft, 6in. high, and bears numerous rose-coloured flowers during July and August.

SOLDANELLAS are pretty alpines, thriving best in a peaty soil in sheltered corners of the rockery. They may be increased by seeds or by division. *S. alpina*, the Blue Moonwort, grows 6in. high, and bears beautifully-fringed pendent bell-shaped flowers during April; they are of a deep purple or violet colour, and borne three or four together on each scape; the leaves are small, and round or kidney-shaped. *S. minima* has large fringed blue flowers, borne singly on scapes 2in. or 3in. high during April and May. *S. montana* grows 3in. high, and produces its purple flowers, two to four on each scape, during April.

STATICE is a genus of ornamental plants, many of which are suitable either for the rockery or for the mixed border; they produce large heads of flowers which are very lasting both on the plant and when cut. *S. spathulata* bears heads of purple flowers during

August, on stems 1ft. high. *S. tatarica* produces numerous pink flowers on a long, broad panicle 1ft. high, during July and August; the leaves are radical, and from 4in. to 6in. long.



FIG. 181.—TIARELLA CORDIFOLIA.

SYMPHYANDRA WANNERI, although a biennial, is a useful rock garden plant, having showy Campanula-like blue flowers. It grows from 6in. to 12in. high, and is a native of the Alps. It is sometimes known as *Campanula Wanneri*.

TIARELLA CORDIFOLIA (Fig. 181) is a charming plant for the rock garden or the front of the mixed border; it has creeping stems, and forms dense masses of delicate foliage, green at first, but afterwards assuming a brownish tint. The stems rise from 6in. to 12in. high, and during May and June bear numerous small, Spiræa-like flowers which, when fully expanded, are of a creamy-white colour, but in the bud state are delicately tinged with pink. It may be propagated by division.

VERONICA TEUCRIUM (Hungarian Speedwell) bears many-flowered racemes of light blue flowers in July. The stems are from 9in. to 12in. long, and form a dense, spreading mass. Its variety *dubia*, known also as *V. prostrata*, is one of the showiest of the dwarf herbaceous kinds, and when in flower forms an effective rockery plant. It is of prostrate habit, forming dense tufts, covered during May and June with bright blue flowers.

WAHLENBERGIA TENUIFOLIA (Fig. 182) is a hardy rock plant, growing from 3in. to 6in. high, and flowering during June and July. The leaves are rather long and narrow; the flowers are violet-purple, white at the base, and are borne from six to ten together in a terminal tuft.

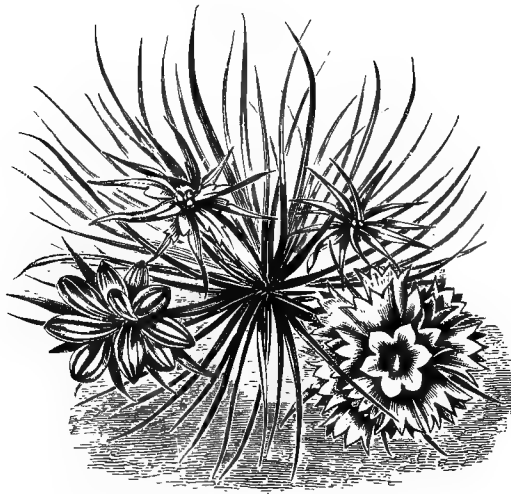


FIG. 182.—WAHLENBERGIA TENUIFOLIA.



10.—*On Hardy
Bulbs and Tubers.*

BY W. D. DRURY.

FIRST to greet us in the spring, and the last to linger with us, giving to our gardens brightness even in the depth of winter, is it any wonder that bulbs and tubers, as ordinarily understood, appeal so strongly to hardy plant lovers? Indeed, having regard to the numerous claims that they have upon the gardener's attention, the wonder rather would be if they did not have such a hold. From the very earliest times bulbs, at any rate, have been viewed with favour, as witness the tender, nay, almost loving care that was lavished upon them by those gardeners of a bygone age like Parkinson. They were amongst the first plants that were utilised for the beautification of English gardens, and thus for their early associations, if for naught else, they are at least entitled to respect. Apart, however, from what may be termed the sentimental aspect of the question, they have claims, and just ones, upon the attention of every practical gardener: their chasteness, or it may be their gorgeousness of colouring, their ease of culture, their general adaptability, and, in the majority of cases, their permanence, entitle them to it.

To fully realise the important part they play, and their true decorative value, let us for a moment think of our gardens say, shorn on the one hand of those spring harbingers the Snowdrops, the Crocuses, the Scillas, the Snow Glories, the Snowflakes, the Hyacinths, the Tulips, and the lesser known, though no less deserving Fritillaries; or on the other of the Anemones, the Winter Aconites, the Cyclamens, and several others. Under the most varying conditions of soil, situation, and temperature,

they clothe themselves in their gayest apparel. The ways in which they may be utilised are as numerous as the plants themselves. For beds and borders, the margins of streams, the choice parts of the rock garden, the shrubby border, and the decoration of window-boxes, they are equally well adapted; and it needs but the exercise of a little taste for a maximum of effect to be procured with a minimum of trouble.

Again, there is a wonderful variety of form, colour, and habit; in fact, so diversified are these characteristics, that one is astonished, when noting the effect of such plants as *Yucca gloriosa* or *Y. filamentosa* in a bed, that they are allies, and close allies, of the Lilies of our summer gardens. The botanist, of course, knows that they are, but the average gardener cannot see how two such dissimilar-looking plants, taken at a cursory glance, are brought together by any system of classification.

Compared with even a very few years ago, these sections of hardy plants have increased at a rate that even the most enthusiastic gardener could scarcely have hoped. Not only are our collections altogether richer in species and varieties, but to-day there flourish in our midst plants whose hardiness would have been considered doubtful, to say the least. As evidence of this we have but to point to the bold-looking Eremuruses, the indescribably beautiful Calochorti and Brodiaeas, all of which at one time were thought to need the shelter of a house. A better acquaintance with their requirements has placed the cultivator of to-day in a position to grow them without any artificial aids, and our gardens are accordingly the richer by their presence.

CULTIVATION.—Though soil and situation are important factors in the successful cultivation of bulbs and tubers, yet so widely different is the geographical distribution of the individuals comprising the groups that it is impossible to lay down hard and fast rules in respect of them. What, for instance, would suit one bulb would be absolutely fatal to the chances of another, and the peculiarities of each member of a family have frequently to be dealt with. The absurdity, therefore, of attempting to generalise will be at once apparent. To prove the truth of such an assertion one has but to take say the Lilies, which are by far the most popular of any plants to be found in either section. In a state of nature it is possible to find one species inhabiting a swamp; another in a comparatively dry place; and yet a third taking an intermediate position, and revelling maybe in a peaty soil. And so it is with all the larger and



more important genera, whether of bulbs or tubers. In connection with the latter, it is only necessary to consider for a moment the Anemones—amongst the most popular of hardy plants—to fully appreciate the relevancy of the remarks. There are no general methods of culture which could, with any degree of certainty, be put forth as applicable to the larger genera of bulbous and tuberous plants, or, indeed, to some of the smaller ones where the conditions under which the species are found naturally vary so much. Seasons, again, exercise a considerable influence upon all plants, and particularly upon those belonging to the sections with which we are now dealing. Take the Lilies, for instance. Some seasons certain species will grow away and flower like weeds; the next they will miserably fail, though treated similarly. The exact cause remains inexplicable, but that such failure alternates with success is the experience of everyone who has tried his hand at Lily culture.

In the matter of propagation, likewise, of both bulbs and tubers, the methods vary not only with different families, but also with individual members of the same family, and here again no hard-and-fast line can be laid down. Each genus, therefore, of either section will be taken alphabetically, and its peculiarities pointed out as far as space will admit. Many bulbous and tuberous plants are extremely impatient of disturbance, while others are best taken up as soon as mature, and stored away until planting time again comes round.

The general method of increasing these popular hardy bulbs and tubers is by offsets, which in many cases are freely produced, and this with amateurs is by far the most satisfactory one. Seed-sowing is undoubtedly interesting, but the process is fraught with not a little difficulty, while the time occupied from the seedling to the flowering stage is so long (four to five years in some instances) as to weary all but actual growers for the trade. For all that, it is highly important that the cultivator should be made aware of the fact that this or that plant reproduces itself freely from seed. To cite an instance, the beautiful and graceful St. Bruno Lilies (*Anthericum*). These are very free in the matter of seed, and this constitutes one of their most useful characteristics when naturalised, as they should be, in grass. Fuller details will be found in the Chapter "On Propagation."

The proper time for planting bulbs and tubers is but imperfectly known, and it is this lack of knowledge which is

responsible for the majority of the failures recorded against them. Popularly it is supposed that so long as, say, the Dutch bulbs are in the soil before Christmas, this will suffice. Such is a great mistake. The time to plant is as soon as they are procurable. Narcissi are frequently left out of the soil far too long, with the result that instead of first making plenty of roots, they develop foliage, and flowers are conspicuous by their absence. August and September are the best months in which to plant Narcissi (including, of course, Daffodils); for though some kinds are accommodating enough to give a fair percentage of flowers if put in later, the way to ensure success is to plant early. And so it is with many other bulbs. Lilies deteriorate very quickly when left out of the soil, and failures innumerable are attributable to neglect of this important matter by the cultivator.

Where to plant bulbs and tubers is a matter dependent largely upon local circumstances. Some are best planted between other subjects which form, as it were, a kind of natural protection. Many of the choicer Lilies, for instance, might with advantage be interspersed between Rhododendrons, Roses, and the usual occupants of the shrubbery border, providing they are not actually under such. The first-named, in particular, are admirably adapted for associating with the taller-growing Lilies. Whole beds, again, might be devoted to the culture of bulbs and tubers, grouping, say, some of the Lilies in the centre, and then disposing others according to height gradations and colour variations until the actual edge is reached. Even this might very well consist of the choicest spring-flowering bulbs, which give a mass of colour early in the year, and then the foliage dies down. In the borders themselves, good clumps of bulbs are preferable to a few straggling lines. Beds which are likely to be utilised for the ordinary summer occupants are not the best places in which to grow spring bulbs, some of which it is necessary to lift before they are ripe, to the certain detriment of the floral display the succeeding season.

In parks and pleasure-grounds where the closely-shaven lawn is not considered the be-all and end-all of a well-kept garden, there is no more beautiful way of employing some of the most effective of bulbs and tubers than by naturalising. What, for example, has a more charming effect than the elegantly chequered purple Snake's Head (*Fritillaria Meleagris*), rearing its gracefully drooping bell-shaped head above the fresh green grass of spring. True, it is only a native plant; but what a gem! There

are several other members of the same family which are quite as hardy, quite as well adapted, and, if anything, even more effective; yet, how seldom do we see them. Potted up in a formal way, and used for the decoration of the greenhouse and conservatory, they are found in plenty, but that is all. Naturalised, what would give a more delightful effect than the smaller-growing Narcissi, the graceful Anthericums, the neat Snowdrops, the many-hued Crocuses, the bright Alliums and Grape Hyacinths, the distinct Cyclamens, with their characteristically pretty flowers and delicately-marked foliage, or the sweet little Winter Aconites, whose pretty flowers, surrounded by a light green collar, are the first to remind us that spring is at hand? How different this from the regular lines of bulbs and tubers all too frequently met with in gardens! The latter is restricted, hard, formal, and unnatural: the former free, simple, and decorative to a degree—Nature, in fact, unadulterated by Art. It is astonishing to think how slowly we progress with this delightful form of gardening. Even those whose gardens and means are unlimited are slow to adopt naturalisation; and yet these very people are the first to complain of bare patches under the shade of trees. There are bulbs and tubers in goodly variety that would flourish under trees, the flowers brightening up the landscape in spring, and the foliage imparting freshness when the trees themselves were verdant. One of the most useful of these subjects for planting under trees is *Cyclamen neapolitanum*, whose rosy-pink flowers in autumn are no less acceptable and decorative than is its silvery-marbled foliage at other seasons. *C. græcum* can be similarly recommended. Belonging also to the tuberous section are the exquisite Winter Aconite, that will thrive where little else will succeed, the distinctly beautiful *Anemone apennina*, and the native Lesser Celandine (*Ranunculus Ficaria*); while amongst bulbs that might be tried are our native Bluebell (*Scilla nutans*), the Spanish Scillas (*S. campanulata* and its varieties), and Solomon's Seal (*Polygonatum multiflorum*). Best of all for the purpose, however, because they will not only thrive under the densest shade, but are proof against the attacks of rats and rabbits, are: *Allium neapolitanum*, *Ornithogalum nutans*, *O. umbellatum*, and *Trillium* (Wood Hyacinth).

It has been urged as an objection to several of the best known spring-flowering bulbous subjects used for garden decoration, that they are bare of foliage at the time of

flowering. Granted that this is an objection; yet it is one which may readily be overcome by providing "carpet plants," as they are termed, which not only take off the naked appearance presented, but act as a protection to the bulbs, and prevent the flowers of the latter from being spoilt by rain splashes. In the rock garden this method of locating some of the choicer denizens, such as the pretty *Iris* species, which of late years have come to the front, has found great favour. Excellent for the purpose are such carpet plants as *Silene pendula*, the Mossy Saxifrages, the neat-growing evergreen Candy-tuft (*Iberis correcefolia*), the quick-growing, sweet-scented Thymes (*Thymus Serpyllum* and *T. Chamædryn lanuginosus*), and others.

PESTS, &C.—Hardy bulbs and tubers enjoy comparative immunity from insect and other pests, though of late years two or three fungoid diseases which are difficult to combat have put in an appearance. The worst is what is known as the Lily disease (*Polyactis cana*), which attacks several of the most popular species, grown alike for garden purposes and for market, but chiefly the pure white *Lilium candidum* (Madonna Lily). The

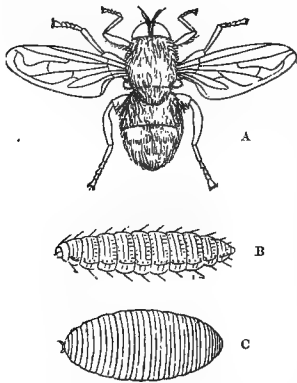


FIG. 183.—NARCISSUS FLY
IN ITS VARIOUS STAGES.

cultivator must therefore be careful to purchase his bulbs from a trustworthy source, and not to be led away by low prices. The grower is first made aware of the presence of the fungus by the foliage becoming spotted with rust, which in time spreads, until the expanded flowers and unopened buds are also attacked. The latter are quite disfigured by patches of brown. It is of little use trusting to Nature to repair the mischief, for frosts have not the slightest effect upon the sclerotia which carry on the cycle of life in the succeeding season. It is very important to take precautionary measures directly the disease is noted, as the spores are readily transmitted

by insect and other agencies, and a large area is quickly infected. Moreover, it is thought that a similar, if not actually the same, fungoid disease attacks the Tulip. All the dead foliage, flowers, &c., of plants known to be infected should be very carefully removed and burnt. Resting bulbs might be kept for a time in powdered sulphur, and very weak solutions of the Bordeaux Mixture might be sprayed on the plants as soon as the disease manifests itself.

Of insect pests one of the worst is the Narcissus fly (*Merodon Narcissi*), which destroys vast quantities of the bulbs. The presence of this creature may be readily noted at planting time by the softness of the bulb in which the maggot is feeding. The aldermanic grub remains in the bulb practically through the winter, when it changes into a pupa in the soil, and eventually emerges as a fly in April or May (Fig. 183, A, B, and C). The perfect insect has a very close resemblance to a bee, the blue-black body being banded with golden-yellow. By way of prevention, all soft bulbs should be carefully examined; any which show signs of premature decay and general deterioration should be marked, and if the maggot is found to be in them, say in August or September, they should be destroyed. Fig. 184 shows a bulb from which the maggot pupated in November.

Snowdrops, again, in certain seasons and in certain districts, are attacked by a very destructive fungus, *Polyactis galanthina*. The peculiarity of this disease is that there is little to warn the grower of the impending attack. The bulbs blossom and develop their foliage as if they were perfectly healthy. The next season, however, there is frequently not a single bulb to be found. Ground which has been infected should receive a dressing of fresh lime, well dug in. All diseased bulbs should also be burnt.



FIG. 184.—DISEASED NARCISSUS BULB,
DUE TO THE ATTACK OF NARCISSUS FLY.

Gladioli are popularly supposed to suffer decay from a fungus, but so far no one has been able to specify what. By Gladioli specialists, however, the decay is thought to arise from an error in treatment in not lifting the corms sufficiently early. And this certainly has been my own experience.

The above constitute the chief of the pests against which the grower of hardy bulbs and tubers has to contend, and it will at once be admitted that the list is not a very formidable one.

Rats, voles, and mice are very destructive in some gardens, the first-named more particularly where waterside planting is adopted.

Having dealt incidentally, at any rate, with the uses, cultivation, and pests of bulbs and tubers, there now remains the enumeration of those genera, species, and varieties which ought to be represented in our gardens. The task, though a somewhat invidious one, is by no means impossible. Perhaps it will be well to state that plants for forcing will not be dealt with here, as a special chapter is reserved for their consideration later on in the work. For room-decoration and window-boxes many of the plants under notice are amongst the best; while an additional list will be found in the "Appendix." A separate chapter has, however, been set apart for the treatment of these subjects.

AGAPANTHUS (African Lily).—A genus of stately liliaceous plants from South Africa, which are sufficiently hardy to withstand English winters, at any rate in the South and West, with a slight protection of straw or other light material during severe weather. The tubular, bell-shaped flowers are of various shades of blue or white, and are produced in large umbels. A deep, well-drained, light rich soil, enriched with well-decayed manure, suits them best. They may be used for the open border; or in large tubs to be disposed along the terraces and walks, or for planting by the sides of ornamental water, their noble appearance, deep green foliage, and striking flowers giving a most effective appearance. Plenty of water should be given in summer, and this supplemented by liquid manure when the flowers are forming. Increased by division in spring. The best kinds are the time-honoured *A. umbellatus*, *A. u. Mooreanus*,

and *A. u. maximus*. The tuberous roots may be lifted and stored much after the manner of Dahlias and Cannas. There are both deciduous and evergreen kinds.



FIG. 185.—ALLIUM MOLY.

ALLIUM. — Pretty and decorative bulbs belonging to the Onion family, and inheriting the evil smell characteristic thereof. They are easily cultivated, and will thrive almost anywhere. For naturalising they are excellent, but they impart bright colour to and furnish flowers in the borders in early summer. They are increased by offsets in autumn, or by seed

sown in spring. To be recommended are : *A. Moly* (Fig. 185), yellow, early summer ; *A. neapolitanum*, white, with green stamens, early summer, although immense quantities of flowers are upon the markets early in the year, the species forcing well ; *A. azureum*, deep blue ; *A. pedemontanum* (syn. *A. narcissiflorum*), mauve, drooping, bell-shaped ; *A. triquetrum*, white ; *A. Ostrowskianum*, rose-crimson ; and *A. flavum*, yellow. For naturalising, the best kinds are *A. Moly* and *A. neapolitanum*.

ALSTRÖMERIA (Herb Lily ; Peruvian Lily).—A genus whose hardiness has been much discussed, but whose distinctness and beauty are undeniable. There can be little doubt about the hardiness of the majority of species classed as such by nurserymen. The secret of their culture lies in the planting and position. A mere covering of the bulbs spells disaster: success is assured by planting from the middle to the end of October, at a depth of from 6in. to 8in. in a sunny border. This is one of the genera of plants which are impatient of disturbance, and once planted the bulbs should not be touched for several years, as they do not attain their full beauty until after the second or third year.

Alströmerias are essentially plants for the border, and noteworthy species are: *A. aurantiaca*, rich orange, spotted with red—one of the best and hardiest ; *A. chilensis*, varying from orange to deep red ; *A. pelegrina* (Fig. 186), yellowish-white ; and *A. psittacina*, deep red, with green splashes. For providing cut material, these plants are most useful, the flowers remaining good over a long period. Height 2ft. to 3ft. They are not fastidious as to soil, but require plenty of water when growing, and a summer mulching is beneficial. Readily grown from seed sown as soon as ripe either in pots or in a prepared border.



FIG. 186.—ALSTRÖMERIA PELEGRINA.

AMARYLLIS (Belladonna Lily).—Though not as hardy as the majority of subjects which should be given a place in those portions of the garden to be devoted to bulbs and tubers, this is sufficiently so to warrant its being included. There can be no doubt as to its handsome appearance, nor yet again as to its value, seeing that it flowers in late autumn, maturing its foliage

in the spring of the following year. Many plants are catalogued as *Amaryllis*, but these, as a rule, belong to different genera, requiring glasshouse treatment—*Hippeastrums*, *Sprekelias*, &c. A position where these bulbs will get plenty of sunshine is one of the requirements in connection with their culture which must be fulfilled; others are a sandy soil, in which there is plenty of loam, and deep planting. Far too many amateurs plant the bulbs too shallow, with the result that they succumb to frost. A south border under a wall, or even under the shelter of a glass structure, where sun can reach, will suit them well, providing the

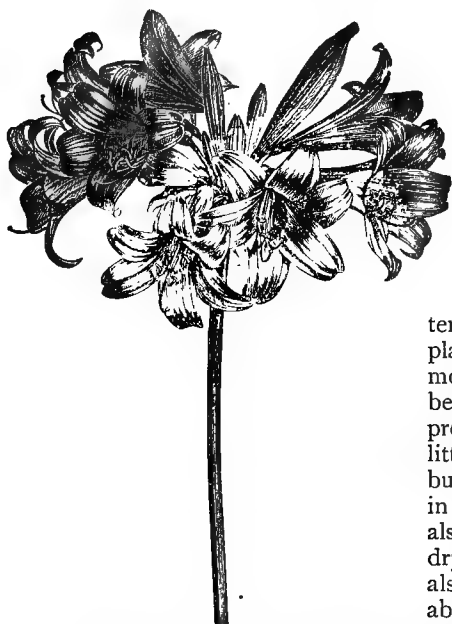


FIG. 187.—*AMARYLLIS BELLADONNA KEWENSIS*.

bulbs are inserted 6in. to 9in. deep. The drainage material must be ample, and 3in. or 4in. of broken bricks at the bottom of the quarters prepared for the reception of the plants will be calculated to keep the bulbs from rotting, as they ought not to be disturbed very frequently—once in four years will be often enough. September is the best month to plant, and a mulching of leaf-mould will afterwards be found beneficial. As an additional precautionary measure, light litter may be strewn over the bulbs in winter. Liquid manure in summer will be helpful, as also will plenty of water in a dry season. These Lilies may also be grown in pots. Height about 2ft. The typical *A. Belladonna* is a delicate pink, and there are other coloured varieties, though none that surpass it for utility; it is, moreover, delicately fragrant, thereby adding another charm. *A. B. kewensis* (Fig. 187) is superior in size and colour to the type.

ANEMONE (Windflower).—Few genera will compare with this for chaste beauty, variety of colour, or earliness of flowers. Indeed, to it belong some of the choicest gems for border, rockery, or naturalising, putting forth as they do their elegant blossoms at a time when the garden is singularly bare of floral subjects. One is often puzzled to know what to plant under

the requirements in connection with their culture which must be fulfilled; others are a sandy soil, in which there is plenty of loam, and deep planting. Far too many amateurs plant the bulbs too shallow, with the result that they succumb to frost. A south border under a wall, or even under the shelter of a glass structure, where sun can reach, will suit them well, providing the

bulbs are inserted 6in. to 9in. deep. The drainage material must be ample, and 3in. or 4in. of broken bricks at the bottom of the quarters prepared for the reception of the plants will be calculated to keep the bulbs from rotting, as they ought not to be disturbed very frequently—once in four years will be often enough. Sep-

the shade of trees. In *A. apennina* the gardener has a most useful subject, and one whose accommodating nature is not sufficiently well known; it is perfectly at home, too, in the wild garden or in the trim-kept, shady border, its bright blue flowers lighting up the dullest of surroundings. This is but one of several species which ought not to be omitted. Readily increased by division in autumn.

Earlier than *A. apennina*, but approaching it in colouring, is *A. blanda*. By affording it a choice site, such as a sunny bank or a rockery, it will give of its best, and, what is more, produce flowers over a very long period. Planted beneath Roses in the border, it has a pretty effect. Increased readily by division, though, like most of the species, it can be quite easily grown from seed. This species will be found most accommodating as to soil, for even in cold, heavy soil it will flourish.

In the Poppy Anemones, which have been evolved from the old *A. coronaria*, the gardener has a delightful class of plant, but one which does best in warmer soils than is the case with the last-mentioned species. The season of flowering, too, may be prolonged almost indefinitely by planting, as is frequently done, for both an autumn and a spring display. These Anemones are found both Single and Double (Fig. 188), and in a variety of colours—rich blues, dazzling scarlets, delicate pinks, snow-whites, and also in flakes. The Singles should be grown from seed sown in June, either in the prepared border or in boxes of fine soil, pricking out the plants in autumn where they are to blossom. These Poppy Anemones are children of the sun, hiding their beauty from the common gaze during dull weather, but quickly opening under solar influence. The Doubles are propagated by division in autumn or in spring, though the first-named season is the better. Named varieties there are in abundance, Chapeau de Cardinal, Snowball, and Bluebeard all being excellent in Doubles, while in Singles the Victoria Giant and The Bride are sure to give



FIG. 188.—ANEMONE CORONARIA.



FIG. 189.—ANEMONE PALMATA.

The strain of Poppy Anemones popularly described as St. Brid rank among the finest forms of this delightful section. The flowers are large, semi-double, and of rich and varied hues. These are readily grown from either seeds or roots. Worthy, too, of note, are the Chrysanthemum-flowered varieties.

In growing Anemones from seed the ground must be made firm previous to sowing the seed. Select a time when the soil is in a nice friable condition, scatter the seed, then lightly cover with sand, and treat as previously advised. When the seedlings are about 2in. high, prick them out where they are to flower.

The secret of successful culture of *A. coronaria* and its varieties, as well as of some others, is to provide them with

satisfaction. Some good mixtures, suitable for those of limited means, are also procurable from nurserymen. These Poppy Anemones, as all the other kinds, like a rich diet. The seed is somewhat difficult to separate, the best way being to sprinkle it with fine earth. It should be lightly scattered, very lightly covered with soil, and sheets of paper or mats placed over it to prevent undue evaporation. Germination will quickly commence, and the seedlings appear, when the mats should be discarded, and gentle sprinklings given. Growth will be fairly rapid, and the young plants will blossom early in the next season.

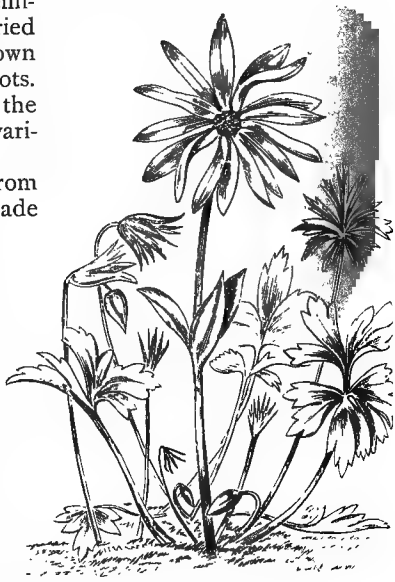


FIG. 190.—ANEMONE STELLATA.

quarters in which they will be sheltered from cutting ground winds. This is *absolutely* necessary. Late planting of the roots is also advisable, December and January being preferable to September and October, especially if the ground be open. If got in at the latter period they often make top growth in a few weeks, and if it once gets injured by winds this is fatal to the chances of flowering in spring.

There are several other spring-flowering kinds deserving of mention, amongst which are *A. palmata* (Fig. 189), yellow; *A. nemorosa Robinsoniana*, a blue variety of the common Wood Anemone; *A. ranunculoides*, yellow; and *A. stellata* (Fig. 190), in a variety of colours.

ANOMATHECA.—Though oftener grown in pots for the greenhouse or window garden, *A. cruenta* is hardy enough for outside cultivation. It is a native of South Africa, and attains a height of about 1ft. A light, sandy soil, a warm raised border or rockery, and deep planting, compared with the size of the bulbs, constitute the chief requirements of this pretty member of the Iris family. The flowers are small but of a brilliant scarlet, and the leaves are graceful and grass-like. There is a recently-introduced species in *A. grandiflora*, with larger flowers. The genus is sunk by modern botanists in *Lapeyrousia*. Readily increased by offsets in spring, or by seeds, which ripen freely.



FIG. 191.—ANTHERICUM LILIASTRUM.

ANTHERICUM (Phalangium).—Quite amongst the first rank of hardy bulbous flowers are the St. Bruno and St. Bernard Lilies (*A. Liliastrum* and *A. Liliago*), and they are fast becoming popular for borders or for associating with other graceful plants, like some of the Irises, in a mixed bed; while they also show to advantage when naturalised. The blossoms of the two species named, which are the commonest of those met with, are white. *A. Liliastrum* has flowers resembling small Lilies (Fig. 191); while *A. Liliago* has small star-shaped flowers. There is a yellow-

flowered plant in cultivation, usually classed as an *Anthericum*—*Hookeri*. It should, however, be relegated to a separate genus, *Bulbinella*. Most graceful foliage characterises the plants, which produce their flowers in early summer, the spikes being from 1ft. to 2½ft. long in the case of the large form of *A. Liliastrum*. Though usually found in trade catalogues under the names here adopted, *A. Liliastrum* is more correctly described as *Paradisea Liliastrum*. Increased either by division in autumn or by seeds. *A. ramosum* is a most graceful species, with white flowers. It should be included where space can be spared.

BABIANAS.—Undeniably beautiful though these are, they are too tender to be grown outside, except in very favoured spots and under very favourable conditions, such as a sunny south border, and a light, loamy, well-drained soil. The flowers are bright as to colour, and Ixia-like in form (Fig. 192). December is the best month to plant, covering the ground well with light litter to protect the foliage from frosts; it should be removed in spring. The bulbs should be planted some 3in. or 4in. deep.



FIG 192.—BABIANA.

BESSERA.—*B. elegans*, a pretty little Mexican bulb, is sometimes successfully cultivated outside when conditions similar to those named under *Babiana* obtain. It cannot, however, be classed as truly hardy. The flowers are scarlet, and in drooping umbels, and the foliage is graceful.

BLOOMERIA.—Here again we have one of those choice bulbous subjects whose culture may be attempted where conditions similar to those recommended for *Brodiaea* obtain.

The species *B. aurea* is yellow with a brown stripe, and the flowers are produced in umbels in summer.

BRAVOA.—Another plant for a sheltered border, and a light, warm soil, is *B. geminiflora*. It is a bright little subject, with drooping racemes of scarlet tubular flowers borne on spikes 2ft. high. Increased by offsets in autumn.

BREVOORTIA COCCINEA (Fig. 193) is the plant usually cultivated as a *Brodiaea*, and is one of the most graceful and striking of such plants. The tubular flowers are scarlet, tipped with green, and are produced on very thin wiry stalks, 2ft. or more high. For culture, see *Brodiaea*.

BRODIAEA.—To America we are indebted for this most beautiful family of liliaceous plants, which until a few years ago were practically unknown in the hardy garden. The genus is a somewhat confused one—at least, by amateurs—and those in search of the plants will find them catalogued as well under *Milla*, *Triteleia*, *Bloomeria*, &c., while several of the plants best known to gardeners under the name of Brodiaeas are now allocated to other genera. Two of the best examples of these latter may be found in *Brodiaea coccinea* (now *Brevoortia coccinea*) and the remarkable plant *Brodiaea volubilis* (now *Stropholirion volubilis*). Mr. J. G. Baker, in 1896, issued an excellent monograph of the genus in the *Gardener's Chronicle*, and all who are botanically interested would do well to consult it.

Brodiaeas are quite hardy if but intelligently treated, and the marvel is that such gems for the border or choice rockery should have escaped notice so long. A south border (raised) and a light sandy soil are their chief requirements. Planting should be done in October or early in November, and the bulbs need not be disturbed except for removing the offsets, which are freely produced. A dozen bulbs in a group will prove very effective. In height Brodiaeas range from 1ft. to 2ft. on the average, the colours varying considerably. There is one slight drawback to the plants, or, rather, to some species, and this is that the foliage is frequently shabby before the flowers are at their best. Gardeners, however, get over this by carpeting the spot with a later-flowering compact annual. For pot-plants, Brodiaeas have few superiors. Some of the best kinds are *B. Howelli lilacina*, soft blue, tipped with white; *B. grandiflora*, rich violet-blue, dwarf-growing, very free; *B. congesta*, purplish-blue, lasting a long time in perfection, 2ft.; *B. laxa* (*Milla laxa*, *Triteleia laxa*), variable as to colour, from rich violet to purplish-blue; *B. Howelli*, white, 2ft.; *B. Hendersoni*, yellow; *B. Douglasi*, bright blue, 2ft.; *B. Orcutti*, light blue, and one of the latest to flower, 1ft.; *B. ixioides* (*Calliprora lutea*), bright yellow with green bands, and the superior form of it known as *erecta*, which is of more compact habit and has erect flowers.



FIG. 193.—BREVOORTIA COCCINEA.

BULBOCODIUM VERNUM (Fig. 194) is a gem amongst spring flowers, whether used in the border or on the rockery, appearing, as it does, with the earliest of bulbous plants. The flowers are rosy-purple, and resemble somewhat those of Crocuses. The

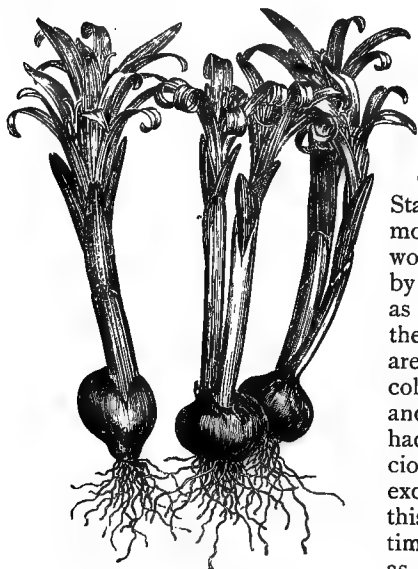


FIG. 194.—*BULBOCODIUM VERNUM*.

leaves are produced with the flowers, and are lance-shaped. Early planting is desirable, and August will be found a good time for either dividing up the bulbs or making new plantations.

CALOCHORTUS (Mariposa Lily; Star Tulip).—These are uncommonly beautiful bulbous plants, worthy of the widest recognition by the hardy plant lover, so long as he can provide the conditions their culture entails. The flowers are of immense size, exquisitely coloured, blotched, or pencilled, and they are, moreover, to be had over a long season by a judicious selection. Few orchids can excel in beauty the members of this little-known genus. At one time these bulbs were regarded as too tender for outside cultivation, but their exact requirements now being understood, they can be as successfully cultivated as many

of the commoner things which are now given a place. For the best results a raised border should be made, the soil being composed mainly of leaf-mould and sand. The site should be a sunny one. Planting should be done in the autumn, and the bulbs lifted as soon as the stems decay, and well ripened each season. They may be propagated by offsets or by seeds. The latter require to be sown in well-drained pans, thinning them out as required, when they may be expected to blossom in about three years. Though some of the kinds will weather the winter without protection, it is best to cover the beds with light litter, removing the same in spring.

The genus also includes the *Cyclobothras*, which differ from the *Calochorti* in having drooping, closed flowers. The plants vary in height from a few inches to 2ft. or 3ft. The smallest, like *C. Benthami*, canary yellow; *C. albus*, white; *C. lilacinus*, purple; *C. Maweanus*, white; and *C. cœruleus*, pure white, with bluish hairs, are well suited for the rockery. They are also the earliest to flower. Later come the Mariposa Lilies, which may

well be represented by any or all of the *C. venustus* forms (Fig. 195), but especially by *citrinus* and *oculatus*; *C. luteus Weedii*, orange-yellow, and var. *concolor*, rich yellow;



FIG. 195.—CALOCHORTUS VENUSTUS.

C. Nuttallii, white, with black eye; *C. Kennedyi*, scarlet; *C. Plummeri*, soft lilac; *C. clavatus*, bright golden-yellow; and *C. Gunisoni*, white, with greenish zone.

CAMASSIA ESCULENTA (Fig. 196) is the only popular member of the genus in the hardy bulb garden, though *C. Cusickii* promises to become so when better known. The plants grow from 1½ ft. to 2 ft. high, and are suitable either for the flower border or for naturalising. Propagated by offsets in autumn; but the bulbs dislike frequent disturbance. *C. esculenta* (Quamash) is a liliaceous plant with bright blue flowers produced during summer. It likes a partially shaded position in a fairly rich soil, though it may also be grown in the ordinary border.

CHIONODOXA.—In this genus we have spring-flowering bulbs of the highest order of merit, of the brightest as regards colouring, of the hardiest constitution, and of the easiest culture. Planted in bold groups in the border or bed they are very effective; and



FIG. 196.—CAMASSIA ESCULENTA.

associated on the rockery with some of the early Narcissi, like *N. minimus*, they are not likely to be forgotten. For naturalising these bulbs are eminently suitable. To frosts they are not in the least susceptible; while they withstand wet weather better than most spring-flowering subjects.

They should be planted in autumn about 2 in. deep; they increase very rapidly. *C. Lucilia* (Snow Glory) is a lovely kind, with deep blue flowers having a white centre; *C. grandiflora* (*C. gigantea*) is a larger form of the same species, and a little later flowering; while *C. sardensis* is another variety bearing deep blue flowers.

CHRISTMAS ROSE.—See *Helleborus*.

COLCHICUM (Meadow Saffron).—The members of this genus are chiefly autumnal flowering, though one or two, like *C. montanum*, blossom in spring. The genus is not well represented in gardens, because of the somewhat ephemeral flowers and the bare appearance presented due to the foliage being produced at another season. Though suitable for borders and rockeries, they are best naturalised, as the grass then forms a fitting carpet. Even when utilised for beds or borders, a carpet of greenery should be provided in the form of some of the smaller Saxifrages, Aubrietias, Thymes, &c. Planting should be done as soon as the bulbs arrive, and they should not be often disturbed. A sunny position and a sandy soil are what



FIG. 197.—COLCHICUM SPECIOSUM.

they delight in, though they will thrive in almost any ordinary flower-border.

Of the autumn kinds the best and most distinct are *C. speciosum* (Fig. 197), rosy-purple; *C. Parkinsoni*, violet-purple, elegantly chequered; *C. byzantinum*, rose-pink; and *C. autumnale album plenum*, with its large, showy, double white flowers. *C. montanum* has already been alluded to as the best of the spring-flowering kinds, but *C. crociflorum* might be named as a fitting companion. The former varies from pink to whitish, and the latter is white, with delicate violet-purple lines. Then there is *C. luteum*, yellow.

CONVALLARIA MAJALIS (Lily of the Valley) needs no recommendation or description. A warm, partially-shaded border, and some good turfy loam, are what the crowns delight in, with plenty of moisture in the growing season, aided by weak manure-water occasionally. Drought is to be guarded against, and this may best be done by mulching the crowns at planting time with thoroughly rotten manure. Autumn is the best time to plant, and little else will be needed except to see that the crowns do not become too crowded, or weakly flower-spikes will be sure to result. In large gardens, where a good supply of the flowers is required, the crowns may be inserted in different positions, some in north, others in south borders. Besides the ordinary variety there is a splendid form in Fortin's (Fig. 198), while there is another having striped foliage, but this is its only recommendation. It cannot be too widely known that Lilies of the Valley flower only on three-year-old crowns. There is no necessity to refer to the value of the Lily of the Valley as a pot-plant.



FIG. 198.—FORTIN'S LILY OF THE VALLEY.

CRINUM.—Several species belonging to this genus are hardy in a sandy, well-drained soil and a warm position. The bulbs *must*, however, be deeply planted, 1ft. being none too much. The middle of May is the best time for this. The after-attention consists in affording plenty of moisture, and in giving some weak manure-water when the spikes are pushing. *C. capense* (properly *longifolium*) and its varieties are the best for outside culture; but *C. Powellii alba* (white) and *C. Moorei*, with handsome

blush-rose flowers, may likewise be planted under the wall of a stove or a greenhouse. These plants remind one of the *Hippeastrums* as regards their flowers, which are of large size, and delicately fragrant. Increased by seeds, or by offsets removed from the parent plant and potted up.

CROCOSMIA AUREA, better known, perhaps, as *Tritonia aurea*, is a most useful plant for a warm border and a light, rich soil. The graceful flowers are *Gladiolus*-like in form, and are highly prized for cutting. The chief value of this plant lies in the season at which it flowers—autumn. In the South and West of England the bulbs need not be lifted if assigned the position advocated; and even where lifting is adopted, they are best potted up direct from the soil before winter frosts appear,

replanting them in May.

The plants are from 2ft. to 3ft. high, and several bulbs should be planted in a group, allowing 3in. to 4in. between each. Besides the type named, which is orange-red, there are in *imperialis* and *maculata* two well-marked varieties worth cultivating.



FIG. 199.—*CROCUS SPECTOSUS*.

CROCUS. — For utility, ease of culture, or for bright colours, *Crocuses*, whether autumn- or spring-flowering, are hardly to be surpassed, and whatever method of planting is adopted, they are sure to give satisfaction. Next to naturalising them, there is no better way of utilising

Crocuses than as edgings

to borders. Massed, they of course look well; but then they have to be lifted, which is not best calculated to secure good results another season, unless great care is taken. They dislike a heavy, damp soil, and being disturbed. Only when the bulbs show signs of deteriorating should they be lifted. September or October is the time to plant the spring kinds, and though the bulbs are sufficiently accommodating to flower if inserted later, it is not desirable. *Crocuses* may be grown to flower earlier by potting them up or even by placing them in saucers filled with Jadoo Fibre, a substance which for indoor work has much to recommend it. When

grown in the open the amateur must guard against two things: the ravages of the sparrows, which may be prevented by stretching *black* cotton across their quarters, and the removal of the foliage before it is ripe. There is a great temptation to do so on account of its unsightly appearance, as there is to twist it into a knot for a similar reason. Both are, however, fatal to success another season. Crocuses generally are increased by offsets, and some few produce seed freely. When this is the case it should be sown as soon as ripe. Deep planting is not good for Crocuses. The best results are obtained when the bulbs are just covered with soil.

Of spring-flowering species and varieties the following may be recommended: *C. Imperati*, lilac, variable; *C. Olivieri*, orange; *C. Sieberi*, pale violet, with orange base; *C. susianus* (Cloth of Gold); *C. obesus*, purple; and several others. There are also, of course, the numerous varieties descended from the well-known *C. vernus*; while mention should also be made of the lovely *C. biflorus*, a winter or early spring kind, whose outer petals are white, striped, and the inner ones pure white.

In the autumn-flowering section, which should be got into the soil as soon as on the market, are several gems, but none more effective than *C. speciosus*, whose fine purple flowers, with rich yellow stamens, are seen to best advantage when naturalised, or when grown upon the rockery (Fig. 199); *C. medius*, purple; *C. zonatus*, lilac, with yellow base; and *C. iridiflorus* (*C. byzantinus*, Fig. 200), purple and lilac. There are, moreover, a number of other species and varieties which flower in mid-winter, but most of these are best grown under the protection of a frame. Exceptions are *C. chrysanthus* and its varieties; and *C. Tommasinianus*, a profuse blossomer, and very hardy. In colour this latter is a combination of silvery-grey and pale blue, and it is one of those kinds which no gardener should overlook. See also "Appendix."

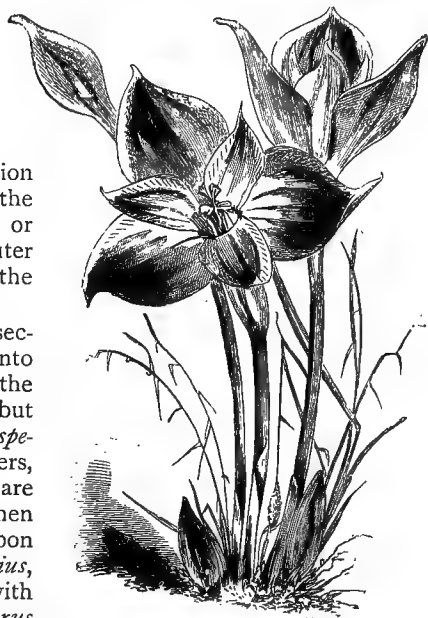


FIG. 200.—CROCUS IRIDIFLORUS
(*C. BYZANTINUS*).

CYCLAMEN (Sowbread).—Though neither a bulb nor a tuber in the strict sense of those terms, it is so generally classed by trade growers, that facility of reference at least will be best served by mentioning it here. The really hardy kinds are few in number, but what they lack in this respect they make up for in utility and decorative value. They are more particularly useful for growing under the shade of trees, where little else save Ivy would live for more than a season. Yet *C. neapolitanum* in such a place will yield its white and lilac-tinted flowers in profusion, these being succeeded by marbled leaves quite as decorative. For woodlands, again, for rockeries, or for shady banks, they are equally well suited. *C. Coum* (Fig. 201) and its several varieties; *C. hederæfolium*,

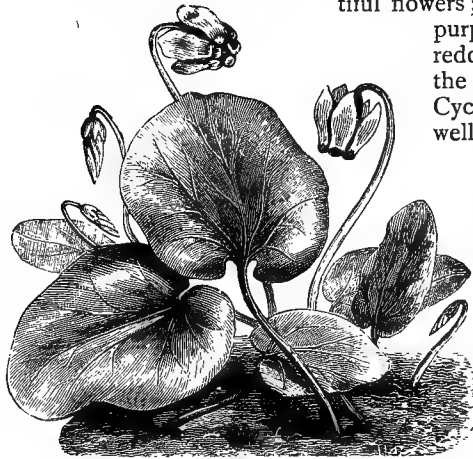


FIG. 201.—CYCLAMEN COUM.

which has scented as well as beautiful flowers; *C. vernalum*, white and purple; and *C. europæum*, reddish-purple, are some of the best. All the hardy Cyclamens grow freely in well-drained, rich peaty, or

loamy soils, and the majority delight in partial shade. Cyclamens are lime-loving plants; so that when preparing a soil it will be advisable to mix up with it some old mortar rubbish in liberal proportions. They dislike ground winds, and this is why they thrive so well in sheltered positions

under trees. Hardy Cyclamens blossom at all seasons—*C. Coum* and its varieties in winter and early spring; *C. vernalum* in spring; *C. europæum* in summer; and *C. hederæfolium* in autumn. The corms should be planted very shallow in late summer. Increased freely by seed sown in pans in a cold frame in late autumn.

ERANTHIS HYEMALIS (Winter Aconite).—This monotypic genus is one of the most useful in the whole range of hardy bulbs and tubers, for the flowers sometimes appear in the very depth of winter, and will flourish amidst surroundings—smoke and tree-shade—absolutely fatal to plant-life generally. A glance at the illustration (Fig. 202) will be sufficient to show that it belongs to the Buttercup family. The plant is but 3in. high, of a bright

yellow, set off with a collar of intense green. A warm soil suits it best, though for a time, at any rate, it will flourish in a cold one.



FIG. 202.—*ERANTHIS HYEMALIS*.

It is the best of all flowering subjects for growing beneath shady trees, and should be freely employed, as a perfect carpet of gold will soon be formed. Though when naturalised it looks most effective, yet, flowering as early as it does, it cannot be despised even as a border plant. The tubers should be planted in autumn. Increased by division in late summer.

EREMURUS.—The merits of the plants belonging to this genus are slowly being recognised by gardeners. There is, however, one great drawback to their ever being very popular, and that is the liability of the foliage to be discoloured by spring frosts and east winds. The brownness

is more noticeable in plants which are placed where the early morning sun shines full upon them, and for this reason a north-west aspect has been advocated. Eremuri are noble plants, and if a well-drained, rich, loamy soil and a position sheltered from high winds can be assigned them, they will flourish. To see them at their best, they should be backed by a wealth of greenery. Autumn is the time to plant, and the roots should not be disturbed. The species best known to cultivation are: *E. robustus*, rosy-peach, 6ft. to 9ft.; *E. himalaicus*, white, with golden anthers, 5ft. to 8ft.; and *E. Bungei*, yellow, 2½ft. All flower in summer.



FIG. 203.—*ERYTHRONIUM DENS-CANIS*.

ERYTHRONIUM (Dog's-tooth Violet). — Of late years many additions have been made to this genus, which now furnishes some of the most useful of spring-flowering plants. The varieties of *E. dens-canis* are well adapted for the edges of borders or shrubberies, or for naturalising. The flowers of all are strikingly Cyclamen-like, and are purple, lilac, yellow, pink, and white in colour; while the foliage of some species is elegantly mottled. Erythrונים range between 6in. and 9in. in height. A shady site amongst the grass is an ideal spot for them, while in the border, in choice corners of the rock garden, mixed with Mossy Saxifrages, or under the shade of shrubs, in a good loam, they will blossom freely. Propagated by division in late summer.

Species and varieties worth growing are the common *E. dens-canis* (Fig. 202), rosy-purple; *E. Hartwegi*, light yellow, very early; *E. grandiflorum*, bright yellow; *E. revolutum* (*Hendersoni*), light purple, mottled foliage; *E. Nuttallianum*, deep yellow; and *E. Johnstoni*, pink, with yellow base.



FIG. 204.—FRITILLARIA MELEAGRIS.

FRITILLARIA (Fritillary). — Distinctly interesting are all the hardy members of this genus which have been introduced to cultivation. In few gardens, however, except cottagers', is the genus represented, and there usually by the more stately

Crown Imperial (*F. imperialis*). They are essentially bulbs for the hardy plant lover, as they thrive without any special attention. For the shrubbery, the border, for naturalising, as well as for the rockery, there are species that may be profitably utilised, our native Snake's Head (*F. Meleagris*, Fig. 204) being one of them. Though this has not gorgeous colours to attract attention, yet its grace and refined beauty are sure to enlist admirers, as those who have seen it in the fields around Oxford can testify. Any well-drained soil will grow these bulbs, which should be planted in autumn, and allowed to remain undisturbed until signs of deterioration are evident. Propagated by seeds and by offsets.

The Crown Imperial, with its whorl of nodding flowers, surmounted by a tuft of foliage, is best placed among the choicer shrubs. The colours vary, but are chiefly yellow or red. Far more graceful, however, are such species as *F. aurea*, pale yellow, drooping, 4in. to 5in.; *F. latifolia* and *F. Meleagris*, in a variety of colours, 1ft.; *F. pudica*, deep yellow, drooping, 6in.; and *F. recurva*, orange-scarlet, 1ft., one of the best, though not as robust as some. All the above-named flower from early to late spring, and should be planted in fair-sized groups when utilised in the beds or borders. *F. recurva* needs to be planted in almost pure sand. Fritillarias make excellent pot subjects.

FUNKIA (Plantain Lily).—Foliage rather than flower recommends these to the notice of the hardy plant lover. They are shade-loving subjects, and in such positions their foliage assumes a greater size, as well as being of a better colour. All the hardy kinds can be



FIG. 205.—FUNKIA SIEBOLDIANA.

used with good effect in shrubberies, as lawn plants, or when naturalised in woodlands: *F. Sieboldiana* (Fig. 205) is often used for the last-named purpose; it also makes a bold, permanent edging. A good deep loam will grow any of the Funkias, which may be propagated by division in autumn or spring. Besides *F. Sieboldiana* and its varieties, *F. ovata aureo-variegata* and *F. undulata* can be recommended for outside culture.

Funkias make capital pot-plants, especially *F. subcordata grandiflora*, with its pure white sweetly-scented flowers.

GALANTHUS (Snowdrop).—Another genus of bulbous plants requiring no recommendation. The Snowdrop has graced our gardens from time immemorial, and though an interchange of commerce is continually presenting us with new forms, all are welcome, even if they do oust from favour some of the species and varieties which were known to an older generation. Snowdrops are so generally associated with spring, that it may not be out of place to refer to the fact that there are autumn kinds.

Most of the Snowdrops will succeed practically anywhere, though a rich, somewhat gritty loam is the best all round. In such a variety of ways may the neat little blossoms be utilised for the decoration of gardens, that it is difficult to call to mind any other bulbous subject of similar size that is so widely appreciated. Associated with Scillas and Chionodoxas in the open border, or with the Iris gems like *reticulata* and many another upon the rockery, they perhaps stand out to the greatest advantage; utilised, however, on grassy banks, under the shade of

trees, they appeal strongest to the true lover of nature. Snowdrops grow best where disturbed least. They should be planted in September, but should it be necessary from any cause to shift them, this may be done after the leaves have died down, or after flowering, and while the foliage is still green. Indeed, as the bulbs are small, the latter plan is preferable for the amateur to adopt.

Of the kinds best known to cultivation there are the various forms of *G. nivalis*, *G. Imperati*, *G. plicatus*, *G. Elwesii*, and the new *G. Ikaria*, which has been grown so successfully at Kew and elsewhere. The Snowdrop is also very pretty when grown as a pot plant for the window, or for the cool conservatory. It will not stand much forcing. Those who wish to experiment may grow the Snowdrop from seed; but for the



FIG. 206.—*GALTONIA CANDICANS*.

general gardener the method cannot be advocated, and he should increase his stock by means of offsets.

GALTONIA CANDICANS (*Hyacinthus candicans*) (Fig. 206) is a most decorative subject if a warm border can be found for it. The

plant is not often met with, though why it is difficult to understand, seeing how effective it is in the mixed border, and how readily it grows. The fragrant flowers are pure white and bell-shaped, and are produced on stems 4ft. or 5ft. high. The bulbs should be planted in autumn, at which season, too, the plants may be increased by offsets. They are impatient of frequent disturbance.

GLADIOLUS (Corn Flag).—Reference has already been made under "Florists' Flowers" to the chief sections of this popular genus. There remains, therefore, but the species to be dealt with here. None of these are very popular, and are seldom met with outside large collections. They are not subjects for the average gardener to take in hand, as the culture of the majority entails considerable trouble and not a little skill to grow them in the outdoor garden, though they make pretty pot-plants. There are a few kinds which stand out prominently, and which may well be taken in hand by the hardy plant lover: *G. Saundersi*, rich scarlet, blotched white; *G. psittacinus*, greenish, with purple streaks; *G. Colvillei*, bright red, and the white form, *alba*; and *G. purpureo-auratus*, deep yellow, with purple blotch, are of them. All require a sunny aspect and shelter from cutting winds, as the growth is made early. They are, moreover, best accommodated on a raised bed or border, and covered with light litter, like heather, until spring, except *G. Saundersi* and *G. purpureo-auratus*. The kinds enumerated should be planted in November or December, and lifted annually except in very favoured spots and soils. The species



FIG. 207.—HELLEBORUS NIGER ALTI-FOLIUS.

excepted should be inserted in spring; 4in. to 6in. will be a good depth to plant the corms. See also "Florists' Flowers," Chapter III.

HELLEBORUS (Christmas Rose; Lenten Rose).—A time-honoured inhabitant of our gardens is *H. niger* and its varieties

(known as Christmas Roses). Their chief value lies in the fact that they are white, and if carefully managed will be in perfection in mid-winter. To have them in the best of condition it is necessary to cover with a bell-glass, or the blossoms soon get spoilt by dashing rains.

Christmas Roses blossom very early. The first to show flower is *H. niger maximus* in November; this is followed by *H. n. altifolius* (Madame Fourcade, Fig. 207) in January; and lastly by the type *H. niger*.

Equally deserving of praise are the Lenten Roses (*H. orientalis*), whose flowers embrace all the shades of rose and purple, as well as white and cream. Many, too, are exquisitely spotted. No hardy plants are more valuable than these, giving as they do of their best in February—a season of the year when outside blossoms are scarce. Other good kinds are *H. guttatus*, *H. colchicus*, *H. punctatus*, *H. abchasicus*, *H. viridis*, and Gertrude Jekyll.

Hellebores will thrive in most garden soils, but they require partial shade, a west or north-west aspect, and a fairly stiff loam.

During summer they require either to be well watered or to be heavily mulched. If this important detail be neglected the crop of blossoms is poor. They are propagated by division, which is best performed soon after flowering has ceased. April is a good month to take the Lenten Rose section in hand.



FIG. 208.—HEMEROCALLIS AURANTIACA MAJOR.

tions, they are valuable to a degree. The only thing that can be urged against them is that the individual flowers are fugitive; but the plants are so floriferous that this is not noticed. In the mixed border or in the shrubbery they are equally at

HEMEROCALLIS
(Day Lily).—These hardy plants of the Lily family are worth attention: as they will grow in almost any soil, and under almost any condi-

home, and they may be planted in autumn or early spring. The flowers are yellow, of different shades, many are fragrant, and all are produced in summer.

All the Day Lilies are valuable for cutting, especially the following: *H. flava*, fragrant, early flowering; *H. Thunbergi*, sweet-scented, late flowering; *H. Dumortieri*, dwarf, very free; *H. disticha flore pleno*; and the new *H. aurantiaca major* (Fig. 208). These plants are excellent for hot, dry, poor soils, although they will thrive almost anywhere. Propagated by division in late autumn, but the clumps are better if not very frequently disturbed.

HYACINTHUS (Hyacinth).—Everyone is acquainted with the Hyacinths—at least with the Dutch kinds, which are those in general cultivation. They are a most popular class of plant, and will blossom in either town or country. Their great drawback, however, is that they deteriorate after the first season, and the only way to get really fine flowers is to plant each season. Beds of Hyacinths make town gardens look gay during the early spring months, and good-sized clumps (the bulbs being arranged 6in. to 8in. apart) always look effective in the mixed border. They delight in a well-drained light but fairly rich soil. The bulbs are liable to be nipped with spring frosts, and for this reason some growers cover their quarters with light litter. When planting, due care must be taken with the colour distribution, and when the flower-spikes are fading they should be removed. This is especially necessary if it is intended to use the bulbs another season. For list of varieties, both double and single, see "Appendix."

So much for what are popularly spoken of as the Dutch bulbs. There are, however, one or two species which ought not to be omitted from the bulb garden—*H. amethystinus* (Spanish Hyacinth) for instance. This is a South European species, introduced as long ago as 1759. The flowers are a bright blue, and are produced in loose spikes in May. This bulb should be given a place in every garden where space can be found. The plant sometimes catalogued as *Hyacinthus candicans* is now regarded as a *Galtonia*, under which name it is described.

IRIS.—A large and interesting family, which, botanically, is divided into two broad sections—Bulbous and Rhizomatous. The former embraces the English and Spanish Irises, and the latter the Flag Irises, whose beautiful and varied colours lend such a charm to our summer gardens. Besides the English and Spanish Irises already alluded to, there are quite a large number of species belonging to the Bulbous section which rank amongst the earliest of spring flowers if provided with a warm, sheltered situation, say on a rockery. To this belong the elegant

small, graceful, and freely produced upon numerous slender stems, borne well above the grass-like foliage. In height they are from 3ft. to 5ft.

Other Irises in this section worthy of note are *I. cristata*, a gem for sunny spots or for the rock garden; *I. unguicularis* (*I. stylosa*), quite hardy, but delighting in a dry, sunny position, such as under a south wall, or upon sunny banks—a charming winter-flowering species; *I. fœtidissima* is another useful species, thriving alike in dry borders, in shade, or in damp places. A highly-prized characteristic of this species are the large scarlet berries, much employed for winter decoration.

Too much can hardly be said in praise of *I. lævigata* (*I. Kämpferi*). Every garden with a damp border, or with a stream, pond, or ditch, should contain this species. It is one of the Japanese sacred flowers, and a special national feast-day and holiday are devoted to the worship of this Iris. There are a host of named varieties, some of the best being: Nitta, Chiyo, Minamobo, and Taira. Also excellent for water-edge planting are *I. versicolor* and its varieties.

Though difficult to grow it would be unfair to leave out altogether in the cold the *Oncocyclus* group of Irises, as it undoubtedly contains many gems, the flowers ranging from bronzy-black to grey and fawn. The secret of their culture lies in giving them a good "baking" in summer, and being allowed to rest immediately after flowering in June until October. Among the best are: *I. susiana* (Fig. 211), *I. Lorteti*, and *I. lupina*.

Of the Bulbous section the Spanish Irises, with their brilliantly-coloured flowers, are the most popular. Strong-flowering bulbs are to be had very cheaply, and nothing is more valuable for cutting during June than these. Where possible, they should be grown in partial shade; the flowers then last longer than if exposed fully to the sun. Any ordinary garden soil will suit them. Following just after come the English Irises, whose flowers are white, mauve, violet, and rich purple.

Then there are many dainty little species in this section, whose claims must not be overlooked. For instance, *I. reticulata*, with



FIG. 211.—IRIS
SUSIANA.

strongly violet-scented purple-blue flowers; *I. Bakeriana*; and *I. Histrioides*. These like sandy soil, and are best when grown in frames or in pots in a cold greenhouse. They flower in early spring. For sheltered spots, again, there are such lovely kinds as *I. alata* and *I. a. alba*, as well as *I. persica*.

In using Irises for table decoration they should be cut in the bud state—just as the flowers are bursting; they develop far better in water than on the plants.

As many amateurs like to try their hand at seed-raising, it may be as well to state that some Irises seed more or less freely—*I. germanica*, *I. aurea*, *I. sibirica*, *I. Monnieri*, and many others. The seed should be sown in a cold frame when ripe, and the seedlings potted off into "sixties," from which they may be transferred to the open ground the following spring.

IXIA.—Though not usually considered hardy, these bulbs may at any rate be cultivated in a light, well-drained soil in the south and west. They are best planted in December and January, inserting the bulbs 4in. deep in raised sunny beds sheltered from winds. The bulbs should be surrounded with plenty of sharp sand, and the beds be covered with light litter. They may be expected to blossom in summer, and when ripe should again be lifted and stored until planting time. There is an excellent colour range. Propagated by offsets. *I. viridiflora* (Fig. 212) is a most uncommon plant, being green, spotted near the centre. For list of varieties, see "Appendix."



FIG. 212.—IXIA
VIRIDIFLORA.

IXIOLIRION.—Like the Ixias, these bulbs are not quite hardy enough to endure the rigours of our climate, and it is only in favourable soils and sites that their culture should be attempted. *I. Pallasii* (*I. tataricum* var.) is the kind usually cultivated, and when it can be induced to flower, its large Lily-like blossoms (Fig. 213) and neat foliage well repay any trouble that may be incurred in protecting it early in the season. A well-drained south border, and a light loam, will be essential to success. The bulbs should be planted in autumn.

KNIPHOFIA (*Tritoma*) (Flame Flower, Red-Hot Poker, Torch Lily).—Bulbous plants of the showiest description, and exceedingly

well known by reason of their fancied resemblance to a red-hot poker. In catalogues they are usually classed as Tritomas; but under whatever name found, they are so decorative that their merits should be known, as frequently they are the brightest flowers in an autumn garden. They are not, however, exclusively autumn plants, for some desirable species (*K. caulescens* and



FIG. 213.—IXIOLIRION PALLASII.

K. Rooperi, about 4ft.) are in beauty in early summer. The former may be described as salmon-red, and the latter as bright red at first, ultimately becoming a nice yellow. Nor are their numerous flowers the only conspicuous feature of these two plants: their foliage is very distinct and bold, and reminds one strongly of that of the Yucca.

Kniphofias may be accommodated in shrubberies and wide borders, on lawns, and also in those delightful old-fashioned beds of perennials still to be met with. The only thing that

can be urged against the plants is that they are not as robust as some of the bulbs already enumerated, and that they need to be protected against severe frosts by covering them with some light mulching material towards the end of October. This is particularly necessary in the less favoured parts of England. A rich well-drained soil is what these bulbs delight in, and they should be planted in spring. Their after-treatment consists in the provision of plenty of water during the growing season, and the assistance of a stimulant when the stems are pushing. Propagation is usually effected by division in spring, but some species it is necessary to propagate by suckers which may be induced to push by subjecting the plant to a severe cutting after the flower-spikes have gone over. The beautiful *K. caulescens* should be treated in this way.

In height Kniphofias vary between 3ft. and 5ft. A few of the most useful kinds, other than those already named, are: *K. aloides* (*Tritoma Uvaria*), the commonest species, but by no means the least desirable. There are many forms of it, the best being *grandis*, Fig. 214, (5ft.), *nobilis* (5ft.), and *Saundersii* (5ft.). Distinct and beautiful are *K. Burchellii* (3ft.); *K. corallina superba*, a very brilliant scarlet, and of dwarf habit (2ft.); *K. Macowanii*, soft pink, and very dwarf (1½ft.); *K. Nelsoni*, scarlet,

of various shades (2ft.), one of the newest; *K. sarmentosa*, a combination of red and yellow (3ft. to 4ft.); and *K. foliosa*, bright yellow, or tinged with red, with a dense raceme 1ft. long, and with leaves in a dense basal rosette (3ft.). This last is a robust kind, and is the same plant as *K. Quartiniana*.

Besides the species enumerated, there have been introduced some lovely hybrids, all worthy the attention of the cultivator.



FIG. 214.—KNIPHOFIA ALOIDES GRANDIS.

Some of the best are Obelisk, deep yellow; Star of Baden Baden, bronzy-yellow; Lachesis, deep yellow; Triumph, orange; and Citrina, soft yellow.

LEUCOIUM (Snowflake).—A small but pretty genus of bulbs. Four species are hardy enough for the outdoor garden: *L. vernalis*, white with green spots, flowering in spring; *L. pulchellum*, white with green tips, appearing a little later;

L. æstivum, white, flowering in early summer; and *L. autumnale*. This last is a gem. It should be planted in August in sharp sand, and in a shady position. The blossoms forcibly remind one of the Snowdrop, to which, indeed, the plants are closely related. The flowers are, moreover, pleasantly fragrant. These bulbs may be accommodated in the mixed border, and should be planted in good bold groups. For the edges of shrubberies, also, they are useful, especially if partial shade is afforded in the case of *L. æstivum*. A light and good soil should always be provided. These bulbs soon establish themselves. *L. verum* should not be disturbed unless absolutely necessary, and then it should be planted at once. In grass it is a gem.

LILIUM.—To this genus belong the true Lilies, a name which has been popularly bestowed upon individual species



FIG. 215.—LILIUM
CANDIDUM.

of many genera. For decorative value, colour-range, stateliness yet gracefulness of habit, and fragrance, there are no bulbous plants that can compare with the Lilies proper. They extend over a wide geographical area, and, as hinted elsewhere, they naturally thrive under very varied conditions as regards soil. Taking the border kinds generally, however, they may be truly said to flourish in any ordinary fairly rich, well-drained soil, if they are planted deep enough (4in. to 6in.), and at the correct time. No bulbs deteriorate more quickly than do the Lilies, and therefore the sooner they are inserted after being purchased,

or after being lifted for renovating borders or beds, the better. Of late years the Lily disease has told heavily against the plants, and especially *L. candidum*, which, though one of our hardiest border kinds, has suffered terribly from the scourge. Reference has already been made to one means of dealing with infected bulbs. Another way, which is said to give excellent results, is to cover the bulbs for a day in flowers of sulphur, taking care that the powder gets well between the scales. Autumn is the best time to plant, and, if possible, home-grown bulbs should be purchased from dealers of repute, as such

take great pains to put on the market only what is likely to enhance their reputation.

There are numerous ways in which Lilies may be grown to advantage, and the shrubbery border offers one of the best.

positions. The shrubs give just the slight protection they require, and if mulched in dry seasons with manure, this is all the attention they need. Towards the end of autumn light litter may be placed over the tenderer kinds in the open border, for it is not every amateur who has garden enough to devote to a shrubbery, and the Lily should be always represented.

By botanists the genus is sub-divided into several groups, that known as Martagon containing some of the hardiest species and varieties for the borders; these vary alike as to height and colour. *L. canadense* is one of the peat-loving species, thriving well where it can be afforded some slight shade, as amongst Rhododendrons. When planting it will be found a good plan to cover the bulbs with sharp sand. The flowers are usually orange or red, elegantly spotted with brown.

L. Martagon is the distinct Turk's Cap, the white variety being most esteemed; 3ft. to 4ft. *L. Szovitsianum* (*monadelphum*) is another distinct species, bearing yellow flowers, dotted with brown, but showing plenty of variation. A deep and somewhat sandy loam is the soil for it; but the cultivator must not be disappointed if it does not flower for a year or two. With this species in particular home-grown bulbs are a decided advantage; 3ft. to 4ft. *L. Humboldtii* is a truly handsome Lily, with deep orange purple-spotted flowers, gracefully drooping; 4ft. to 6ft. *L. auratum* is one of the most popular of Lilies, and justly so; its size, the variety in which it is found, and its handsome flowers, make it one of the most attractive

flowers of the late summer garden. It is another of those species which thrive in a peat soil, sheltered by shrubs. If planted 6in. deep, it will need nothing more than a mulching in winter, and will continue to flower for years; 2ft. to 4ft. Next to *L. auratum* in popularity is the Madonna Lily (*L. candidum*, Fig. 215), which is grown by everybody, and whose fragrance is wafted from cottage-garden or from mansion pleasure-ground; 3ft. Other desirable border kinds are: *L. croceum*, a robust species, with showy orange flowers; 4ft. to 6ft. *L. Browni*, with trumpet-shaped flowers, pure white inside, reddish-brown outside; 3ft. *L. bulbiferum*, crimson, very distinct, with the bulbils borne in the axils of the leaves. *L. Thunbergianum* (*L. elegans*, Fig. 216), a very variable species alike as to height and colour, orange-red prevailing; these Lilies are most useful for the shrubbery border; 1ft. to 4ft.



FIG. 216.—LILIUM
ELEGANS.

L. tigrinum (Fig. 217) is an old inhabitant of cottage-gardens, and, on account of its ease of culture and accommodating nature, is always welcome. *L. t. splendens* is an improvement upon the type; 3ft. to 5ft. *L. pardalinum* is a robust species, with bright orange-red flowers, spotted with purple. This is another kind which is best covered with sand at planting time. There are many forms met with in cultivation, all delighting in a liberal fare, that known as *minor* being very distinct; 3ft. to 7ft. Another good



FIG. 217.—LILIIUM TIGRINUM.

kind is *L. chalcedonicum* (the true scarlet Turk's Cap), with its intense scarlet turban-shaped flowers; 3ft. Several others might be enumerated—*L. rubescens* and *L. Washingtonianum*—and one is tempted to include such beautiful Lilies as *L. speciosum* (*lanceifolium*) *Kratzeri* and *L. tenuifolium*; but unless very favourably situated,

they are likely to disappoint. Nor must *L. rubellum* (Fig. 218) be forgotten, as it promises to prove one of the hardiest for border culture, as it certainly is one of the loveliest. The flowers are a beautiful pink, with showy light yellow anthers, and deliciously fragrant. It, moreover, is an early species, flowering in June. For pot work it can also be recommended. The soil best suited to its requirements is a sandy loam.



FIG. 218.—LILIIUM RUBELLUM.

Lilies may be propagated in a variety of ways—by seeds, offsets, bulbils, and by scales. This last is a most interesting method, and valuable where it is desired to produce kinds absolutely true.

The usual method is by offsets, which will flower in from three to five years, according to species and treatment.

MONTBRETIA.—See Tritonia.

MUSCARI (Grape Hyacinth).—Bulbous plants of great value in the outdoor garden, as they are early to flower, easy to cultivate, and bright as to colour. Being all of dwarf habit, they should, when grown in the border, be allotted a front position; but they look best when naturalised on a bank, their bright colours standing out well against the tender greens of spring. The brightest gem in the genus is *M. conicum*, a rich celestial blue, with a delicate fragrance, which latter considerably enhances its value. *M. armeniacum* is a blue of a deeper shade, flowering rather late; while *M. monstrosum* (Feathered Hyacinth), an old garden favourite (purple lilac), *M. Szovitsianum* (light blue), and *M. botryoides pallidum grandiflorum* (pearl blue), are all worth growing. Muscari make nice pot plants. The bulbs should be planted in September, and propagation is effected by offsets at the same season.

NARCISSUS.—Just as no summer garden would be considered complete without its Lilies, so no spring garden would be



FIG. 219.—NARCISSUS LEEDSII, NATURALISED UNDER TREES.

furnished without its quota of Narcissi. No particular soil or position is required to successfully grow the majority, and all may be enjoyed if but the rudest of contrivances exist to give them shelter; and it is this freedom from cultural complications which constitutes another of their chief charms. They are flowers of the people, and by them have been grown

from the earliest times of which we have records of gardens being kept in this country. As pot plants, too, *Narcissi* excel, and elsewhere in this volume their adaptability to such a purpose will be considered.

In border or on rockery, in shrubbery or in woodland, they are alike ornamental, and are fit associates for the finest of spring flowers. What a wealth of beauty may be had even in the first months of the year by planting in the mixed borders the earlier Daffodils, the bright *Chionodoxas* and *Scillas*, and the Snowdrop! Individually, how different is each; collectively, what a feast to the eye they present! Those who know the Daffodil in its native haunts long to plant other varieties equally adapted



FIG. 220.—*NARCISSUS BULBOCODIUM*.

to grassy slopes and stretches of lawns which are strangers to the gardener's scythe or mowing-machine—at least, until the naturalised plants have completed their growth. Nature leads the way, leaving those who appreciate the truly beautiful and informal to follow in her train. Those who can afford to indulge their tastes thus should dibble in the bulbs in late summer as plentifully as they can: and in the spring the grass will be bejewelled with the yellow gems.

In the borders the bulbs should be planted with no niggard hand, selecting the earliest opportunity for the operation. There is, however, another thing to be remembered: *Narcissi* must not come in contact with raw manure. Rather should they be planted in quarters from which, say, some earlier crop has been taken, but in a good loam, and sufficiently deep to be out of the reach of ordinary frosts. Some varieties will grow under the shade of trees, and no more effective way exists of displaying the delicate beauties of, say, *N. albicans*, *Johnstonii* Queen of Spain, *Achilles*, *Von Sion*, or *J. G. Baker* than under lawn trees whose shade is not too intense. Where *Narcissi* are growing freely in borders or in beds, it is a mistake to disturb them

annually, as do some. Once in three years is often enough unless disease asserts itself, when it will be found an excellent plan to lift them and plant in quite fresh ground, virgin pasture loam if possible, and under the shade of trees. This applies to the whole of the Large Trumpet Daffodils (*Magnicoronati* group), which are such features of our gardens, and whose name is simply legion, also to Incomparabilis, Barrii, early-flowering Poeticus, Burbidgei, Backhousei, Leedsii (Fig. 219), Tridymus, and the late-flowering Poeticus.



FIG. 221.—NARCISSUS BICOLOR HORSFIELDII.

Besides representatives of the various sections into which botanists have divided the genus, there are a host of small-flowering kinds too fragile to be risked in the mixed border, but whose beauty ought not to be lost. For these a place on the rockery should be assigned, and providing a suitable carpet-plant is provided, they will push up their sweet little flowers before winter's icy grip has released its hold. They should not be disturbed so long as they are doing well. In low-lying pockets in the rock garden might be tried *N. Bulbocodium* (Fig. 220) and its varieties, except *monophyllus* (Hoop Petticoat), as well as *N. cyclamineus*, all of which are moisture-



FIG. 222.—NARCISSUS MADAME DE GRAAF.

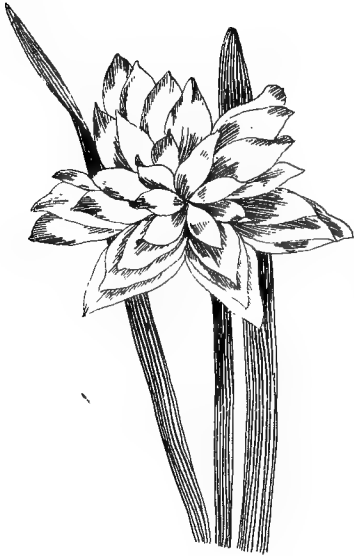


FIG. 223.—NARCISSUS CAPAX
PLENUS (QUEEN ANNE'S
DAFFODIL).

White Trumpets, both Single and Double. Of the Singles, the following varieties are very typical: Glory of Leiden, Bicolor *Horsfieldii* (Fig. 221), *Madame de Graaf* (Fig. 222), and *Mrs. J. B. Camm*; while in Doubles, *Capax Plenus* (*Queen Anne's Daffodil*) (Fig. 223), *Plenissimus*, and *Telamonius Plenus* may be mentioned. This group has the crown as long as the perianth divisions. The next group, *Parvicoronati* (which includes the white *Poet's Narcissus*), embraces a lot of popular varieties whose distinguishing characteristic is that the crown is less than half as long as the divisions of the perianth. To this group belong *Burbidgei*, *Poeticus*, *Little Dirk* (Fig. 224), and many another favourite. In the third group, *Mediocroronati*, we have the *Chalice-cupped Daffodils*, or *Star Narcissi*, which are characterised by the crown or cup being half as long as the perianth divisions, or in one or two cases as being three-quarters as

lovers; while in other pockets might be inserted *N. nanus*, *N. minimus*, *N. lobularis*, *N. triandrus albus*, and *N. juncifolius*. All will not flourish, though sufficient will to justify the experiment. Many advocate the planting of *N. Bulbocodium monophyllum*; but this, though undoubtedly dainty, is not often a success, even where the best of conditions—a warm, sheltered position, and a rich, light soil—are forthcoming. To appreciate this pretty species at its true worth, it must be grown in a pot and kept in a cool frame or greenhouse, when, if well watered, the exquisite flowers will be produced in January and February. A dozen bulbs may be accommodated in a 5in. pot.

The *Magnicoronati* are subdivided into Yellow Trumpets, Yellow-and-White Trumpets, and

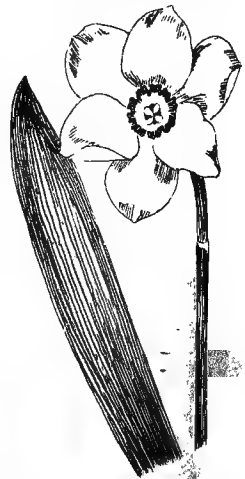


FIG. 224.—NARCISSUS
LITTLE DIRK.

long. These flower right up to May. Some good varieties are C. J. Backhouse, Gwyther (Fig. 225), Frank Miles, and Leedsii. A list of varieties for general purposes will be found in the "Appendix."

Propagation is usually effected by offsets, which should be separated from the older bulbs, and planted out; and by seeds. The latter process is, however, too long for the man of little leisure to undertake.

NERINE (*Loxanthes*).—Though the commonest species (*N. sarniensis*) is known popularly as the Guernsey Lily, it is not a native of that island. It can only be grown out-of-doors under especially favourable circumstances, as the leaves are produced after the flowers, and, if not protected in some way, they are injured by frost. The bulbs are on the market

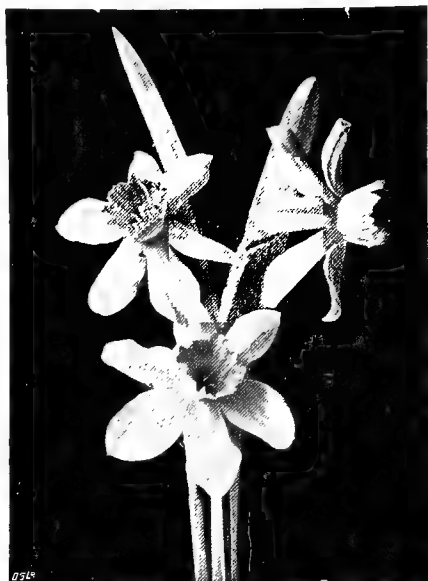


FIG. 225.—NARCISSUS GWYTHER.

in late summer, and they should be planted at once. The blossoms are gorgeous, being of a bright scarlet, and produced in umbels. Some cultivators grow *N. curvifolia major* in warm borders, but it is usually wintered indoors. Propagated by offsets at planting time. As a pot-plant, *N. sarmensis* excels.

ORNITHOGALUM (Star of Bethlehem).—A few species of this genus deserve to be mentioned, for if they are not showy, they provide gardeners with several good subjects not only for the rockery, the border, and the grass, but also for bare places under trees. They flower in either spring or early summer. *O. nutans* is much prized for cutting, as its silvery-grey colour, shaded with green, blends well with any other flower; it is about 15 in. high, and will grow in either shade or sunshine. *O. umbellatum* (true Star of Bethlehem) is another most useful species for under trees or grass, smothering the ground with its lovely white flowers. The plant usually sold as Star of Bethlehem in early spring is *Allium neapolitanum*. Stately kinds, like *O. pyramidale*, may be used with excellent

effect among *Andromedas* and similar shrubs. The flowers are snowy white, and are produced in pyramidal spikes 2ft. to 3ft. high. These bulbs, which should be planted in late summer, should not be interfered with except for purposes of increase.

PANCRATIUM (Sea Daffodil).—Only one species of this genus is really hardy, and that in favoured situations, such as advocated for *Crinum*s. Indeed, *P. illyricum* may very well be treated on the lines suggested for the *Crinum*s. Increased by offsets in autumn.

POLYGONATUM (Solomon's Seal).—Allied to the Lily of the Valley is the genus here named, several species of which might



FIG. 226.—POLYGONATUM MULTIFLORUM.

oftener be used, especially for shady nooks under trees, and for naturalising in woodlands. Indeed, gardeners might well take a lesson from Nature in respect of the adaptability of these plants for the last-named purpose, as at least three species are to be found growing in our woods—*P. verticillatum*, *P. officinale*, and *P. multiflorum* (Fig. 226), the last two having double forms. Though the flowers cannot boast striking colour, they are neat in the extreme, and are, moreover, disposed in such a way that they have a grace which is all their own, and are succeeded by pretty if not showy fruits—usually of a purplish-black. Other good species are *P. roseum*, rose-pink; *P. oppositifolium*, white, ribbed with red; and *P. punctatum*, white, lilac-dotted. There

are several other species, but those named include all that are best in the genus. With the exception of *P. oppositifolium* (which is best given a place in a rockery), all may be successfully grown in shady places, if the soil is fairly good. They should be propagated by division in autumn or spring, or by seeds (which, as noted, are freely produced), sown when ripe. Polygonatums are largely used as pot plants for forcing, *P. variegatum* being very effective.

PUSCHKINIA (*Adamsia*; Striped Squill).—A much-confused genus of liliaceous plants approaching the Scillas. The species is valuable on account of its early flowering, and constitutes one of the brightest gems in the spring bulb garden. Given a sunny position, a light, rich soil, and a covering of straw manure in winter, these charming bulbs will be at their best in April. For rockwork it is also equally as well adapted as for the choicer parts of the mixed border. *P. scilloides* is 4 in. high, and bears light blue flowers striped with a darker colour; while the form *compacta* (Fig. 227) has its flowers more thickly produced. *P. libanotica*, of many catalogues, is but a synonym of *P. scilloides*. These bulbs should be planted in autumn, and should be propagated by seed in September, as after four or five years the bulbs usually die, after the manner of *Scilla sibirica*.



FIG. 227.—PUSCHKINIA SCILLOIDES COMPACTA.

RANUNCULUS (Crowfoot).—Elsewhere the Ranunculus has been dealt with as a florists' flower. All that need be added here are the few species and varieties which are suited to the mixed border or the rock garden. Few of them require any special treatment, so long as a rich, porous, fairly-moist soil is provided, allocating them a shady, rather than a sunny position. Well deserving a place in any garden is *R. amplexicaulis*, which, though but 1 ft. high, bears large white flowers in May that are highly prized for cutting. The leaves, too, are pretty with their glaucous hue. *R. aconitifolius flore-pleno* (Fair Maids of France) is pretty, its snow-white flowers being produced very abundantly. *R. gramineus* is a magnificent species for either border or rockwork, its shining yellow flowers and silvery-grey foliage forming a beautiful combination. *R. acris flore-pleno* (Bachelors' Buttons) is but a double form of one of our meadow Buttercups, but it is bright and distinct enough to

merit a place in gardens. *R. monspeliacus* is a Buttercup from the Mediterranean, with very large flowers; being only 1ft. high, it is best planted on the rockery. *R. Lyalli*, though generally grown as a cool greenhouse plant, may be successfully treated out of doors if afforded a sheltered position. Its flowers are white, of good substance, and with pretty stamens, and might very well be assigned a position on a rockery, where the conditions suitable to most of the Ranunculuses obtain. The planting should be done in late autumn, and if the following spring should be at all dry, the quarters should be given a good soaking. These species should not be disturbed.

SCHIZOSYTLIS COCCINEA (Crimson Flag; Kaffir Lily) is a lovely iridaceous subject with bright crimson Gladiolus-like spikes of flower. It is one of those subjects which require to be taken great care of when grown outside, and to receive plenty of attention in the matter of watering. Light soils will not grow this autumn-flowering gem; but a west border and a fairly deep, rich soil will suit it admirably, if a slight protection is given it in winter. In height it grows from 2ft. to 3ft., and

the spikes are much valued for cutting. The plants should be inserted in early spring, grown on through summer, and towards autumn potted up for greenhouse decoration during winter. Or again, a frame might be placed over the plants in October, when flowers would be obtainable the following month. For pot work this plant is one of the best that can be named for the season of November. Propagated by division in April.



FIG. 228.—*SCILLA HISPANICA*.

luxuriantly in a warm, sandy soil. It is a gem whose beauty should not be hidden. There are many other species valuable in their way. *S. bifolia*, in one of its numerous varieties (*S. b. taurica* to wit), should always be represented.

SCILLA (Squill).—For beds or borders the Scillas are amongst the hardiest and brightest of spring-flowering subjects. Indeed it would be difficult to point to a brighter flower than *S. sibirica*, which flourishes so

For naturalising, there is nothing better than *S. nutans*, the Wood Hyacinth or Bluebell of our copses, and its white and red forms resembling in shape the Lily of the Valley; and *S. hispanica (campanulata)* (Fig. 228) and its white form (*alba*). They are strong growers, and can hardly be too freely planted, especially in grass, while they rank among the very best bulbous subjects for planting under the shade of the larger trees; they flower in late spring. *S. italica* is another bright-coloured species, flowering in late spring; it is sweetly fragrant.

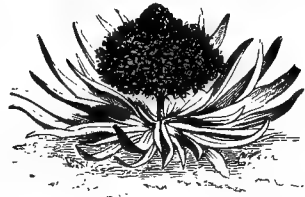


FIG. 229.—*SCILLA PERUVIANA*.

Distinct and beautiful, and flowering in summer, are two or three sorts for which room should be found: *S. peruviana* (Fig. 229), *S. p. alba*, which are perfectly hardy, and are handsome border plants in summer; and *S. autumnalis*, purple-blue, flowering in autumn. Scillas make capital pot plants, and are very frequently



FIG. 230.—*SISYRINCHIUM GRANDIFLORUM ALBUM*.

SISYRINCHIUM (Satin Flower).—A not very popular genus of irideaceous plants, though there are one or two species which have great claims upon the gardener's attention. Those in

employed as room plants, the bright flowers of say *sibirica* and *bifolia* being much appreciated in spring.

Hardy Scillas may be planted about 3in. deep in autumn, and are best not interfered with for several years, unless the soil shows signs of exhaustion. With these, as with Crocuses, however, this difficulty is best got over by periodical top-dressings of good manure. Propagated by offsets taken in late summer, or by seeds, the latter, of course, being a somewhat slow process.

commerce are usually grown in the borders or on the rockery, a sandy loam being preferable. *S. grandiflorum* (purple) and *S. g. album* (white) are charming when used in combination, their gracefully-sheathing leaves being light and delicate (Fig. 230). These like a somewhat shaded situation. *S. bermudianum* is of dwarfer growth, and bears violet flowers. The season of flowering is in early summer. They should be planted in October, and are best propagated by division of the roots.

SPARAXIS.—Cape of Good Hope bulbs of exceeding beauty, but, like their relatives the *Ixias* only to be grown in favoured positions outside. If, however, such can be assigned them, they should undoubtedly be tried. *S. pulcherrima* (now known as *Dierama pulcherrima*) has bell-shaped flowers, numerous disposed on thin, graceful stems, 4ft. to 5ft. high. They vary considerably as to colour, the most striking being striped, and are produced in summer. Propagated by offsets.

STERNBERGIA (Mount Etna Lily).—Hardy bulbs, yet but little known in gardens, though extremely useful. Three or four

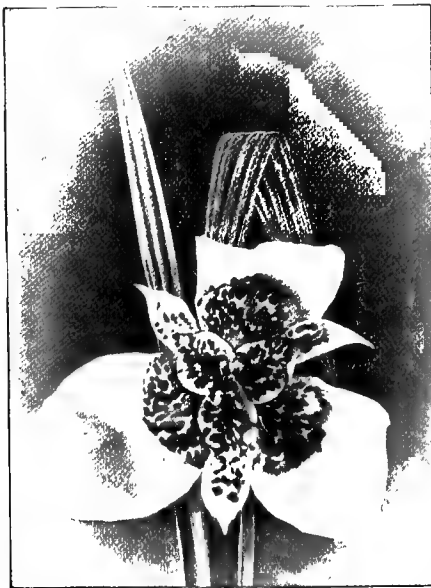


FIG. 231.—TIGRIDIA PAVONIA ALBA.

species are in cultivation, the best known being *S. lutea* (Winter Daffodil; Yellow Star Flower). It is a Crocus-like flower, produced in late autumn, and some good patches brighten up the garden at that season. There is a variety of it (*Fischeriana*) which flowers in spring. Of late years there has been introduced another very handsome kind in *S. macrantha*, bright yellow, flowering in autumn. Sternbergias thrive best in a warm, sandy loam and a sunny position. They should be planted in autumn, affording the bulbs a little protection in winter. They are impatient of disturbance. Propagated by offsets in late autumn.

TIGRIDIA (Tiger Flower).—Another genus of bulbs, several kinds of which should be accommodated in the outdoor garden if

a suitable position can be found them. They delight in sunshine and a light, fairly rich soil. Though gorgeous as to flower, their beauty is short-lived; but the time over which the flowering period extends more than compensates for the ephemeral nature of the individual flowers. It is safer to lift these bulbs



FIG. 232.—VARIETIES OF TRITONIA (MONTBRETIAS).

when thoroughly ripe in October, and store them in a dry, cool place in sand until April, than to leave them in the soil all winter. *T. pavonia* (syn. *T. conchiflora*), yellow, with scarlet markings in cup; *T. p. grandiflora*, brilliant scarlet, with yellow markings; *T. p. alba* (Fig. 231), white, spotted with carmine;

T. p. liliacea, clear rose; and *T. p. immaculata alba*, pure white, are real gems. There is also a species of recent introduction in *T. Pringlei*. It is a Mexican plant of great beauty, the flowers being large and of a glossy scarlet. Still more recent is *T. Van Houttei*, with small bronze-black flowers. A bed of Tigridias in blossom is a sight not likely to be forgotten.

TRILLIUM (Wood Lily).—North American plants of distinct appearance, and valuable subjects for moist, shady nooks in the ordinary garden or for similar positions on rockeries. They flower in spring, and should be freely planted, especially *T. grandiflorum*, snowy-white, set amidst pretty foliage. Another very desirable sort is *T. sessile californicum*, creamy-white, with spotted foliage; while *T. recurvatum*, purple, marbled foliage, and *T. stylosum*, rose-pink, are very pretty.

Trilliums should be planted in autumn and not be often disturbed; propagated by division. The petals, calyces, and leaves being arranged in threes have also earned for this genus the popular name of Trinity Flower.



FIG. 233.—TULIPA KAUFMANNIANA.

TRITONIA (including *Montbretia*). — In this genus are found some graceful and showy plants flowering in summer. Those usually catalogued as Montbretias are the most popular. The foliage partakes of that of the Gladiolus, and the blossoms

are some shade of orange, and valuable for cutting. The Montbretia section of the genus are best planted in autumn, lifted annually, and replanted at once in fresh soil, discarding the old and exhausted roots. This is by no means necessary, as excellent results are frequently obtained by leaving the bulbs undisturbed for two or three years. *T. Pottsii* and the variety *grandiflora* are very decorative; but the best kinds are the garden forms of *T. crocosmiflora* (Fig. 232) (itself of garden origin, being a cross between *T. Pottsii* and *Crocosmia aurea*), which are far and away superior to the type. Varieties to be recommended: Bouquet Parfait, Pluie d'Or, Etoile de Feu, Rayon d'Or, Transcendant, Tigridie, Sulphurea, and Eldorado.

Tritonias proper are not adapted for the outdoor garden, though in the South and West of England, *T. crocata* and its varieties would doubtless succeed in a warm part of the garden. They should be planted in October. As a rule, however, they are best given the shelter of a frame laying well in the sun, the bulbs being covered with sand.

TULIPA (Tulip). — The merits of the Tulip as a florists' flower have been discussed in an earlier chapter. There are, however, a number of desirable species which ought to find a place wherever possible.



FIG. 234.—*TULIPA ACUMINATA*.



FIG. 235.—*TULIPA MACROSPEILA*.

Of late years a wave of popularity has set in in their favour, and there has been a tendency to plant species rather than florists' varieties. One result of this has been the introduction of several new kinds, which promise to surpass in brilliance of colour and general utility many of the older species. These species should be planted in good bold groups, or in masses where it will not be necessary to lift them to make room for summer occupants. In such

places they may be allowed to remain for three years, provided there is no sign of deterioration in the bulbs. Propagation is effected by offsets. The smaller-growing kinds are admirable for rockwork.

Where there are such a number of kinds worthy of consideration as is the case with Tulip species, it will only be possible to call attention to the best of the group: *T. Batalini*, soft yellow; *T. Clusiana*, white, striped red, and violet base, excellent for a warm part of the rockery; *T. Eichleri*, bright scarlet, bordered with yellow, for sunny spot; *T. Greigi*,



FIG. 236.—PARROT TULIP.

vermillion red, with dark basal spot, one of the best for a sunny, dry position; *T. Gesneriana spathulata* (*T. G. vera*), rich scarlet, blackish centre; *T. Kolpakowskiana*, a Central Asiatic species of great brilliancy (vermillion-red, blotched at base); *T. Kaufmanniana*, large flowers of a creamy-white, with yellow blotch in centre (Fig. 233); *T. retroflexa*, soft yellow; *T. elegans*, bright red, with yellow eye; *T. saxatilis*, rose-pink, with yellow eye; *T. Orphanidei*, orange-yellow, black centre; *T. Leichtlinii*, coral-pink outside, and white inside; *T. praecox*, crimson, black centre; *T. acuminata*, yellow, streaked with red, the petals being thread-like (Fig. 234); *T. macrospeila* (Fig. 235), shining bright scarlet, with black and yellow centre, fragrant; and *T. vitellina*, pale yellow, as the specific name denotes. From *T. platystigma* the Parrot Tulips (Fig. 236), now so highly esteemed, have been evolved. These, however, in poor soils, are apt to revert to their parent. There are also many forms of what are known as May-flowering Tulips, which ought not to escape the attention of growers. One of the best is Picotee, with its white recurved petals, elegantly margined with rose (Fig. 237).

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flexa*, soft yellow; *T.
elegans*, bright red, with
yellow eye; *T. saxa-
tilis*, rose-pink, with
yellow eye; *T. Orpha-
nidei*, orange-yellow,
black centre; *T. Leicht-
linii*, coral-pink outside,
and white inside; *T.
praecox*, crimson, black
centre; *T. acuminata*,
yellow, streaked with

VALLOTA PURPUREA (Scarborough Lily).—A beautiful Cape bulb, suited to a warm, sunny border. It should be planted 6in. to 7in. deep in May, and not be disturbed again till absolutely necessary. The flowers are large, brilliant scarlet, and funnel-shaped. Excellent for pots. Propagated by offsets.

ZEPHYRANTHES (Flower of the West Wind; Zephyr Flower).—Though seldom seen out of doors there is one representative of this graceful genus that may be so cultivated. This is *Z. candida*. All that it requires are a sunny spot and a light yet fairly rich soil. The Crocus-like flowers are produced towards the end of summer, and are of a pure white. The bulbs should be planted in late autumn, and are propagated by seeds or by offsets.



FIG. 237.—TULIPA PICOTEE.



II.—*On Trees* and *Shrubs.*

BY
 MORTIMER
 THORN.

WE need scarcely praise trees and shrubs for their beauty, for that is apparent to everyone who glances at the lovely landscapes of these Isles; yet it is only during recent years that there has been a general awakening to the previously known utility of the trees and shrubs of our own and foreign lands for garden decoration. The tree- and shrub-life of foreign climes has adorned our gardens ever since travellers began to send over things which they considered worthy of use here. Japan, China, New Zealand, the Himalayas, and other temperate lands contribute trees which rank amongst the most beautiful objects of the garden and park, and some of them are becoming so familiar that we are almost led to believe they are indigenous. We cherish trees, too, for their varied forms; some are erect, as the Lombardy Poplar; others are like the spreading Oak and the purple-leaved Beech; while the Willow touches the water's surface with its slender branches: a delightful variety indeed, and indispensable in the well-planted garden.

A hundred shrubs also are at hand to embellish the English garden; shrubs of beauty in some form, whether it be their

flowers in spring and summer, or their foliage in autumn, when Nature paints them with crimson, brown, yellow, and other rich tints. We may select from among the ornamental Plums, Deutzias, Mock Oranges, the sea-loving Escallonias, Cytisus, Berberis, Diervillas, Olearias, Spiræas, Kalmias, Azaleas, and many others, the individual requirements of which we have considered under their proper headings. But variety is useless if good taste is wanting. A common shrubbery is usually a place in which beautiful things are crowded together without reason, throttling each other in their endeavours to reveal their true characters. The cultivator's aim should be to let everything in the garden tell its own tale, and he should never forget that in bold grouping the most artistic picture is secured. It is colour-effect that the planter should most think of, avoiding unpleasant contrasts. We have often wondered that the majority of gardeners and others have never dipped more deeply into the rich store-house of trees and shrubs, but have confined themselves to a few kinds, which one wearies of because so frequently repeated. One misses the variety that a good selection gives, not only in form, but also in colouring, from the silvery-grey of the Willow, through shades of green, to even the deepest purple; while, in the form of the leaf, we see the same wonderful range.

Amongst deciduous kinds for winter effect we would specially mention the yellow-stemmed Willows and Ash, the red-barked Cornus, Willow, and Berberis, the silver-barked Birch, Rubus (Bramble), and in a less degree the silvery Poplar and the native Sea Buckthorn. The Alders, Willows, and Nuts are also effective, because of the freedom with which their elegant catkins are borne on the leafless branches.

Of trees and shrubs that blossom during the winter the following are specially meritorious: A good-sized plant of *Chimonanthus fragrans* (Winter Sweet), with its deliciously-scented blossoms, is always welcome in December; while the elegant and pendulous catkins of *Garrya elliptica*, borne at the tips of the evergreen shoots, the fragrant *Lonicera Standishii*, *Arbutus* (Strawberry Tree) of sorts, and the naked-flowered Jasmine (*Jasminum nudiflorum*) are of great value at this season. The deciduous Daphne (*D. Mezereum*), with its white- and pink-flowered varieties, *Hamamelis arborea* (Japanese Witch Hazel), *Viburnum Tinus* (Laurustinus), the white- and pink-blossomed Heaths (*Erica carnea* and *E. c. alba*), as well as *Berberis*

japonica, are too precious to pass by unnoticed. These are followed by a couple of exceptionally free-flowering Rhododendrons, viz., *R. dauricum* and *R. præcox*. *Prunus Davidiana*, one of the most charming of early spring-flowering trees, is generally in blossom about the middle of February. Although not showing the clusters of small yellow flowers of *Cornus mas* (Cornelian Cherry) are effective, especially if a suitable background of evergreen shrubs is afforded.

Amongst spring-flowering trees and shrubs are many gems suitable for decorative planting—Forsythias, Pieris (Andromeda), *Nuttallia cerasiformis*, Pyruses, Magnolias (deciduous), the fragrant *Corylopsis spicata*, Almonds, Peaches, Cherries, Plums, Thorns, and Amelanchiers are a few of the spring-flowering treasures.

Some trees and shrubs are conspicuous for the splendid colours assumed by the leaves before they fall off, and in this respect *Quercus coccinea* (Scarlet Oak), *Q. conferta*, *Q. rubra*, Azaleas, *Acer rubrum*, *A. circinatum*, *A. palmatum* varieties, *Rhus typhina*, *R. cotinus*, *R. glabra*, *Berberis Thunbergi*, *B. vulgaris*, *Euonymus atropurpureus*, *Viburnums*, *Amelanchier canadensis*, *Cratægus punctata*, *C. prunifolia*, *C. coccinea*, *Liquidambar styraciflua*, *Parrotia persica*, *Cornus alba*, *C. florida*, *Styrax obassia*, *Pyrus torminalis*, *Liriodendron tulipifera*, and *Vitis* (including *Ampelopsis*) of sorts, are a few of the most striking.

One of the most delightful groups of hardy trees and shrubs may be composed of berry-bearing kinds, and planters would do well to introduce these more freely into pleasure-grounds, parks, &c. A suitable list will be found further on.

The trees and shrubs hereunder enumerated have been divided into several groups, and the deciduous kinds have been kept separate from the evergreens. Sections on Weeping trees, Berry-bearing kinds, Wall shrubs, &c., may be of service to those requiring trees and shrubs for certain purposes.

Planting.

The subject of planting or transplanting is of great importance to those having anything to do with the cultivation of hardy trees and shrubs, as the success or failure depends in a large degree on the way in which such details are carried out. It should not be forgotten that if a tree or shrub is worth planting, it should be carefully treated. Ground for the reception of ornamental trees should be properly drained, if not

naturally so, and trenched. It must, however, be remembered that trees and shrubs differ as regards the kind of soil most suitable for them. Some are naturally deep-rooting, and others, like the Heath family and its allies, may be taken as examples of surface- or shallow-rooting subjects. Such shrubs as the deciduous *Daphnes* are best planted as quickly as possible after the fall of the leaf in autumn, as root-action commences soon after Christmas, which would be interfered with if planting were deferred until spring.

Opinions differ greatly as to the best time to transplant trees and shrubs. Some prefer early autumn, some March, and others April and May. We believe, however, in autumn planting, as then the temperature of the ground is higher than is the case either in mid-winter or in early spring, and the trees are enabled to make fresh roots and establish themselves in their new quarters before winter. Besides, they are better able to commence growth in spring without feeling ill effects. Any time between September and March will do so long as the trees are in a condition to be lifted, ordinary care is taken in the operation, and provided, of course, that the ground is in a proper state to receive them.

Planting in dry, windy weather is not advisable, as evaporation then goes on much more rapidly than is the case when the weather is mild and dull. It will therefore be seen that the conditions most favourable for planting are when the atmosphere is damp or moist. It is not a good practice to transplant in mid-winter, as the ground at that period is very cold. Neither should transplanting be done or attempted in frosty weather.

With regard to seedlings that have been growing in seed-beds, or autumn-rooted cuttings, spring will be found the best time for planting these out in nursery rows in soil suited to their requirements. Until well established they should be watered daily.

Evergreens, especially Hollies, Yews, Bays, Portugal Laurels, &c., may be transplanted with safety in April and May. They should always be lifted with good balls of earth, and the roots interfered with as little as possible; but they should never be exposed to drying winds, which injure the small fibrous rootlets. They should not be kept out of the ground longer than is really necessary, and if any of the roots should get bruised, the injured parts should be cut away at once, because if allowed to remain they might decay, and be the means of causing others to die; if

a sharp knife be used in cutting the roots the damaged parts will soon heal over.

In the case of trees which are required to travel long distances, the roots should always be protected from dry, parching winds by means of mats, tiffany, hay, or any such material. Holes for their reception should have been previously prepared, and be larger than the ball of earth attached to the roots, which latter should be spread out carefully in all directions, so that they will be in a position to take up nourishment from all sides; besides, by fixing the trees more securely in the soil, they are better able to withstand boisterous winds. The soil at the base should be loosened, and the distance between the trees will depend on the size, kind, and object for which they are intended. It sometimes happens that the ordinary soil of the garden is not suited to certain kinds of shrubs, in which case the indifferent soil should be taken away and replaced by some favourable to the well-being of the subjects it is intended to plant. The too common mistake of huddling the roots up together should be avoided, and the disadvantages of too deep planting cannot be too strongly condemned. Manure in any shape should never be placed in immediate contact with the roots, as it will do more harm than good; it should be incorporated with the soil.

The importance of regular transplanting in a young state, especially such as belong to the Fir tribe, does not seem to be sufficiently understood, or is not carried out to the extent it should be. It frequently happens that trees get too big or bulky for certain positions, and it becomes necessary to lift some of them, in order to give those that are left more room to develop. If transplanting has not been properly attended to in the early stages, the chances of successfully moving them is considerably minimised unless extra care is taken in the operation.

Trees that are "mop-headed," or top-heavy, should be supported by stakes, and securely tied immediately planting is completed, so as to prevent them from being blown over in windy weather. It is wise, especially if planting be done in the spring, to give a good watering to consolidate the soil about the roots, and if water is applied to the foliage by means of a garden engine or syringe, the trees will be greatly assisted in making fresh roots. In the case of trees that are impatient of disturbance at the root, it is an excellent plan to mulch after transplanting with decaying

leaves, light litter, &c., which not only protects the ground from frost, but prevents the escape of heat and moisture.

Shrubs grown in pots are not a success as a rule, for the reason that the roots are matted together through too close confinement. We have noticed how much more vigorous are shrubs lifted from the open than those turned out of pots, except in the case of delicate kinds that need protection in early life, but such as these should never be planted in the open air unless the situation is peculiarly favourable. Planting from pots may be carried out at almost any season, but that is the only advantage, and this is not a practice for general recommendation.

Pruning.

This is an all-important subject, yet one unfortunately both little understood and neglected. To properly prune the various trees and shrubs several points must be considered, such as habit, health, and purpose for which they are intended; also if the flowers are produced on the previous or current year's growth. Site and soil are also important.

In borders that are planted with mixed shrubs pruning is essential to keep the too vigorous growth within bounds, and to both protect and encourage weaker kinds. The shrubbery border should be examined at least twice a year, and not allowed to remain unattended for protracted periods.

In pruning flowering shrubs the object should be to improve their general appearance and to encourage greater freedom in blossom. To accomplish the latter, one must sometimes sacrifice growth, especially if the shrubs have been neglected in the early stages, as like fruit trees they should be carefully attended to whilst young, when it is easy to lay in a good foundation. Old worn-out, sickly, and useless wood should be removed, and young vigorous shoots encouraged.

The subject may very well be discussed under two heads: (1) spring pruning, and (2) summer pruning. The point that troubles many lovers of hardy shrubs is to distinguish between the two sections. Roughly speaking, shrubs whose flowers are produced in winter or spring should be pruned immediately the flowers are over, so that they may be encouraged to make new wood early and thus become matured before winter.

The charming Winter Sweet (*Chimonanthus fragrans*) is a typical example of a winter-flowering shrub. In February the

flowering wood should be cut back to an eye of the old wood, and the worn-out growths removed altogether. *Garrya elliptica* should be pruned in early spring, the object being to encourage vigorous growths, which, if properly ripened, will flower freely. Of Honeysuckles, *Lonicera fragrantissima* and *L. Standishii* should have their old wood thinned out in March. The Winter Jasmine (*Jasminum nudiflorum*) should be attended to about the same time, and if the plant be growing against a wall the main shoots should be secured thereto, and the smaller growths allowed freedom: its effect when in blossom is much prettier than when all the shoots are nailed to the wall.

Portugal Laurels are best pruned in April, and the Holly in March or August, as there is time for the wounds to heal before growth ceases. With *Forsythia suspensa* the weak growths should be cut away, and the strong shoots shortened as soon as the blossoming period is over, as shoots 6ft. in length will result, and carry flowers freely the following spring. The Evergreen *Cratægus Pyracantha* should have its weak growths thinned out in early spring, and vigorous growths from the base laid in to take the place of the old shoots. Clusters of berries will thus be borne at the bottom, as well as at the top of the plant. In the early summer the overcrowded shoots of *Olearia Haastii* should be thinned out, and Mahonias (Barberries) may be treated in the same way at the same time. Rhododendrons do not as a rule require much pruning beyond a thinning out of the overcrowded delicate shoots after flowering is over. The seed-pods should always be removed unless seed is required.

As the flowers of *Cydonia japonica* are borne on short spurs along the old wood in March and April, pruning must be done when necessary in the last-named month, and only the very old wood should be taken away, as a too free use of the knife with this early-flowering shrub robs it of much of its beauty. Deutzias, Cytisus, Genistas, Spiræas, Escallonias, Philadelphus, Ribes (Flowering Currants), Syringas, Loniceras, Wistarias, Viburnums, &c., should have their vigorous shoots shortened, and delicate growths removed after flowering. The knife should be used sparingly with such things as Kalmias, Pieris (Andromeda), Vacciniums, Azaleas, Ledums, &c. The majority of the evergreen ornamental shrubs are best pruned in summer.

Clematisses need special attention, as the flowers are produced upon different kinds of wood. The herbaceous sorts, such as

THE LAKE AT KEUI.



C. diversifolia, *C. recta*, and *C. Davidiana* should be cut down to the ground in autumn, while those belonging to the *Viticella* and *Jackmanni* sections are best pruned to within 9in. of the soil in November. The *Lanuginosa*, *Montana*, and *Florida* types flower from June to October, and these should be pruned in February, removing the whole of the weak, overcrowded shoots, and a part of the old flowering wood.

Certain shrubs are improved by close pruning. *Paulownia imperialis* is a case in point. If the whole of the wood be cut down in the autumn to a few eyes, strong shoots will be thrown up in spring, the most vigorous of which should be selected and the others removed. Treated thus, *P. imperialis* makes a good lawn shrub, planted either singly or in a group. The Golden-leaved Elder is much improved by severe pruning, as its young shoots are of a richer yellow than when left unpruned. Willows, *Amorphas*, *Coluteas* (Bladder Sennas), &c., may be kept within bounds by a free use of the knife. The Stag's Horn (*Rhus typhina*) bears pruning well, and if compact plants are desired close pruning is necessary. *Hydrangea paniculata hortensis* (*H. p. grandiflora*) should be pruned in February, and the whole of the previous year's wood cut back to a single eye, as hard pruning is essential if large, well-formed panicles of flowers are desired in autumn. With regard to most of the other *Hydrangeas*, a thinning out of the shoots will be ample.

Conifers should not be pruned in winter; the best time is spring or summer, as the trees being then in growth the wounds quickly heal. Conifers generally, however, require very little pruning. The Larch and Pine families are, for instance, apt to bleed freely if pruned when in full growth. Conifers should be moulded into shape when young. Such trees as *Cedrus Deodara*, *C. Libani*, and *Tsuga canadensis* (*Abies canadensis*) frequently throw up delicate, pendulous leaders, and are apt to become flat-headed unless the side-growths are shortened when young, and more strength thrown into the principal leader.

Deciduous Trees and Shrubs.

ABELIA CHINENSIS (*A. rupestris*) is a charming dwarf shrub, not planted half so much as it ought to be. Its clusters of small sweet-scented pale pink flowers are borne in profusion towards the end of the pendent shoots during August and September. Though by no means particular as to soil, it produces the greatest display when planted in rich well-drained loam and good leaf-mould.

ACANTHOPANAX RICINIFOLIUM (*Aralia Maximowiczii*) has large deeply-lobed rich green leaves, set on long petioles. It is of distinct growth, with an erect stem, and in its native habitat is said to reach a height of 80ft. *A. spinosum* (*Aralia pentaphylla*, *Panax spinosum*) is a dwarf shrub with deeply-cut bright green leaves; it needs a sheltered corner and rich soil to do it justice. *A. s. variegata* is a handsome form having pale green leaves edged and splashed with cream-white, but it is rather tender.

ACERS (Maples) are ornamental trees of good growth, and well adapted for hiding unsightly views. They require plenty of air, and do not make satisfactory specimens when cramped for room. The flowers are mostly of a greenish-yellow shade, are borne in racemes, and are succeeded by attractive winged fruits; while the foliage changes in autumn to shades of yellow, orange, and red; and in this respect Acers stand in the front rank of trees conspicuous for their autumnal beauty. *A. macrophyllum* is a fast-growing kind, and succeeds well on dry soils. Its leaves are large and handsome. *A. diabolicum* (*A. pulchrum*), a native of Japan, bears in early spring numerous short racemes of large greenish-yellow flowers; it is a free-growing tree, with stout branches and large, Plane-like leaves. *A. crataegifolium*, also indigenous to Japan, forms a slender tree, conspicuous for its small deep green Hawthorn-like foliage. *A. c. Veitchi* is an attractive sort, with variegated leaves; very uncommon and quite hardy. *A. hyrcanum* (*A. caucasicum*), from the Caucasus, forms a compact specimen of rather slow growth; its rich green leaves set on bright red petioles are heavily shaded with yellow in autumn, and covered with a brownish tomentum on the under-sides; they are very pleasing in autumn when turning to a reddish-brown shade. *A. pennsylvanicum* (*A. striatum*), the Snake-barked Maple, is very conspicuous by reason of its green bark being striped with white; it is a native of the United States, very ornamental, and grows luxuriantly in dry soils. *A. saccharinum* (Sugar Maple) is a handsome, free-growing, North American species, bearing some resemblance to the well-known Norway Maple; its leaves, covered with whitish powder on the under-surface, are very effective, especially in autumn, at which time the colour changes to a warm rose tint. *A. Heldreichi* is of erect growth, with finely-cut leaves. *A. argutum* is a distinct and elegant Japanese species, of medium height, quite hardy, and very uncommon in this country; its palmately-lobed leaves are set on long footstalks. *A. dasycarpum* (Silver Maple) is a beautiful park tree, with rich green palmate leaves glaucous on the under-surface; it is of fairly rapid growth, and one of the best Acers for avenues. *A. circinatum*, a North American tree of short stature, is well adapted for planting where the taller ones would be out of place; its leaves change to bright scarlet in autumn; a capital sort for dry soils. *A. monspessulanum*

is freely branched, and grows about 20ft. high; its bright green leaves are set on long footstalks; it is very ornamental, by no means common, and thrives better in gravelly soils than most of its congeners. *A. platanoides rubrum* has distinct reddish-brown foliage; very effective in the landscape. *A. p. globosum* is rather slow in growth, and forms a neat round-headed tree; well adapted for extended culture. *A. p. Schwedleri* is of good growth, with broad bronze-green leaves set on long bright red petioles; very effective in autumn. *A. pictum rubrum* (*A. colchicum rubrum*) is a choice tree of vigorous growth, with conspicuous brownish-red bark and glossy-green leaves, which in summer assume a purplish-red hue, intensifying in colour till they fall off in autumn. *A. rubrum* (*A. coccineum*), the Scarlet Maple, ranks as one of the finest of American Maples for its autumnal tints; it grows about 20ft. high, of rather slender habit, and its green, deeply-lobed leaves change to shades of orange and red in September. *A. Pseudo-platanus flavo-marginatum* has pale green leaves, mottled and edged with white. *A. P.-p. Webbianum* has similar leaves to those of the last-named, but the tree is of more vigorous growth. The purple foliage of *A. P.-p. atropurpureum* is very rich; this variety deserves to be planted extensively in parks and pleasure-grounds. *A. P.-p. Leopoldi* has pretty variegated leaves set on red petioles; it is distinct and handsome. *A. P.-p. elegantissimum variegatum*, a sport from the last-named, is without doubt the best of the recently-introduced Sycamores. In habit it resembles the type, being free in growth, quite distinct, and very ornamental. In spring its leaves are suffused with rose-pink on a cream ground, and in some cases they are irregularly splashed with green. Where vigorous trees with showy foliage are required this Sycamore should be noted. *A. Negundo variegatum* is one of the most charming of hardy trees, with silver-coloured foliage, and is a favourite tree for the villa garden; it succeeds well in dry soils, and does not lose colour in the sun. It may be grown either as a bush, or as a standard, worked on the green-leaved kind. *A. N. elegans* is much freer in growth than the last-named; its stout light green shoots are covered with a glaucous bloom, and the pale green leaves irregularly bordered and splashed with yellow, change to cream-white with age; a fine decorative tree. *A. N. crispum* and a *A. N. laciniatum* are also noteworthy.

For elegance of habit, colour, and variety of foliage, no hardy shrubs can compare with the varieties of the dwarf-growing Japanese Maple (*A. palmatum*). Although some of them have been grown in British gardens for a considerable time, they have not been much planted. No doubt their absence may be due to the fact that they were looked upon as a trifle tender. Their hardiness is, however, beyond question, and we are familiar with

plants that have withstood several degrees below zero without showing any signs of injury. What they do object to, and this should be remembered at planting-time, are north and east winds; this difficulty can be overcome by selecting a position sheltered from cold winds. All the Japanese Maples mentioned below make splendid pot subjects for conservatory and room decoration, as well as pleasing lawn trees. They thrive in ordinary soil, provided it is well drained. *A. palmatum* (*A. polymorphum*) is a well-known kind, having deep green leaves, shaded with yellow and rose in autumn. *A. p. aureum* is strikingly handsome, with rich yellow foliage. *A. p. roseo-marginatum* has deeply divided leaves, pale green, edged with rose-pink. *A. p. sanguineum* has leaves a trifle larger than the type, and of a rich crimson hue. The leaves of *A. p. atropurpureum* are of a beautiful bronzy-purple shade; it is a vigorous grower. *A. p. dissectum* (*A. p. palmatifidum*) is a distinct and beautiful form, with light green fern-like leaves; its sub-variety, *ornatum*, also has fern-like leaves, but of a rich



FIG. 238.—ÆSCULUS PAVIA.

shade of bronze-purple. *A. p. septemlobum* has beautiful foliage of a tender shade of green. *A. p. s. elegans* is very ornamental; the beautifully-lobed leaves undergo various changes of colour, from pale green, through pink and crimson, to dull red. *A. p. s. laciniatum* is distinct, elegant, and of good growth. Its soft green leaves are touched with rose.

ÆSCULUS.—The value of *Æ. Hippocastanum* (Horse Chestnut) for park decoration is well known, and as an avenue tree it

is second to none. It is not over-partial to wet soils, a rather rich loam, moderately dry, suiting it admirably. *Æ. H. flore-pleno* is a fine variety with double flowers; its spikes of flowers are large and massive, and remain in condition for a long time. It is later in coming into blossom than the type. *Æ. carnea* (*Æ. rubicunda*) is a North American species, and grows about 20ft. high. It is valuable in gardens where the first-named species would be too big. Its bright scarlet flowers are produced on stout spikes, and stand well above the deep green foliage. *Æ. c. Brioti* makes a medium-sized, well-balanced tree, with deep rose-coloured flowers. It is very floriferous, and one of the finest of the family. *Æ. indica* (Indian Horse Chestnut), a native of the Western Himalayas, is a lofty, much-branched tree, and bears abundantly thyrsoid panicles of white flowers blotched with yellow and red at the base. *Æ. flava* (*Pavia bicolor*) is a yellow-flowered kind, distinct and ornamental. *Æ. parviflora* (*Pavia macrostachya*) is a handsome small-growing tree, suitable for small gardens; it is also useful for planting as an isolated specimen on the lawn. Its long racemes of white flowers are very beautiful, and borne with much freedom. *Æ. Pavia* (*Pavia rubra*, Fig. 238) is of dwarf habit and slender growth, and carries slender panicles of bright red flowers. *Æ. californica* (*Pavia californica*) is somewhat scarce in gardens, but very handsome. It is rarely seen more than 15ft. in height, and is very pretty about midsummer when laden with its pale rose-coloured flowers.

AILANTUS GLANDULOSA (Tree of Heaven) is of rapid growth, and its divided leaves are deep green, and often 5ft. long. It succeeds well in dry soils, and as it grows to a height of 60ft., it is more adapted for the park than for the garden. It may also be used with good effect in sub-tropical gardening if treated as recommended for *Paulownia imperialis*.

ALDERS (*Alnus*) are specially suitable for damp soils, and when planted near water produce a telling effect in spring, when their elegant pendulous catkins (Fig. 239)

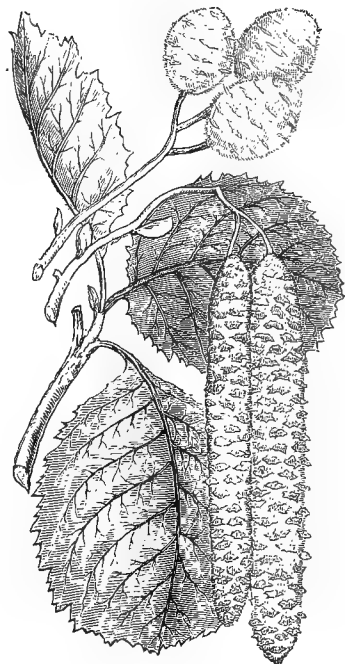


FIG. 239.—*ALNUS GLUTINOSA*.

are displayed on the leafless branches. *A. glutinosa aurea* has strikingly ornamental foliage, especially in spring, and this does not get burnt by hot suns. *A. g. imperialis* (fern-leaved), *A. g. laciniata* (cut-leaved), *A. cordifolia*, *A. cordata*, *A. pubescens*, *A. viridis*, and *A. oregona* are useful decorative kinds.

AMELANCHIERS.—In the months of April and May these are laden with their graceful racemes of snow-white flowers, and when planted in conjunction with some of the pink-flowered Pyruses, Almonds (Prunuses), or Thorns, produce a pleasing effect. *A. canadensis* (*A. Botryapium*; *Mespilus canadensis*) varies in height from 20ft. to 40ft., and a good-sized tree in full blossom is very beautiful. It is also effective in autumn, as its leaves assume a rich shade of golden-yellow. This kind should be increased by layering, as then the plants flower freely when 18in. or 2ft. high, and in such a condition are well adapted for planting in distinct masses. *A. c. oblongifolia* is the last of the group to blossom. It is of bushy habit, and carries a wonderful profusion of white flowers on short racemes. Fine for massing. *A. alnifolia* (Dwarf June Berry) grows about 8ft. or 9ft. high, and is specially valuable for small gardens. It is a



FIG. 240.—ARALIA CHINENSIS.

lovely free-flowering shrub, and particularly attractive in late summer by reason of its brilliant-tinted foliage. *A. vulgaris* is another excellent kind, of free growth. The Amelanchiers succeed in ordinary soil.

AMORPHA FRUTICOSA (False Indigo), from the South United States, grows freely in dry soils, and bears spikes of bluish-purple flowers in summer. It is of upright habit, and grows about 6ft. high. *A. canescens* (Lead-Plant) is distinct, with grey leaves and slender panicles of dark blue flowers that are borne in September, on which account room should be found for it in the garden.

ARALIA SPINOSA (Anglica Tree) retains its large compound leaves till frost sets in, and although its yellowish-white flowers are small, they are produced in such great quantities as to give it a distinct and handsome appearance. It is quite hardy and vigorous in growth, and as it blossoms in late autumn is specially valuable for public parks and pleasure-grounds. Its leaves and stem are provided with short spines. It should never be cramped for room, as its real beauty is seen only when allowed freedom in growth, a free circulation of air, and when planted in moist, rich soils. *A. chinensis* (*Dimorphanthus mandschuricus*; *Aralia mandschurica*) (Fig. 240) also delights in a moist, warm soil, and, although hardy, protection from north and east winds should be secured for it. Its large bipinnate leaves are composed of small ovate leaflets, and the creamy-white flowers are produced in terminal panicles.

AZALEAS.—See Rhododendrons.

BERBERIS.—The Barberries form a delightful group: Not only are the numerous varieties beautiful when in flower in spring and autumn (when the foliage changes to shades of crimson, chocolate, and orange), but they are also attractive when covered with fruit in winter. Ordinary soil is suitable, and a select list should contain some of the following: *B. vulgaris foliis-purpureis* is one of the most charming of dark-leaved shrubs; it grows freely, and keeps its colour well. It is best increased by cuttings, layers, or division, as a great percentage of seedlings revert to the type. Planted in masses, and cut down annually, it throws up vigorous shoots with rich purple foliage. *B. v. asperma* is an old but by no means common shrub; it forms a stout bush, and in autumn, when laden with its immense crops of bright scarlet berries, is one of the most desirable of berry-bearing shrubs. *B. v. aetnensis* forms a dwarf bush with peculiar zig-zag branches and stout spines; its flowers are produced freely. *B. v. amurensis*, *B. v. fructu-albo*, and *B. v. macrocarpa* are also showy. *B. aristata* grows into a stout bush, with brownish-red spreading branches and shining green serrated leaves; its bright yellow flowers are produced on long stalked racemes and are succeeded by red berries, which hang on the bushes until the middle of winter, at which time its brightly-coloured bark is effective. *B. sinensis* is an elegant Chinese species, and bears a wonderful profusion of flowers, which are followed in autumn by attractive berries, and as the leaves die off a rich crimson colour it is valuable for autumn effect; it grows about 6ft. high, and has been cultivated in this country since 1815. *B. Lycium*, from the Himalayas, is a valuable Barberry, of distinct growth, with upright slender branches and narrow glaucous leaves; the flowers are borne in erect racemes with great freedom; it is a distinct and uncommon species. The most beautiful in autumn

is a Japanese species named *B. Thunbergi*, which forms a dwarf, compact, much-branched bush, with small pendent flowers and tiny pale green leaves, which are brilliant crimson, orange, and yellow in autumn; this is a first-rate subject for small gardens, as well as for planting in front of taller-growing shrubs. *B. virescens* and *B. concinna* are effective. *B. angulosa* is beautiful in the autumn, the foliage dying off a crimson-scarlet colour.

BIRCHES (*Betula*) are scattered over Europe, Asia, Japan, and North America, and vary from mere bushes to trees nearly 100ft. high. Few trees, either exotic or native, are more beautiful than our own British Birch (*Betula alba*, Fig. 241).



FIG. 241.—*BETULA ALBA*.

Its elegant pendulous branches are clothed with leaves of the tenderest green in spring and summer, and in winter its erect slender silver trunk adds a touch of colour to the landscape. It grows to a height of about 60ft. There are many forms of the Common Birch, and the following list comprises some of the most ornamental: *B. a. purpurea* is of drooping habit, with dark purple leaves; distinct and handsome. *B. a. fastigiata* is of free, distinct growth; in habit it resembles the Lombardy Poplar. *B. a. dalecarlica* (*B. laciniata*) should be included in a list of select trees; the smooth green leaves are deeply cut and lobed. *B. lenta* (Cherry Birch) reaches a height of 70ft., and forms a round-headed tree; with age the branches droop gracefully. *B. Maximowiczii*, one of the latest additions to the Birches, is very ornamental, free in growth, and quite hardy; it is a Japanese species with large leaves—much larger than those of any other Birch—and has rather dull orange-coloured bark. *B. nigra* (Red Birch) loves a moist soil, such as on the margins of lakes and streams, and is well adapted for

public parks and gardens; its rough, picturesque trunk is handsome. *B. occidentalis* (Black Birch) also delights in damp soil; it is of elegant habit, with long, pendulous branches, and dark green bark. *B. populifolia* (*B. acuminata*) and *B. papyrifera* are useful for the park. *B. nana* is very distinct; it

is of dwarf habit, rarely exceeding 3ft. in height, and succeeds admirably in boggy soils; useful for the shrubbery. *B. fruticosa* grows 4ft. taller than *B. nana*, and thrives under identical conditions. The Birches are very accommodating, and grow freely in poor soils.

CÆSALPINIA JAPONICA (*C. sepiaria*) is a somewhat rare shrub, introduced from Japan about forty years ago. It is quite hardy in this country, and delights in a peaty, well-drained soil and a sunny position. It is of spreading habit, with soft green leaves, composed of numerous small pinnules. The long, nearly erect racemes bear from twenty to thirty rich yellow flowers, which contrast well with the red anthers. A useful shrub for massing.

CALOPHACA WOLGARICA (*Colutea wolgarica*) thrives in sandy soil, and bears numerous racemes of yellow pea-shaped flowers from June to August, these being succeeded by brownish-red seed-pods. It is a low-growing shrub, and suitable for the front of the shrubbery. It may also be worked on the Laburnum, several feet above the ground-line; and if planted at intervals amongst low-growing shrubs, produces a pleasing effect.

CALYCANTHUSES.—Though not numerous, these comprise shrubs with dull red, deliciously-scented flowers. They thrive best in partial shade, and delight in a rich moist loam. *C. floridus* (Carolina Allspice) is an old inhabitant of our gardens, having been grown in this country since 1726; it is generally met with as a low bush, but in suitable situations will grow 8ft. high. *C. glaucus* (*C. fertilis*) is indigenous to the mountains of North Carolina, and of much the same habit as the last-named; the flowers are, however, less aromatic, and of a deeper shade of purple. *C. occidentalis* (*C. macrophyllus*) is a delightfully sweet-scented shrub, with large deep crimson flowers and ample bright green leaves; it grows about 6ft. high.

CARAGANA ARBORESCENS (Siberian Pea-Tree) grows freely, and flowers abundantly in dry soil; it blossoms in quite a small state, and succeeds well in smoky districts; its pea-shaped flowers are bright yellow. *C. Redowski* is remarkable for its elegant habit; its flowers, although similar to those of the type, are borne on long thin branches. *C. frutescens*, also indigenous to Siberia, bears very freely its pea-shaped flowers in May, although in some seasons it blossoms in April. It forms a roundish bush, of upright habit, and grows about 5ft. high. *C. microphylla* (*C. alta-gana*), *C. pygmæa*, *C. spinosa*, and *C. tragacanthoides* are attractive also.

CARPINUS (Hornbeams) are ornamental trees of good growth in ordinary soil. *C. Betulus* is well known, but the cut-leaved

form, *C. B. asplenifolia* (*C. B. laciniata*), is less common, and very distinct. *C. B. purpurea*, *C. B. pyramidalis*, *C. caroliniana* (*C. americana*), and *C. cordata*, are also deserving of attention.

CARYAS are beautiful park trees, and delight in rich soil and plenty of head-room. As they make few fibrous roots, and do not transplant easily, it is a good idea to set the nuts in the places where the plants are to remain. A few of the best kinds are *C. alba*, *C. olivæformis* (*C. angustifolia*), *C. sulcata* (*C. cordiformis*), *C. amara*, and *C. porcina*.



FIG. 242.—CARYOPTERIS
MASTACANTHUS.

CARYOPTERIS MASTACANTHUS is a somewhat scarce but pretty Japanese or Chinese shrub, with pale blue flowers (Fig. 242) that are borne in autumn with great freedom. It is of free growth, and delights in full exposure to the sun and in being out of the reach of cold east winds.

CASTANEA SATIVA (*C. vesca*) (Fig. 243), the sweet Spanish Chestnut, is a familiar park tree, but its silver (*albo-marginata*), yellow (*aureo-marginata*), and cut-leaved (*laciniata*) forms are less known, although decidedly ornamental. Other good kinds are *C. dentata* and *C. crenata*. They succeed best when planted in sandy loam.

CATALPAS are noble trees, beautiful in both foliage and flower. *C. bignonioides* (*C. syringæfolia*) is a native of North America, and has been in British gardens about 200 years; it is hardy in most parts of England, assumes a spreading form, and grows to a height of about 30ft. Its leaves are bold and bronze-tinted, whilst its flowers are borne freely in erect spikes at the points of the growths. They are white, flushed with puce, and dotted with purple in the yellow throat. *C. b. aurea* has golden-yellow leaves, which keep their colour throughout the summer, and do not get burnt by hot suns, as do those of so many variegated shrubs and trees. *C. cordifolia* (*C. speciosa*) is of vigorous growth and hardier than *C. bignonioides*. The soft green heart-shaped leaves, as well as the large white flowers mottled with purple and

yellow in the throat, are distinct and handsome. It is the first member of the genus to flower. The Catalpas flourish in moist soils, and are first-rate lawn trees.

CERCIS SILIQUASTRUM (Judas Tree) about the middle of May bears rose-coloured flowers with great freedom on the brown



FIG. 243.—*CASTANEA SATIVA*.

stems (Fig 244). It is a strange and picturesque dwarf tree, and is happiest when planted in a rather damp, rich loam.

CHIONANTHUS VIRGINICA (Snow Flower, or Fringe Tree) is a native of North America, whence it was introduced in 1796. It delights in a moist loam and a shady situation, and its fragrant, pure white flowers, with long, narrow petals, are borne in pendent clusters in May. As it is difficult to increase from cuttings it may be grafted on the Common Ash in March in the open air, or raised from imported seed. It is useful for forcing.

C. v. latifolia and *C. retusus* may also be mentioned, but in point of beauty they are inferior to the first-named.



FIG. 244.—*CERCIS SILIQUASTRUM*.

CLEMATIS(non-climbing).—This much-neglected, yet beautiful group of Clematis, is deserving of more extended culture, as it affords a goodly display of variously-coloured flowers in early summer and autumn. Those here mentioned are thoroughly hardy, needing no protection whatever, and as they are easily accommodated, many a border could be made more attractive were they more generally cultivated. The best results are obtained when planted in a deep, moist, rich soil, as the roots are numerous, and go rather deeply into the soil. *C. aromatica* is a delightful shrub, with small, sweet-scented, violet flowers, produced in summer and autumn. It grows about 5ft. high, and is sometimes labelled *C.*

caerulea odorata. *C. integrifolia*, a European species, bears its showy blue flowers from June to August, and *C. De Durand*, a hybrid between the last-named and *C. lanuginosa*, is particularly handsome, with large dark violet flowers. It grows about 4ft. high, and flowers profusely and continuously for about four months. *C. Fremonti* hails from North America; and bears purple drooping flowers. *C. recta* (*C. erecta*), an old species, bears a wonderful profusion of small fragrant white flowers in dense branching corymbs, which remain in beauty for some considerable time. It is a gem for the border, and delights in full exposure to the sun's rays. *C. heracleæfolia* (*C. tubulosa*) is a Chinese species of free growth, with broad deep green leaves, and in summer bears clusters of tubular-shaped purplish-blue flowers. *C. h. Davidiana* is an improvement on the last-named, and valuable for its attractive blue flowers.

CLEODENDRON TRICHOTOMUM is an autumn-flowering shrub, quite hardy, vigorous, and very handsome. Planted in rich soil

it grows into a bush 10ft. high, having numerous stout branches clothed with large dark green leaves that are particularly showy in autumn when fading to a reddish-brown, crimson, and orange. Its deliciously-scented white flowers, with a rosy-purple calyx, are borne in large terminal cymes in September. *C. foetidum* (*C. Bungei*) should only be planted in the open air in very favoured localities. It is better adapted for the unheated greenhouse.

CLETHRAS.—When planted in peaty soil and a sheltered nook, these grow well and flower abundantly. They form neat bushes, and all bear racemes of fragrant flowers of various shades of white. They are suitable for planting in the front of the shrubbery, as well as by lake or stream-side. *C. alnifolia* (Alder-leaved Pepper Tree), from North America, forms a loose bush 4ft. or so high, and about the middle of July bears an abundance of flowers at the points of the branches. *C. a. tomentosa* merits attention principally on account of its lateness in flowering. It is distinct and pretty, grows about 4ft. high, and from July to the middle of October bears a profusion of pure white flowers which are considerably larger than those of the type. The following are excellent kinds: *C. a. scabra*, *C. canescens*, and *C. acuminata*.

COLUTEA ARBORESCENS (Bladder Senna) thrives under the same conditions as the Caraganas; it grows about 10ft. high, and bears yellow pea-shaped flowers, succeeded by soft green bladder-like legumes, which change to a reddish colour by the time the seeds are ripe. *C. cruenta* (*C. sanguinea*) is a quick-growing species with bright green leaves and reddish-coloured flowers. *C. istria* (*C. microphylla*) and *C. melanocalyx* are also showy.

CORNUS (Dogwoods) are effective dwarf shrubs and small trees, and as some of them thrive under the shade of tall-growing trees their value is enhanced. Some are conspicuous on account of their variegated foliage, others by reason of their showy flowers, whilst a few are effective in winter, as then the slender bright red-barked branches give colour to the landscape. *C. florida* (*Benthamia florida*) (Fig. 245) is not so well known as it might be. It is rather difficult to get it properly established, but once it is so, its pure white flowers are borne freely every year about April. The leaves in autumn change to brown and yellow. It loves a sunny spot. *C. f. rubra* is a desirable shrub, with rose-pink flowers. *C. macrophylla* (*C. brachypoda*) is a strikingly-handsome Dogwood, with large rich green leaves, heavily tinted with orange-red in autumn; the clusters of white flowers are produced in the early summer. *C. m. variegata* is a pretty silver-leaved shrub, deserving of extended culture. *C. Kousa* (*Benthamia japonica*) is another lovely white-flowered

shrub that should be noted by the planter; it is of good growth, and very hardy. *C. alba* should be planted for winter effect, preferably in groups in front of taller-growing shrubs. After its

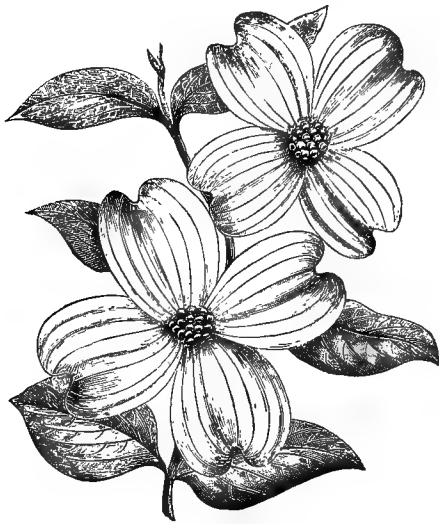


FIG. 245.—*CORNUS FLORIDA*.

leaves have fallen, the bare red stems create a rich colour-picture. One of the most effective of variegated shrubs is *C. a. Spaethi* (*C. sibirica Spaethi*). The pale green leaves are striped with yellow, and irregularly bordered with golden-yellow. *C. alternifolia*, *C. circinata*, *C. sanguinea*, and *C. officinalis* are good Dogwoods, too. *C. mas* (Cornelian Cherry) is of tree-like habit, and in February and March is particularly noticeable when bearing its clusters of tiny yellow flowers; it thrives well in sandy soil.

CORYLUS AVELLANA ATRO-PURPUREA (Purple-leaved Nut) is a handsome shrub or small-growing tree, with crimson-purple foliage. It may be grown in either bush or standard form, and for planting in shrubberies where silver-leaved or pale green shrubs predominate, its value is considerable. In order to secure large and richly-coloured leaves, hard pruning should be practised yearly. *C. colurna* (*C. arborea*) is very ornamental when displaying its long showy catkins. *C. heterophylla* (*C. Sieboldiana*) and *C. rostrata* are noteworthy.

COTONEASTERS.—See “Berry-bearing Trees and Shrubs.”

CRATÆGUS (Thorns) form a group of considerable importance amongst low-growing trees, and may be cultivated in gardens of restricted area. They grow in almost any kind of soil, and either when covered with their fragrant white, pink, or red flowers in spring, or when laden with showy berries in autumn and winter, are highly ornamental. The following are a few of the best kinds: *C. coccinea* is the scarlet-fruited North American Thorn, and grows to a height of from 20ft. to 30ft.; its white flowers are produced in May, and its deep green cordate leaves turn in autumn to rich crimson. Its effect in winter is very fine. *C. c. macrantha* is a vigorous Thorn with a spreading head, and

on account of the rich autumnal tints should be planted freely in public gardens and parks. *C. Azarolus* is of vigorous growth, and frequently reaches a height of 20ft. ; its white fragrant flowers are borne in May, and its orange-red fruits are large and effective in autumn. *C. A. Aronia* (*C. Aronia*), popularly called the Aronia Thorn, is a native of the Levant, of good growth, and bears a large display of white flowers in June. It is a conspicuous object in the landscape in autumn when laden with its large yellow fruit. It is a grand lawn tree. *C. monogyna* is free in growth, and of a distinct, pendulous habit ; when in full flower it is very beautiful. *C. m. crantonensis* has larger flowers of a purer white, and is of elegant habit. *C. m. stricta* is somewhat similar in growth to the Lombardy Poplar, and for gardens of limited size should not be overlooked ; the white flowers are borne with moderate freedom. *C. m. flexuosa*, *C. m. semperflorens*, *C. m. Regina*, and *C. m. præcox*, are showy. The leaves of *C. Crus-galli arbutifolia* turns to a brilliant crimson in autumn, and for this reason the variety should be planted extensively. *C. C.-g. ovalifolia*, *C. C.-g. linearis*, *C. C.-g. fontanesiana*, *C. C.-g. pyracanthifolia* (*salicifolia*), and *C. C.-g. splendens*, are very ornamental. *C. oxycanthoides flore-pleno rosea* (double rose-coloured Thorn) is one of the most delightful of June-blossoming shrubs ; its flowers are borne with great freedom, and continue long in perfection. *C. o. flore-pleno coccinea* (double scarlet) should be planted freely in the park and garden ; like the last-named, its bright red flowers remain long in beauty. *C. o. lucida* produces a wealth of double white flowers, and makes a capital companion to the last-named. The flowers of *C. o. flore-puniceo* are single, red, very attractive, and borne freely. *C. o. atrofusca* is a beautiful weeping Thorn, with medium-sized pure white flowers. *C. heterophylla* (*C. multiflora*) is a dense-headed tree of low growth ; its white flowers are borne early in spring, and it retains its leaves until early winter, while its crimson fruit is effective, and hangs on the tree for the greater part of the winter. *C. cordata* (*C. acerifolia*) is a handsome American species, with a round top and shining green leaves, which, in September, turn to crimson-scarlet ; the white flowers are produced in dense terminal corymbs late in the season. *C. orientalis* (*C. odoratissima* and *C. flabellata*) grows 20ft. high when treated generously ; it is freely branched, slightly pendulous, and one of the latest to start into growth in spring, but when mantled with white blossom is delightful. *C. pinnatifida*, a choice Thorn, bursts into leaf early in spring, and is conspicuous in autumn, when its decaying leaves take on shades of yellow and brown. Its fruits are large and attractive. *C. parvifolia* is a valuable late-flowering Thorn. It is rather slow in growth, and prefers partial shade to full exposure. It forms a low, much-branched tree, armed with very long sharp

spines, and produces freely its large white blossoms about the beginning of June; while the greenish-yellow fruits hang on the trees for the greater part of the winter. *C. pyrifolia* is meritorious by reason of its large, handsome, Pyrus-like leaves. It bears an abundance of white flowers in June, and drooping clusters of orange-tinted fruits in October. *C. Douglasi*, from North West America, grows about 15ft. high, and is conspicuous for its leathery leaves, and small dark purple fruits. *C. spatulata* is well adapted for small gardens, as it is rather slow in growth, and rarely exceeds 12ft. in height. It forms a neat tree, with elegant branches, and in May and June, when bearing its white flowers, is very handsome. Its attractive fruits are bright red in colour. Few Thorns retain their foliage longer than this one. *C. tanacetifolia* (Tansy-leaved Thorn), a distinct and handsome species indigenous to Greece, ranks amongst the best of the late-flowering kinds. Its deeply-cut greyish leaves and fragrant flowers are very welcome, while its large yellow fruits are pleasing in autumn.

CYTISUS.—This genus comprises several useful garden shrubs. As most of them are very free-flowering, and not particular as to soil, they should not be forgotten. *C. albus* (white) and *C. scoparius* (yellow) produce masses of colour, and Andre's Broom—*C. s. Andreanus* (*Genista Andreana*)—is effective when planted in groups. The last-named is useful for forcing, and when grafted on the Laburnum makes a compact head, and comes into flower in advance of those on their own roots. For open-air planting it will be found to answer better on its own roots. *C. s. pendulus* deserves a place in the rock garden; it has large rich yellow flowers. *C. capitatus*, a European species, bears an abundance of rich yellow flowers in June, and in some seasons the lateral growths produce another display in autumn; it is very hardy, and grows from 3ft. to 4ft. high. *C. biflorus* (*C. elongatus* and *C. ratisbonensis*) is very beautiful; its yellow flowers are produced in threes along the whole length of the shoots; it grows about 4ft. high. *C. nigricans* (*Lembotropsis nigricans*), Black Cytisus, has been cultivated in this country since 1730. It is a neat-growing Austrian species, with trifoliate leaves, and bears erect racemes of bright yellow flowers with much freedom from June to the early part of August. *C. praxox* (*C. purgans* × *C. albus*) is a delightful dwarf shrub, producing its cream-coloured blossoms in early summer. Planted in masses on the grass, and with the lower shoots pegged to the ground, it is, when in flower, distinct and pretty. This kind is best increased by cuttings, as the majority of plants raised from seed revert to the White Broom (*C. albus*). *C. purpureus* is of interest for its dwarf habit and free-flowering qualities; its small purple flowers are borne from May to August, and quite distinct from all its congeners. When worked on the Laburnum, 4ft. or

5ft. from the ground, it forms a pretty weeping shrub; but when grown on its own roots, it rarely attains more than a few inches high; for which reason it should always find a place in the rock garden. *C. p. albus* is a white-flowered form of the last-named, and quite as hardy. *C. shipkaensis* has clusters of pure white flowers at the apex of the growths, which are very useful for cutting. *C. austriacus* (*C. banaticus*) forms a neat bush, 2ft. high, with clusters of yellow flowers from July to September. *C. Ardoini* is fine for the rock garden, as it is of dwarf habit and very free-flowering. *C. kewensis* (*C. Ardoini* × *C. albus*) is quite prostrate or creeping in habit, and bears its cream-white flowers freely; it is a beautiful rock shrub. *C. purgans* is an uncommon garden shrub; less vigorous in growth than *C. præcox*. It is a native of South-West Europe, and although introduced to this country as long ago as 1768, it is even now rarely met with. It is a neat, low-growing species, and in May and June, when laden with its golden-yellow blossoms, is very pretty.

DAPHNES.—The type of the deciduous group, *D. Mezereum*, is a European shrub of great value in the garden in early spring, and one deserving of more extended culture for its delightfully fragrant reddish-purple flowers, which are produced so abundantly along the whole length of every branch. It loves a cool, moist soil and an open position, but it is by no means averse to partial shade. Beautiful effects are obtained when planted in groups on the grass, using as a carpet such things as *Gaultheria procumbens* and Butcher's Broom. There are a few excellent varieties differing from the type in the colour of the flowers and the time of flowering, the principal of which are *D. M. flore-albo* (white) and *D. M. grandiflora (autumnalis)* (bright red). The flowers of the last-named sometimes appear in October, and if the winter is mild a display of blossom is kept up until spring. *D. Genkwa* (*D. Fortunei*) is a beautiful and uncommon Japanese species, with long, slender, gracefully-arching shoots, upon which are borne sweet-scented lilac-coloured blossoms in early spring. This is well adapted for forcing into flower for conservatory decoration during the dull winter months. *D. alpina* is a pretty alpine species, suitable for the rock garden, as it rarely exceeds 2ft. in height. It is a close-growing, much-branched shrub, and in March and April produces its small, fragrant, blush-coloured flowers.

DEUTZIA.—Though not large, this genus contains several easily-grown and handsome-flowering shrubs. *D. crenata* (*D. scabra*) grows in good soil to a height of about 8ft., and when its shoots are laden with racemes of pure white flowers its beauty is evident. The double white flowers of *D. c. flore-pleno* are suffused with purple, and borne very freely. *D. c.* Pride of

Rochester has double white flowers; it is of erect habit, and very distinct. *D. c. punctata* deserves a place on account of its pretty variegated foliage—pale green, striped with white and blotched with dark green. *D. parviflora* is the first to flower in the open air; it is a native of Northern China, and makes a dense bush 5ft. high; the creamy-white flowers are produced in profusion. *D. corymbiflora* is a new kind, of elegant habit and wonderfully free-flowering; the pure white flowers are borne in graceful panicles, and last in good condition for a long



FIG. 246.—DIERVILLA VAN HOUTTEI.

time; a very valuable addition. *D. gracilis* is the most generally cultivated member of the genus; it is perfectly hardy, of slender growth, 2ft. high, very free-flowering, and valuable for forcing. Another dwarf-habited kind, but of stronger growth than *D. gracilis*, is *D. Lemoinei*, also useful for forcing; it is a very handsome variety, and exceptionally floriferous, the small white flowers being borne in compact trusses.

DIERVILLAS.—Few dwarf-growing shrubs are more easily grown, or create better effect, than the Diervillas (Weigelas or Bush Honeysuckles). Planted in beds on the turf, or in front

of taller-growing shrubs in the border, they succeed and look well. They like rich, well-drained soil, and an annual top-dressing of leaf-mould increases the floral display. The thin, flowerless shoots should be removed. A good selection should include some or all of the following: *amabilis* is of good growth, and bears an abundance of rose-coloured flowers in early summer. *Van Houttei* (Fig. 246), carmine shaded red

and mottled white. Abel Carriere is very fine; the rosy-carmine flowers are large and freely produced. Beranger, rose-purple, yellow throat. Eva Rathke is very handsome; flowers rich purple, almost crimson: the plant is of good habit, and flowers continuously. Jean Mace is another beautiful kind, with larger and deeper-coloured flowers. *rosea* is a general favourite, its rose and white flowers being produced with exceptional freedom, and Stelzerni, with its dark red flowers, is equally attractive. *candida* and *hortensis nivea* are the best of the white-flowered kinds; not only are the flowers of the purest white, but they are borne with more than usual freedom. Both are desirable shrubs for forcing. Some kinds are conspicuous for their yellow and variegated foliage, especially those named *Amabilis variegata* and *Looymansi aurea*. The leaves of the former are edged and striped with white. The latter is one of the showiest of golden-leaved shrubs; it should be planted in a sunny spot, and never allowed to want for water during dry weather; before the leaves fall they are heavily-shaded with brown.

ENKIANTHUS CAMPANULATUS is of Japanese origin, with slender branches and small, ovate, oblong serrated leaves; the pretty pink flowers, striped with red, are produced in clusters. *E. japonicus* should also be included; it is of good habit, and the rich green leaves turn to a deep orange colour in autumn. The drooping flowers are pure white and borne freely. These plants succeed best in a moist, peaty soil and a sheltered situation.

EUCRYPHIA PINNATIFOLIA (Brush-Bush) is a very handsome shrub from Chili, where it is said to grow to a height of about 15ft. Its deep glossy green pinnate leaves and pure white flowers, with golden stamens in the centre, are very beautiful. It blossoms in July and August, and is perfectly hardy near London, but should be planted in a warm spot so as to insure proper ripening of its wood to withstand severe winters and promote full annual flowering. It is attractive in autumn when its leaves are shaded with orange. Good drainage is essential, and a soil composed of loam, leaf-mould, and rough peat, suits it well.

EUONYMUS.—See "Berry-bearing Trees and Shrubs."

EXOCHORDA.—This is a small genus closely allied to the Spiræas, and succeeds under similar treatment. The best-known member of this ornamental group is the Pearl Bush, *E. grandiflora* (*Spiræa grandiflora*), frequently used as a wall-coverer, but as it is quite hardy it may be planted as an isolated specimen on the fringe of the lawn with excellent results. It is a Chinese plant and bears racemes of pure white flowers each as large as a two-shilling piece on all the well-ripened growths in May, at

which time it is particularly handsome. *E. Alberti*, a rare and delightful white-blossomed shrub, is fortunately also hardy, and may be described as superior to the type.

FAGUS.—For pleasure-ground planting the Beech (*Fagus sylvatica*) is well known. It is seen to the best advantage in sandy soil with a calcareous bottom. In early spring the tender green foliage is very pleasing, and towards the fall of the leaf the colour varies to chestnut-brown. The Beech makes a good hedge plant. *F. s. argentea variegata* is distinct and effective; leaves broad, green, and finely-striped with white; it is late in unfolding its buds in spring. *F. s. heterophylla* (*F. laciniata*), the fern-leaved variety, is charming, and grows well. *F. s. macrophylla* (*F. latifolia*), with its bold leaves, is very handsome, and deserves to be largely grown; it is a vigorous grower and requires plenty of head room. *F. s. atro-purpurea* is unquestionably one of the most ornamental of purple-leaved trees; it is as free in growth as the type, and much more beautiful. *F. s. tricolor* is showy and distinct, with large purple leaves streaked and margined with rose-pink; it is very attractive in a young state, while *F. s. grandidentata* and *F. s. aureo-variegata* are deserving of mention.



FIG. 247.—FORSYTHIA
SUSPENSА.

FORSYTHIAS are delightful April-flowering shrubs, suitable for many purposes; they all bear an abundance of yellow bell-shaped flowers, and are of easy culture. On account of its low growth, *F. viridissima*, introduced from Japan in 1845, is well adapted for planting as a margin to the shrubbery. Beyond doubt, however, the most useful, as well as the most beautiful, species is *F. suspensa* (*F. Fortunei* and *F. Sieboldi*) (Fig. 247). Its graceful, arching shoots, often 6ft. long, create a pleasing effect in spring, when clothed with golden-yellow flowers. It is useful for covering pillars and running over verandahs, as well as for hiding unsightly walls. To show the flowers off to advantage, Forsythias should be planted amongst low-growing evergreens. Beyond the removal of weak and spent-out growths, little pruning is necessary; but it should be remembered that the best time for this operation is immediately the plants have done blossoming, as they are then allowed the

full season in which to make and mature their wood. *F. intermedia*, a garden form between those already mentioned, should be included amongst choice spring-flowering shrubs. The Forsythias are of simple culture and readily increased by means of cuttings of half-ripened wood placed in sandy soil in close cases and shaded from the sun.

FOTHERGILLA ALNIFOLIA (American Witch Alder) produces terminal spikes of white, fragrant flowers in advance of the leaves. It is a dwarf-growing shrub of rather poor habit.

FRAXINUS EXCELSIOR (Ash) is well known as a timber and ornamental tree, and in order to get the best effects in the landscape, as well as timber of the finest quality, attention must be paid to position and soil. The Ash is not a good hedgerow tree, because of its roots, which ramble in all directions close to the surface of the soil, and soon exhaust its goodness. It succeeds best in a rich, moist (not too damp) soil, and when well established is of great beauty. Some of the varieties are handsome, especially the following: *F. e. aurea* (Golden-barked Ash), a conspicuous tree, and well adapted for planting in conjunction with the Silver-stemmed Birch, as the effect of the two in association is most pleasing; it is effective in summer as well as winter, but it is in its leafless state that its true character is seen. Then there is the silver-leaved kind (*F. e. foliis-argenteis*), in which the soft green leaves are striped and mottled with white; this is of robust growth. *F. e. heterophylla* (*F. e. diversifolia* and *F. simplicifolia*) has leaves of diverse shapes, but they generally consist of from three to five leaflets; it is decidedly ornamental. The narrow-leaved varieties, *angustifolia* and *crispa*, are also effective. *F. americana* (*F. alba*) is of rapid growth and distinct habit, having a perfectly straight trunk; it thrives in moist soils. *F. a. aucubæfolia aurea* is very free in growth, retaining its golden-coloured foliage throughout the summer, and is very useful for planting in sandy soils, as well as for adding colour, especially in public parks and gardens. The foliage of *F. a. foliis-argenteis variegatis* is very handsome, with cream and white markings on a green ground. *F. angustifolia* is of slender growth, with narrow rich green leaves. *F. potamophila* is distinct and ornamental, while *F. Richardi* should not be overlooked, being of erect, free growth, with foliage of a pleasing shade of green. *F. quadrangulata*, from the United States, grows about 60ft. high in favourable situations, and is very distinct on account of its four-angled branches and large handsome leaves.

The Flowering Ashes constitute a valuable group. *F. Ornus* (*Ornus europæa*) (Fig. 248) succeeds wherever the Common Ash thrives; it forms a well-balanced tree some 30ft. high, and is conspicuous in May and June when carrying its large plume-like

clusters of white flowers ; it makes a beautiful lawn-tree. *F. O. latifolia* and *F. O. angustifolia* are choice trees. *F. floribunda* (*Ornus floribunda*) grows about 35ft. high in suitable soils, and is deserving of wider recognition ; it is a lovely free-flowering tree. *F. Mariesii*, a native of Northern China, sent home about



FIG. 248.—FRAXINUS ORNUS.

twenty years ago, is quite hardy, but of somewhat slow growth ; its leaves are glossy green, and its large, dense panicles of snow-white flowers are borne in great profusion a fortnight later than those of *F. Ornus* ; it should be grafted on the Common Ash. *F. longicuspis* and *F. Bungeana* are very attractive species.

FUCHSIAS.—In the warmer parts of England Fuchsias flourish in the open air, but in cold districts the protection of a wall will be advisable to bring them through severe winters. *F. macrostemma*, a native of South America, *F. globosa*, and *F. Riccartoni*

are the best kinds for outdoor planting, and when they succeed are very showy in flower.

GAYLUSSACIA FRONDOSA (*Vaccinium frondosum*) is a much-branched bush, 4ft. or so high, and delights in a moist, peaty soil. It bears dull purple bell-shaped flowers in slender racemes, in May and June. *G. dumosa* (*Vaccinium dumosum*) is distinct, its pretty rose-coloured flowers being touched with white. This plant grows freely in dry soils, and blossoms in June and July.

GENISTAS thrive in soil that suits the Cytisus. *G. radiata* (*G. holopetala spartium radiatum*) is of slender growth, 2ft. high, and its yellow flowers appear in summer. *G. virgata* (*Spartium virgatum*) is a lovely shrub of elegant growth ; it bears an abundance of rich yellow flowers, and assumes a tree-like habit ; it grows freely and flowers profusely in sandy soil. *G. aetnensis* (*Spartium aetnense*), the Etna Broom, a native of Sicily, is a loose-growing shrub, sparsely supplied with small, narrow leaves ; its beautiful yellow flowers are succeeded by attractive seed-pods, and like the last-named it is happy in sandy soil. *G. hispanica* (Spanish Broom) is one of the showiest of the dwarf-growing *Leguminosæ* when laden with golden-coloured blossoms in early summer ; it is easily managed, perfectly hardy, rarely exceeding 1oin. to 1ft. in height, and admirably adapted for edgings to

beds occupied with permanent shrubs. It may also be used with good effect for covering dry banks and such like places. *G. tinctoria elatior* (*G. elata*, *G. thyrsoiflora*) is of free growth and very free-flowering. *G. sagittalis* (*Spartium sagittale*) is useful as an edging to beds or for the rockery; it is of prostrate habit and bears brightly-coloured flowers. *G. prostrata* and *G. pilosa* deserve a place in the rock garden. They are both of dwarf habit and free blossomers.

GLEDITSCHIA TRIACANTHOS (Three-thorned Acacia), *G. monosperma*, and *G. sinensis* (*G. ferox* and *G. horrida*) are tall, freely-branched trees, supplied with formidable spines and pinnate, rich green leaves. They succeed best in a rich, deep, loamy soil, and are good town trees as well as effective for park-planting.

GYMNOCLADUS CANADENSIS (Kentucky Coffee Tree) is a handsome foliage tree of free growth. Its very large bipinnate leaves, composed of small, dull bluish-green leaflets, do not appear until late in the spring, and its spikes of white flowers are borne in June. A rich, deep soil is advisable for this ornamental tree.

HALESIA TETRAPTERA (Silver Bell Tree) is an ornamental low-growing tree that succeeds best in rather moist soil. Its small Snowdrop-like flowers are pure white, and appear freely in April and May. *H. corymbosa* (*Pterostyrax corymbosum*) is a very uncommon Japanese shrub, and bears an abundance of small white flowers suffused with rose-pink in corymbose panicles early in June; it grows about 12ft. high, and succeeds well against a wall. *H. hispida* (*Pterostyrax hispida*) (Fig. 249) also carries an abundance of white flowers in corymbose racemes. It is free in growth, very hardy, beautiful when in flower, but is not planted nearly so much as it ought to be. *H. diptera* grows about 10ft. high, and is deserving of a place in pleasure grounds. The snowy-white flowers appear about three weeks after those of the first named species, and remain a long time in perfection.

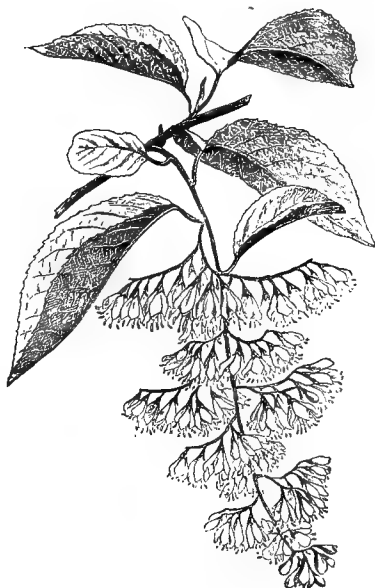


FIG. 249.—HALESIA HISPIDA.

HALIMODENDRON ARGENTEUM (Salt Tree) is a rare and beautiful shrub; it thrives in sandy soil, and produces pretty pink pea-like flowers with much freedom in early summer. The pinnate leaves are covered with a white silky down, which gives the plant (especially when treated as a standard worked on the Laburnum) a distinct and pleasing appearance.

HAMAMELIS ARBOREA (Japanese Witch Hazel) is a curious, and in a way beautiful, shrub or small tree; its flowers appear in winter, and their long, twisted, golden-yellow petals rising out of the deep claret-coloured calyces are pleasing indeed in the weak sunshine of a January day. It grows to a height of 15ft., and stands out as one of the most attractive of early-flowering trees, as every fully-ripened small twig carries a rich profusion of flowers; and if a background of evergreen shrubs is afforded, the golden colour is seen to greater advantage. Apparently it is not generally known that this Witch Hazel succeeds well in sandy soil, although a fibrous loam, mixed with leaf-mould, forms the best mixture for planting it in. Good drainage is essential. *H. mollis*, from Central China, is the latest addition, and a particularly valuable one it is, too; it is quite hardy, of rather slow but neat growth, with broad deep green leaves and lovely flowers composed of rich orange-yellow wavy petals and glossy chocolate-coloured calyces; it is free in blossom, and in habit bears some resemblance to *H. japonica*. The other members of the genus are not nearly so attractive as those named above. The Hamamelis here mentioned may be propagated by grafting in February or early March on stocks of the North American Witch Hazel (*H. virginica*), which should have been potted up the previous spring, so that they may be thoroughly established by grafting time. Use well-ripened scions and place them in a warm case and syringe overhead lightly twice a week to facilitate new growth.

HEDYSARUM MULTIJUGUM is an uncommon shrub, introduced from the desert plains of Central Asia in 1883. It is a member of the leguminous family, varies in height from 3ft. to 5ft., is of spreading, rather loose habit, and commences to flower in the early part of June, keeping in blossom until the end of August. As few shrubs flower at that time, it is unusually welcome. Its reddish-purple pea-shaped flowers are borne in axillary racemes about 1oin. long, and the best effects are produced when the shrub is grown in masses, especially if the lower shoots are pegged into the soil. It delights in sun-heat, and prefers a somewhat dry soil.

HIBISCUS.—This genus embraces a valuable group of shrubs for the garden, as they flower in autumn, when few others are in blossom. Few shrubs are more easily accommodated than the varieties of *Hibiscus syriacus* (*Althæa frutex*), but they pay for

generous treatment, and when planted in a rather deep, rich soil, with full exposure to the sun's warmth, the display of blossom is particularly fine. The type is well known, having been cultivated in British gardens over 300 years. It seldom exceeds 6ft. in height and as much through, and carries numbers of purplish-violet cup-shaped flowers. The varieties are numerous, and the following are some of the best: *monstrosa* has large blush-white flowers, blotched with crimson at the base of each petal. *caelestis* is the first to flower; colour pale blue, blotched with purple. *totus albus* is very charming; flowers large, good shape, and pure white. Painted Lady is showy; pale rose, blotched with deep red. Duc de Brabant, *lilacina plena*, Comte de Hainault, Lady Stanley, *amplissima*, Leopoldi, and *amaranthus* are also deserving of recognition.

HYDRANGEAS should be represented in all gardens, as they are ornamental and easily grown. *H. hortensis* (*H. japonica*) (Fig. 250) is hardy in the South and West of England, and bears freely its large heads of flowers in summer. Some varieties raised from it are of great value. A few of the best are: *stellata*, with pale rose flowers, suffused with a deeper shade. *Lindleyi* (*H. japonica roseo-alba*) is distinct and handsome.

Thomas Hogg has enormous heads of snow-white flowers. Although hardy in sheltered spots, the *hortensis* group of Hydrangeas is seen to better effect when grown as pot-plants for conservatory decoration. In the open ground the shoots are sometimes cut down in severe winters, but vigorous growths are thrown up from the base of the plants in spring. *H. radiata* (*H. nivea*) is a free-growing sort with deep green leaves covered with a conspicuous white felt-like substance on the under-surface. It creates a pleasing effect when disturbed by wind. *H. quercifolia* (Oak-leaved), an American species, grows a few feet high, and delights in a moist, rich soil; its pure white



FIG. 250.—HYDRANGEA HORTENSIS.

flowers are produced in thyrsoid panicles. It is rather tender, and should only be planted out of doors in a sheltered position. *H. pubescens*, from Japan, is of erect, free growth, and bears flattish corymbs of white flowers tinged with rose. Of late-blossoming kinds *H. paniculata hortensis* (*H. p. grandiflora*) is the best; planted in either rich or poor soils, it always bears huge panicles of white flowers, provided the previous year's wood is cut back in February to a couple of eyes. A good mulching of leaf-mould or manure in June is a great benefit to the plants. *H. petiolaris* (*H. scandens*) is a Japanese species of climbing habit, fastening itself to walls by means of its numerous aerial roots; it has broad leaves, and flat corymbs of greenish-white flowers.

HYPERICUMS (St. John's Worts) are useful ornamental shrubs of low growth, some of which succeed under the shade of trees. They are nice rock-garden shrubs, and thrive in poor soils. The flowers of all are of different shades of yellow. *H. calycinum* (Rose of Sharon) is well known as a sub-evergreen carpet-plant, succeeding well in moist soils and under the drip of trees. *H. uratum* (*H. nepalense*) is a neat-growing species of much beauty. *H. patulum* is very charming, but, unfortunately, little known; it is of good growth, flowers abundantly, and is a first-rate rock-garden plant. *H. hircinum* commences to flower during the early part of August and continues until October. It is quite hardy, of free but slender growth, and very attractive when carrying its rich yellow flowers. The foliage emits a goat-like odour when bruised. *H. Moserianum* (*H. calycinum* × *patulum*) is one of the best of the St. John's Worts, being exceptionally free in growth as well as in blossom; its deep buttercup-yellow flowers are about the size of a five-shilling piece, and are produced throughout the summer and autumn; in severe winters it gets cut down to the ground-line, but with the return of spring throws up strong arching shoots from the root-stock. *H. Androsæmum* (Sweet Amber) grows from 2ft. to 3ft. high, and bears large golden-yellow flowers from July to September. *H. Buckleyi*, the latest addition to the genus, is a pretty and distinct dwarf-growing American species, well worthy of a place in the rock garden. It flowers in July. *H. Kalmianum*, *H. prolificum*, and *H. elatum* are good kinds also.

IDESIA POLYCARPA (*Polycarpa Maximowiczii*) is a lovely ornamental foliage tree indigenous to Japan, whence it was introduced in 1866. It is a choice tree, seldom planted in this country notwithstanding its hardiness and value for park decoration. It prefers a rich, moist, well-drained soil, and shelter from east winds is advisable. It forms a round-headed tree with stout branches supplied with heart-shaped, alternate, cheerful green leaves, set on long red (almost crimson) petioles. The drooping racemes of small sweet-scented flowers are succeeded by clusters of small dark fruits.

ITEA VIRGINICA (Virginian Willow), which is rare in English gardens, loves a cool, moist soil, and a shady position. It is a North American shrub, bears abundant racemes of white flowers in July and August, and usually grows about 4ft. high, forming a neat, compact bush.

JAMESIA AMERICANA, a native of the Rocky Mountains, forms a low, much-branched bush, with greyish-green leaves, and in June bears compact terminal clusters of white flowers. Ordinary soil and a rather shady position suits this rare shrub admirably.

JUGLANS (Walnuts).—These are valuable for ornamental planting, and prized for their nuts, or fruits, which are abundantly produced on large trees. The genus is generally represented in parks and pleasure-grounds by *J. regia*, which has been cultivated in this country upwards of 300 years, although noble specimens of the Black Walnut (*J. nigra*) are to be seen in various parts of the British Isles. There are, however, other species and varieties deserving of recognition, by reason of their ornamental qualities and freedom in growth. The genus comprises less than a dozen species, most of which hail from North America, and as they are all procurable in this country they might be employed more frequently in the park, especially for autumn effect. *J. nigra* is a first-rate town tree. It is vigorous in growth, with long branches and graceful foliage, which in September turns yellow, and is very effective in the landscape. *J. regia laciniata*, sometimes met with under the names of *J. heterophylla* and *J. filicifolia*, although not so vigorous as the type, is in some respects superior to it. It is slower in growth, and its slightly drooping branches, clothed with rich green, deeply-cut leaves, are very handsome. It makes a lovely lawn tree, and fruits freely. *J. mandschurica* is a very uncommon and handsome Walnut from Amurland. It is hardy, vigorous, and distinct, and yields a plentiful supply of pear-shaped fruits. *J. cordiformis*, a Japanese species, is equally hardy and well adapted for pleasure-grounds. *J. californica* and *J. Sieboldiana* are also deserving of the planter's notice.

KERRIA JAPONICA FLORE-PLENO (Double Jews Mallow) (Fig. 251) is a beautiful yellow-flowered shrub, suitable for planting



FIG. 251.—*KERRIA JAPONICA FLORE-PLENO*.

in beds on the grass, in the rock garden, against a wall, or in the open border. *K. j. major* is unfortunately far too seldom seen considering its great value as a hardy flowering shrub. The flowers are double, freely produced, larger, and superior to the last-named. The single-flowered kind, *K. japonica* (*Corchorus japonicus*) is seldom met with nowadays; it is nevertheless a very fine shrub, with rich yellow flowers. Another sort having variegated foliage, and named *K. j. foliis variegatis*, deserves a place in the rock garden; it is of rather slow growth, and a little tenderer than the type.

LABURNUMS.—The Common Laburnum (*L. vulgare*) is too well known to need description. When in flower (April to

June) its pendulous racemes of golden-yellow flowers are of exquisite beauty. It succeeds in dry as well as in damp soils. *L. v. Carlieri* (*Cytisus Carlieri*) is also very free-flowering, its flowers being produced in long, narrow racemes. *L. v. foliis aureis* is a distinct variety with golden-yellow foliage, which colour it retains throughout the summer; it is free in growth.

L. alpinum (*Cytisus alpinus*) (Fig. 252), the Scotch Laburnum, varies in height from 20ft. to 30ft.; in habit it resembles the first-named species, but its leaves are larger, and it is generally three weeks later in bearing its richly-coloured flowers, on which account it should be planted to prolong the floral display. *L. a. Parksii* is another excellent kind, with very long racemes of flowers. *L. a. Watereri* and *L. a. grandiflora* are attractive free-flowering

sorts. *L. a. autumnalis* is the latest of all the Laburnums to flower, and although not so ornamental as other members of the genus, it is too valuable to be omitted altogether. *L. Adami* (*Cytisus Adami*), a hybrid between *L. vulgare* and *Cytisus purpureus*, bears yellow and reddish-purple flowers on the same tree, and in some cases on the same branch. *L. caramanicum* (*Cytisus caramanicus*, *Podocytisus caramanicus*), introduced from Asia Minor twenty years ago, is a very rare and beautiful



FIG. 252.—LABURNUM ALPINUM.

shrub. It is of dwarf, bushy habit, generally about 4ft. high, with trifoliolate pale green leaves, and in July bears a profusion of bright yellow flowers in erect racemes.

LESPEDEZA SIEBOLDI (*Desmodium penduliflorum*) produces a wealth of bright, rosy-purple, pea-shaped flowers in racemes during autumn. It is of slender habit, with long arching shoots, and delights in a rich, well-drained soil and a sunny position. Although it usually dies back close to the ground, it throws up shoots from the base in spring.

LEYCESTERIA FORMOSA (Himalayan Honeysuckle) is a beautiful shrub, and grows freely and flowers profusely even in poor,



FIG. 253.—LEYCESTERIA FORMOSA.

hungry soils. Its long drooping racemes of white flowers (Fig. 253) suffused with purple, and the purplish-crimson bracts, are very distinct, and are succeeded in autumn by clusters of highly-coloured seeds that are much relished by game.

LIQUIDAMBAR STYRACIFLUA (Sweet Gum Tree) is of medium growth, and well adapted for small pleasure-grounds or for avenues. Its smooth leaves are arranged alternately and much divided, the colour being a tender green, varying with age to a deep glossy green, and in autumn again changing to rich purple and crimson, occasionally shaded with orange; in this condition the leaves hang on the trees until the first frost. The autumn beauty of this Liquidambar is its chief attraction, and, unlike many forms of tree life, its rich colouring is not withheld even in shaded situations. The leaves are fragrant, especially in spring. Although not particular as to soil, it prefers a moist one.

LIRIODENDRON TULIPIFERA (Tulip Tree) is conspicuous by reason of its erect trunk, peculiar grey bark, striped with white,

broad, three-lobed, smooth green leaves, and greenish-yellow, fragrant, Tulip-like flowers that are produced during summer. Before the leaves drop, they pass to pleasing shades of orange and yellow. The tree is of free growth, and especially so when planted in deep, rich, moist soil. *L. t. aurea* differs from the type in having the central portion of each leaf blotched with yellow. Both are ornamental trees and splendid for the park.

LONICERAS (Honeysuckles) (non-climbers), though not particularly showy, are of value for the shrubbery. They are quite hardy, succeed well in ordinary soil, and some bear delightfully fragrant flowers. The following are worthy of note: *L. involucrata* (*L. Ledebourii*) forms a dense bush, and its yellow flowers, suffused with red, are borne in June and July. *L. Alberti* is a neat-growing kind, with erect, slender branches clothed with narrow pale green leaves. The rose-coloured flowers are very pretty. *L. tomentella* is deserving of extended culture, as it is free and neat in growth, with small leaves, and in July bears an abundance of small pink flowers in pairs. It is distinct, beautiful, and valuable for its lateness in flowering, as some of the earlier-flowering sorts are in berry when this one is laden with its tiny but attractive flowers. *L. quinquelocularis* (*L. diversifolia*) grows about 5ft. high, and in June and July bears a profusion of small pale yellow flowers; it was introduced to this country in 1840. *L. microphylla* forms a dense bush, the young growths of which are very showy by reason of their bright red bark, while the small glaucous leaves are attractive and very distinct. *R. fragrantissima* and *L. Standishii*, referred to in another section as suitable wall-coverers, are amongst the most delightful of early-flowering shrubs. Both are thoroughly hardy and capable of enduring very severe winters without protection of any kind. The flowers of each are small but very fragrant and borne with such freedom as to merit special attention at the hands of shrub-cultivators, as the number of shrubs blossoming in the open air at the same time—January and February—are very few in number. *L. Morrowi*, a Japanese species, bears small flowers in spring, and these are succeeded in July by heavy crops of round bright red berries. It flourishes in sandy soil. *L. cœrulea* (*Xylosteum cœruleum*) bears greenish-yellow flowers and attractive dark blue berries. It forms a stout bush, erect in habit, and free in growth. *L. tatarica*, an old species, carries an abundance of small rose- or pink-coloured flowers in May. It generally grows about 5ft. or 6ft. high. *L. t. pulcherrima*, *L. translucens*, and *L. Korolkowi* are deserving of attention.

LOROPETALUM CHINENSE belongs to the Witch Hazel family, and is a lovely free-flowering shrub or small tree, 4ft. or 5ft.

high, and perfectly hardy. Its flowers are borne in clusters, and in shape are not unlike those of the Hamamelis. They are creamy-white, and are divided into four narrow petals. The leaves are small and rich green. It prefers a rich soil, and, like the Hamamelis, delights in perfect drainage.

LYONIA PANICULATA (*L. ligustrina*), a North American shrub, varies in height from 4ft. to 10ft; it grows freely in peaty soil, and bears short racemes of white flowers from June to August.

MAGNOLIAS.—Amongst shrubs and trees with showy flowers these are very noteworthy, and it is difficult to say why they are not more frequently met with in gardens, as they are of simple culture, quite hardy, and beautiful when in flower. Magnolias delight in a rich, well-drained soil, but so long as the drainage is good, the quality of the soil is of no great importance. It is, however, wise to protect them from east winds, as they flower early, and sometimes get injured by biting winds and late frosts. Autumn planting should if possible be avoided, as Magnolias do not transplant readily at the fall of the leaf. The best time to move them is in spring, just as growth commences. After planting they should be watered at the roots, and syringed overhead to prevent the wood from shrivelling. *M. conspicua* (Yulan) is the best known kind. It is a native of China, and has been cultivated in British gardens since 1789. It forms a freely-branched tree, 20ft. or so in height, and a specimen laden with its large, pure-white, sweet-scented, cup-shaped flowers is very handsome in March. *M. c. Soulangeana* is a hybrid between *M. conspicua* and the purple-flowered *M. obovata*; in habit it resembles the first-named parent, while its fragrant flowers are shaded with rosy-purple without and soft pink within. *M. c. Norberti* has large, stout, purplish-tinted flowers. *M. c. Lennei* (*M. obovata* × *M. conspicua*) is a gem, and deserves to be planted extensively; its rosy-purple flowers are large and freely produced. The stately Himalayan *M. Campbellii* is very beautiful, but a drawback to its general cultivation is its shy flowering in a young state; its finely-formed flowers are rose and white, shaded with crimson on the outside, and borne in advance of the leaves. In April and May, *M. stellata* (*M. Halleana*), the dwarfiest of all Magnolias, is, in the open air, literally smothered with delicately-scented flowers as white as driven snow. A great recommendation in its favour is that it flowers whilst very young. In addition to its early-flowering it is the finest Magnolia for pot-culture, and where flowers for conservatory decoration are in demand in January, the kind now under notice should be remembered. *M. stellata* pink variety is a charming companion to the type. The flowers are of similar shape and size, but instead of being pure white they are beautifully shaded with pink. *M. parviflora* is a valuable

addition to the dwarf-growing Japanese Magnolias, being very free and beautiful in blossom; its pure white cup-shaped flowers, with crimson-red stamens, are produced readily even on small plants. *M. Watsoni* is another rare and beautiful species, with delightfully fragrant cream-white flowers, which measure from 5in. to 6in. in diameter, the central cluster of rich yellow stamens, with bright red filaments, being very attractive. *M. hypoleuca* is useful for parks; it is a vigorous, free-growing tree, with very large leaves, bright green above and glaucous beneath. The deliciously-scented flowers, from 6in. to 7in. across, are cream-white with prominent reddish-purple anthers. *M. obovata* (*M. purpurea*, *M. discolor*) is of dwarf habit, and produces sweet-scented purplish flowers with moderate freedom. *M. acuminata* (Cucumber Tree) is a vigorous-growing North American species, with a straight trunk and numerous stout, spreading branches supplied with large deep green leaves, and in June and July bears bell-shaped, fragrant, greenish-yellow flowers. It is a handsome park tree. *M. glauca* has been cultivated in this country upwards of 200 years. It grows about 12ft. high, but is rather slow, and in sheltered positions is sub-evergreen. On account of the under-sides being silvery-white a pretty effect is created when the leaves are disturbed by wind. The cream-white, sweet-scented, cup-shaped flowers are produced in June and July. *M. tripetala* (*M. Umbrella*) grows freely in ordinary garden soil. It is a handsome species for the pleasure-ground, and requires plenty of room to show its character. It is thoroughly hardy, has very large deep green leaves, and in June is meritorious by reason of its large white sweet-scented flowers, which are succeeded by showy deep red fruits. *M. macrophylla* grows about 35ft. high, and like the last-named, has very large leaves. The flowers are also large, white, and stained with purple in the centre. As this noble species is a trifle tender whilst young it should, if possible, be planted where spring frosts have little effect upon it.

NEILLIA (*Spiræa*) OPULIFOLIA is a quick-growing bush, and produces feathery clusters of white flowers in June. The golden-leaved variety, *lutea*, will, if planted in a sunny spot, retain its yellow colour throughout the summer. *N. amurensis* is another useful plant for the shrubbery.

NUTTALLIA CERASIFORMIS (Osoberry) is a bushy, compact, free-growing Californian shrub, and although its small white flowers, in axillary drooping racemes, are not showy, they are borne so freely and so early in the year in the open air that they are specially welcome. Its culture is of the simplest.

NYSSA SYLVATICA (*N. multiflora*) is a fine park tree, of medium height and rather slow in growth, and deserves to be planted extensively for its autumnal effect, its foliage being rich

crimson, and in this respect is perhaps the most conspicuous of trees grown for the beauty of their foliage. It thrives best in moist soil.

OXYDENDRON ARBOREUM (*Andromeda arborea*, *Lyonia arborea*) produces its small white blossoms in September, a time when there is a dearth of flowers amongst hardy shrubs. The branched racemes of wax-like flowers range from 5in. to 9in. long, and are borne at the tips of the branches. It is of rather slow growth, and although in its native habitat (North America) it ranges from 30ft. to 40ft. high, yet in this country it rarely attains more than half that height. It succeeds best in a cool, moist, peaty soil, and flowers in quite a young state, while its foliage dies off a rich purple-red colour in autumn.

PÆONIA MOUTAN (Tree Pæony) (Fig. 254) is one of the most gorgeous of flowering shrubs, yet far from common in gardens. Tree Pæonies are cross-feeding plants, and delight in a deep loam enriched with well-decayed manure. A yearly mulching of manure or leaf-mould should be afforded. Copious supplies of water should be given while growth is progressing, and frequent doses of liquid manure will also greatly assist them. Good drainage is important. The plants should not be disturbed at the root more than is really necessary.



FIG. 254.—DOUBLE-FLOWERED VARIETY OF *PÆONIA MOUTAN*.

Although perfectly hardy, discretion as to position should be exercised, and the Pæonies must not be planted where the young growths are likely to suffer from late spring frosts. On the other hand, they must not have a too-sheltered position, or the wood will not ripen sufficiently to carry flowers. They are lovely subjects for planting on the lawn, and few shrubs produce a more charming effect in the mixed shrubbery border, when in flower, than do the varieties of *P. Moutan*, their deeply-cut and variously-tinted foliage giving them additional beauty. For growing in pots, for conservatory decoration, they are also well suited. After flowering is over, encourage them to make fresh growth, and later on

plunge out of doors in a sunny spot, and give plenty of water. The following are good varieties, and represent a wide range of colour: Louise Mouchelet, soft pink; very double, large and handsome. Reine Elizabeth has deep salmon-red flowers of good form. *splendidissima* is distinct, having white flowers spotted with lilac. *lactea* is one of the best double whites. *grandiflora superba* deserves to be planted extensively; its splendid white flowers are spotted with carmine. Triomphe de Gaud, bright rose. Lord Macartney is very attractive, with crimson flowers and conspicuous golden-yellow stamens in the centre. *rosea odorata* is rich rose, shaded with salmon in the centre, and delightfully fragrant. Van Houtte, bright carmine. Purpurea, deep violet-purple. Henry Irving, Elizabeth, Don Quixote, Jean de Reszke, and Julius Cæsar have exceptionally large flowers of rich and beautiful colours.

PARROTIA PERSICA (Iron Tree) is closely allied to the Hamamelis, and should be included on account of the rich autumnal tints of its foliage. Its small flowers, with conspicuous crimson-tipped stamens, are borne on the leafless branches with much freedom in February. It is a small much-branched choice tree, and delights in a light sandy soil.

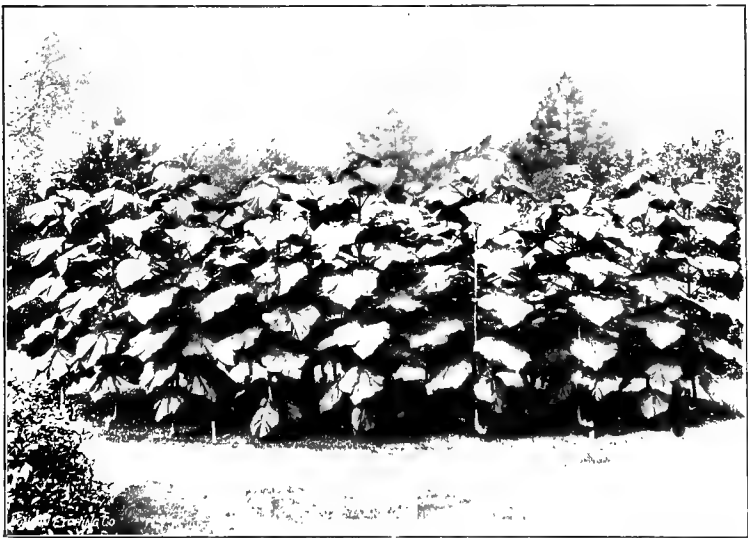


FIG. 255.—PAULOWNIA IMPERIALIS.

PAULOWNIA IMPERIALIS (Fig. 255) is a vigorous Japanese tree of great beauty, and may be planted with success in ordinary soil,

care being taken not to expose it to cold, biting winds. With a free use of the knife it can be made a useful addition to the shrubbery border skirting the flower-garden. Trained to a single stem, the latter will, if cut down nearly to the base in October, throw up strong shoots 6ft. to 8ft. high the following year which, with the exceptionally large and handsome pale green leaves, give the plant quite a sub-tropical appearance. Its purplish-violet sweet-scented flowers are borne in terminal panicles, but they frequently suffer from late spring frosts. Apart from its attractive flowers it is well adapted for park decoration.

PHILADELPHUS (Mock Oranges) are easily-accommodated shrubs, usually having fragrant flowers. The common species, *P. coronarius*, a native of South Europe, is being superseded by some of the more recently introduced kinds, but deserves a place in the woodland; it sometimes grows vigorously in unfavourable soils and situations, and is therefore too useful a shrub to be entirely neglected. *P. c. foliis argenteo-variegatis* is happy in a warm soil—not otherwise—or under the shade of trees, as its leaf-colour fades. *P. c. foliis aureis* is the golden-leaved variety, and a capital shrub for planting in masses in an open sunny position; it is more satisfactory than the last-named, and succeeds well in cold,



FIG. 256.—PHILADELPHUS GORDONIANUS.

close soils, but not under the branches of trees. For planting on sandy banks it is as effective as the yellow-leaved Elder, and hot summer suns are not hurtful. *P. Gordonianus* (Fig. 256), an American species, is vigorous and upright in growth; its large white, almost scentless flowers are borne in rich abundance, and about five weeks later than those of *P. coronarius*. *P. grandiflorus* (*P. speciosus*), also of American origin, bears enormous pure white sweet-scented flowers; it is a free grower, and requires plenty of head-room. *P. g. laxus*

(*P. pubescens*) is less vigorous in growth, but equally free in blossom. *P. undulatus* is a neat-growing variety, of medium height, and exceptionally free in blossom. *P. inodorus* is less vigorous in growth than *P. grandiflorus*; the flowers are also smaller, and devoid of fragrance. As the odour of Mock Orange flowers is not agreeable to everybody, this sort should be noted, as it blossoms much more freely than some of its congeners, without possessing overpowering fragrance. *P. Satsumi*, a Japanese species, grows about 6ft. high, and forms an elegant bush; the flowers are white, and borne abundantly. *P. Keteleeri flore-pleno* is free-flowering, and of good habit.

P. microphyllus is suitable for the rock garden, as it rarely exceeds 2½ft. in height. It is slender in growth, and in summer its Myrtle-like leaves are almost hidden by the wealth of tiny pure white flowers. *P. microphyllus* has been the forerunner of a group of dwarf-growing and exceedingly free-flowering Mock Oranges, raised by that eminent French hybridist, Mons. Lemoine, who commenced crossing it with a garden form of *P. coronarius*. Some of the best kinds raised from it are: *Lemoinei*, pure white, fine for massing in the open air, and useful for forcing; *Boule d'Argent*, free, with semi-double, delightfully-fragrant flowers; *Gerbe de Neige*, with its sweet-scented single flowers; and *Mont Blanc*, pure white.

PLATANUS ACERIFOLIA (Plane Tree) is so well known that description is unnecessary. It is the finest of all trees for street planting, as it luxuriates in poor soils and smoky atmospheres. *P. a. Süttneri* is of upright, compact habit, and very effective. Its deeply-cut leaves are beautifully marbled and striped with cream white on a pale green ground, the variegation being constant in all soils. It is quite hardy and vigorous; a fine tree for the park. *P. cuneata* (*P. digitata*, *P. nepalensis laciniata*) forms a low, much-branched tree, with glabrous wedge-shaped leaves. *P. orientalis* is vigorous and of free growth.

POPULUS (Poplar) contains many hardy trees, which are of quick growth and happy in nearly all soils. *P. heterophylla*, with its heart-shaped leaves, is distinct and beautiful, and grows to a height of about 50ft.; the petioles, as well as the under-surface of the leaves, are white, which gives additional beauty. *P. angulata* (Caroline Poplar) is a very ornamental free-growing species, especially when planted in damp soil. *P. grandidentata* grows about 50ft. high, and its yellowish leaves, touched with red in spring, are very handsome. *P. canescens* (*P. albotremula*) is conspicuous in spring when carrying its long catkins, and its pale grey leaves when disturbed by a gentle breeze possess distinct beauty. It is well adapted for planting by the side of lakes and on islands. *P. alba macrophylla* (*P. Picarti*) is a large-leaved form of the well-known *P. alba* (Abele Tree).

P. a. nivea (*P. argentea*) is an uncommon tree, and one of the most ornamental of the white-leaved Poplars. The young shoots and the under-surface of the leaves are covered with white tomentum. *P. a. pyramidalis* (*P. bolleana*, *P. Korolkowi*) is of erect growth and very effective; it is well adapted for planting in restricted areas, as its branches occupy but little space. Like the last-named, the young growths and under-sides of the leaves are covered with white. *P. deltoidea aurea* has soft yellow leaves set on bright red petioles, which gives it a distinct and pleasing appearance, especially in autumn, when the colour deepens to orange. Additional beauty is afforded by reason of the young growths being more or less touched with red. It is free in growth, and the foliage does not burn in hot summers. *P. ontario variegata* is a tree of vigorous growth; leaves large and showy, dark green shaded with paler green, and heavily mottled and splashed with rich yellow. *P. nigra pyramidalis* (*P. fastigiata*) is a Poplar tree of rapid and upright growth, and well adapted to make a wind-break to protect more delicate trees and shrubs. *P. angustifolia* (*P. salicifolia*) has distinct, narrow, Willow-like leaves. *P. balsamifera* (Balsam Poplar) is vigorous, and well adapted for hiding unsightly buildings and shutting out ugly views. *P. b. candicans* differs from the last by having the under-sides of the leaves covered with a whitish tomentum. It succeeds in poor soils. *P. laurifolia* (*P. Lindleyana*) and *P. Simonii* are suitable for parks and pleasure-grounds.



FIG. 257.—PRUNUS (*AMYGDALUS*) COMMUNIS.

PRUNUS.—Under the genus *Prunus* are now included the Almonds (*Amygdalus*), Peaches (*Persica*), and Cherries (*Cerasus*). All blossom early, and as the flowers appear before the leaves a background of evergreen trees and a position beyond the reach of cold east winds should be chosen. *P. Amygdalus* (*Amygdalus communis*) (Fig. 257) grows to a height of from 20ft. to 30ft., and thrives in common soil; in early spring, almost before winter has gone, its rose-pink flowers give colour to the garden. *P. A. flore-pleno* is a lovely double-flowered rose-coloured variety; its blossoms last a long time in perfection. The flowers of *P. A. persicoides* (*Persica amygdaloides*) are much the same in colour, and specially valuable for their very early

flowering. *P. A. macrocarpa* should be grown extensively, as it is one of the best Almonds, its flowers being large, handsome, and of a pretty shade of pink. *P. A. amara* (Bitter Almond) is also very beautiful. *P. Davidiana alba* is the earliest of all the Peaches to flower in the open air, its buds sometimes unfolding in the middle of January. Being very hardy, of free growth, and flowering so early in the year, it is surprisingly uncommon; its small pure white flowers are borne along the previous year's wood (often 3ft. in length) with great freedom, and it is a capital grower. *P. (Amygdalus) nana* is fine for grouping in beds on the grass, as it is of very dwarf habit (3ft. to 5ft. high), and carries a rich profusion of rose-coloured flowers. *P. Persica* (Peach Tree) is a charming early-flowering tree, while its double-flowered red (*flore roseo-pleno*) and white (*flore albo-pleno*) forms are equally pleasing; these, however, are not quite so free in growth as the Almond, and require protection from north and east winds. *P. Simoni* belongs to the early-flowering group, as it frequently unfolds its lovely white blossoms in February. It is very free flowering, and quite hardy. *P. Mume* (*P. Myrobalana flore-roseis*) flowers about the same time as the Almonds, and its slender brown shoots carry a wealth of rose-pink flowers. *P. triloba (Amygdalopsis Lindleyi)*, noted elsewhere, is a glorious shrub, with double pink flowers.



FIG. 258.—PRUNUS JAPONICA FLORE-PLENO.

P. divaricata is a useful lawn and park tree, having a round head and pendulous branches; it is particularly attractive in spring, when mantled with its small snow-white blossoms. Though not so showy in flower as some of its congeners, *P. cerasifera atropurpurea* (*P. Pissardi*), from Persia, is welcome for its rich purple foliage, and when associated with such things as silver-leaved Acers its beauty is much enhanced. *P. Cerasus semperflorens* (All Saints' Cherry) is a beautiful tree for the lawn. It is of weeping habit, and bears white flowers and red fruits simultaneously during the summer and autumn.

P. Cerasus (*Cerasus vulgaris*) is a charming and fairly well-known kind, but its double-flowered form, *P. C. Rhexi flore-pleno*, is more beautiful, and deserving of wider cultivation. *P. C. Avium flore-pleno* (*P. Avium multiplex*) is a very attractive ornamental Cherry, its double white pendent flowers being borne in clusters, and lasting in good condition for several weeks; it is of good growth. *P. japonica flore-pleno* (*P. sinensis fl.-pl.*) (Fig. 258) is of slender habit, and bears an abundance of small pure white flowers; this kind is in great demand for forcing. *P. chamæcerasus* (Siberian Cherry) is a delightful small-growing tree with white blossoms, borne profusely in May. *P. Jacquemontii*, a rare and



FIG. 259.—PRUNUS PENNSYLVANICA.

beautiful free-flowering shrub, should be grown extensively where spring flowers are valued. It forms a neat bush and bears rose-pink flowers. *P. prostrata* bears a wonderful profusion of rose-coloured flowers, and should be noted by anyone on the look-out for choice shrubs. It is a beautiful border shrub, dwarf, with long, slender growths, and quite hardy. *P. Padus* (Bird Cherry), a charming European tree, useful for park decoration, grows 35ft. high, and bears numerous racemes of white flowers. Another kind that is useful for forcing is

Prunus (C.) *Pseudo-Cerasus*, a small Cherry, with pretty rose-coloured flowers; useful for small gardens. *P.* (C.) *P.-C.* James H. Veitch, a recently-introduced Japanese tree, is a grand acquisition to spring-flowering trees. It is quite a fortnight later than the last-named in coming into flower, and differs from it also by reason of its greater floriferousness and larger and deeper-coloured flowers, which are borne in dense pendulous trusses. The bronze-green foliage gives additional beauty. *P.* (C.) *pennsylvanica* (Fig. 259) has long been cultivated in this country; it freely produces clusters of white, Hawthorn-like flowers in May. Few ornamental Cherries are more delightful than *P. serrulata* (C. *Sieboldi*), with its double white flowers, suffused with pink, and borne in terminal clusters on well-ripened spurs along the old wood; it is of stout growth, and in rich soil grows to a height of from 15ft. to 20ft.



FIG. 260.—PYRUS FLORIBUNDA.

green leaves composed of from fifteen to nineteen leaflets. It is useful for towns, and should be pruned to a single stem when young, as it is apt to branch freely close to the ground. *P. stenoptera* and *P. rhoifolia* are very ornamental trees.

PYRUS.—This genus contains many treasured spring-flowering trees and shrubs, and a good use should be made of them in parks and gardens. The freedom with which their delicately-tinted

PTELIA TRIFOLIATA AUREA is a handsome, free-growing, small tree, with pale yellow leaves set on long footstalks; it is quite hardy, and when planted in sandy soil, with full exposure to the sun, the rich colouring is seen to advantage. *P. trifoliata* (Hop-tree) is of free growth, and when carrying its crops of seeds in autumn is effective.

PTEROCARYA CAUCASICA (Caucasian Walnut) succeeds admirably in damp soils, and grows to a height of about 30ft., forming a freely-branched, round-headed tree, with deep

flowers are produced, together with their simple cultural requirements, place them in the front rank of deciduous-flowering trees. *P. (Malus) floribunda* (Fig. 260) forms a neat, small tree, with slender spreading branches that are every year covered with pink flowers, the unopened buds being rich crimson; its small fruit is also effective. *P. f. flore-pleno* (*P. Parkmanni*) has semi-double flowers of the same colour as those of the type, and is very floriferous. *P. (Malus) Ringo* is a dwarf, compact, much-branched tree, and very free-flowering; it is one of the most attractive of ornamental Apples, and is lovely in spring when clothed with its pink-tinted blossoms. *P. R. sublobata* is equally free-flowering, its clusters of flowers being large and of a delicate pink shade. *P. sikkimensis* (*P. baccata indica*) is perfectly hardy, distinct, pretty, and of free growth, with white and rose-coloured flowers. Another beautiful and little-known variety is *P. Scheideckeri*; this is as free in blossom as *P. floribunda*, but differs from that in being of more erect growth, with larger, finer, and more deeply-coloured flowers. *P. spectabilis* (*Malus spectabilis*, *M. sinensis*) is very showy with its bright pink, semi-double flowers. *P. Malus*, and its varieties, *coccinea* and *nervosa*, are showy flowering trees. *P. coronaria* (Sweet-scented Crab) is a distinct and lovely species, bearing a profusion of fragrant white or delicate pink-tinted blossoms, generally after the majority of its congeners have passed their best. Its highly-coloured fruit, which emits a fragrance similar to that of Violets, is very ornamental. *P. c. fl.-pl.* comes into flower about the same time as the last-named, and is conspicuous for its large and shapely double rose-coloured flowers; it is a gem. *P. prunifolia* (Siberian Crab) grows to a height of 20ft., and bears pink flowers, which are succeeded by richly-coloured fruits; its varieties, *xanthocarpa*, *fructu-coccineo*, and *chlorocarpa*, are worthy of note. *P. rivularis* (*P. diversifolia*, *P. fusca*) is a rare North American species, producing an abundance of white flowers and highly-coloured fruits. Few trees are more attractive than *P. baccata* in April and May, when its branches are laden with blossoms. *P. b. microcarpa coccinea* is distinct and pleasing in autumn on account of its bright red fruits. *P. b. xanthocarpa*, *P. b. conocarpa*, and *P. b. præcox* should also be included.

All the above-mentioned Pyruses are excellent for planting as single specimens on the lawn.

Some of the White Beams (*P. Aria*) are pleasing foliage trees, growing well in ordinary soil. *P. A. græca* (*Sorbus græca*) has roundish leaves, and in autumn bears great clusters of berries. *P. A. salicifolia* (willow-leaved) is of erect, free growth, and is also conspicuous in autumn when laden with berries. The leaves of *P. vestita* (*Aria lanata*, *P. nepalensis*) are covered with silvery-white tomentum, which gives the tree a distinct and

handsome effect. *P. rotundifolia* (*P. latifolia*), *P. Torminalis* (*Sorbus Torminalis*), *P. Decaisneana*, and *P. intermedia* are of good growth, and in every way desirable. *P. spuria* (*Sorbus heterophylla*), *P. lanuginosa*, and *P. americana microcarpa* are also deserving of attention.

QUERCUS (Oaks) are valuable timber and landscape trees. Some kinds are very showy, and a list of select varieties should include the following: *Q. coccinea*, an Oak with brilliant-coloured foliage in autumn. *Q. pedunculata Concordia* (*Q. foliis-aureis*) is the best of the Yellow-leaved Oaks. *Q. p. heterophylla* (*Q. laciniata*, *Q. dissecta*) and *Q. p. filicifolia* (*Q. asplenifolia*); the last-named a particularly handsome kind, with elegantly-cut rich green leaves. The leaves of *Q. p. variegata* (*Q. elegantissima*) are mottled with grey and white on a soft green ground. *Q. p. fastigiata* (*Q. pyramidalis*) is of erect growth, similar to the Lombardy Poplar. *Q. p. purpurascens* (*Q. atropurpurea*) has dark purple foliage. *Q. sessiliflora rubicunda* is very distinct, the leaves being large, and tinted with purple. *Q. s. mespilifolia* merits attention by reason of its pretty, narrow, Willow-like leaves. It succeeds best in moist soil. *Q. rubra* (Red Oak) is another large-leaved kind of great beauty. *Q. conferta* (*Q. pannonica*, *Q. hungarica*) is of erect habit, with conspicuous, deeply-cut, rich green leaves, which take on shades of yellow and brown ere they fall in autumn. *Q. Cerris variegata* is the best of the Silver-leaved Oaks, its pale green leaves being splashed and irregularly margined with white; it is of free growth. *Q. laurifolia* is particularly attractive in autumn, when its large leaves change to shades of crimson and yellow. *Q. castanæfolia* is a handsome species, with bold, rich green leaves, bearing some resemblance to those of the Spanish Chestnut. *Q. dentata* (*Q. Daimyo*) is a very fine Japanese species, with very large leaves; it is free in growth. *Q. stellata* (*Q. obtusæfolia*) rarely exceeds 50ft. in height; its rough green lobed leaves are covered with a yellowish down on the under-surface. *Q. Mirbeckii* is one of the last of the Oaks to lose its deep green leaves in autumn; it is a South European species, of fairly rapid growth, and decidedly ornamental. *Q. nigra*, *Q. palustris*, *Q. macrocarpa*, and *Q. Prinus* are other handsome Oaks.

RHODODENDRONS.—During May and June the Azalea group are wrapped in colour of all shades from white to yellow and orange, through pink, rose, and salmon, to scarlet and crimson, whilst the flowers are deliciously scented, and beautiful for cutting and placing in vases for room decoration. Azaleas are perfectly hardy, and thrive in loamy soil, but prefer one that is composed principally of peat and leaf-mould. Lime should be absent from the soil, and good drainage is essential, as they are never happy when water becomes stagnant at the roots. Although amongst the

choicest of dwarf shrubs suitable for pleasure-grounds and shrubberies, it is well not to forget that the flowers are sometimes injured by cold winds. To preserve them from injury they may be planted in a colony by themselves, where they will get sufficient sun-heat to ripen the wood properly, and be afforded shelter from biting winds, &c., by tall-growing trees. Azaleas are amongst the most serviceable of hardy shrubs for forcing. Plants are easily raised from seed, but when certain colours are required, named sorts should be procured. For this reason we give the names of a few good kinds, with the colours added. *R. occidentale* (Californian Azalea) is one of the easiest to blossom, and valuable for prolonging the floral display. It forms a dense, freely-branched bush, and its delightfully fragrant white blossoms nestling amongst the pea-green foliage is distinct. Its leaves change to blood-red in autumn, which gives it additional beauty. *R. arborescens* is of vigorous growth, with large clusters of very fragrant red flowers, and as the bright green leaves are well developed at flowering time the blossoms are seen to excellent advantage. *R. viscosum* (Clammy Honeysuckle) hails from North America, and produces great quantities of sweet-scented white and rose-coloured flowers. It succeeds best in moist soil, and as it belongs to the late-blossoming section, is deserving of attention.

R. calendulacea generally reaches a height of about 6ft. Its orange-coloured flowers are produced in May, in advance of the leaves. This species is interesting as being one of the parents of the so-called Ghent Azaleas.

R. nudiflorum, like the last-named, has played an important part in the development of the Ghent Azaleas. It grows about 4ft. high, and bears a profusion of lovely rose-scented flowers about the end of May.



FIG. 261.—RHODODENDRON DAHURICUM.

R. sinensis is a treasured shrub, and one that has been used extensively by the hybridist. *R. rhombicum*, a Japanese species, is one of the first of the group to flower in the open air in spring, and very beautiful it is when carrying its rose-pink or purple-coloured blossoms. It is an attractive autumn shrub, as its leaves assume a deep red colour. *R. Rhodora* (*Rhodora canadensis*) is another pretty and distinct early-flowering species, introduced upwards of 130 years ago. Its flowers are purple. *R. Vaseyi*, a very uncommon species, is also a very delightful one, too. In some seasons its flowers may be seen in full beauty towards the end of April, but it may be considered a May-flowering species. In



FIG. 262.—RHUS TYPHINA.

its native home it forms a stout bush 12ft. or more high, but of course it has not yet reached such a size in this country. Its flowers are borne in terminal clusters, and when first expanded are pale pink, which gradually gives place to white. Its hardiness has been proved, and it flowers in a small state. *R. Schlippenbachii* is a new, distinct, and very handsome Chinese species, that has proved itself capable of resisting the rigours of our sometimes severe winters. It forms a rather loose-growing shrub, and bears an abundance of large soft pink flowers, spotted on the upper segments with crimson. It is a valuable shrub. *R. dahuricum* (Fig. 261) is a conspicuous object in the early part of March, when freely bearing its purplish flowers. It grows

about 4ft. high, and is quite hardy. *R. dilatatum*, a very rare and beautiful Japanese species, bears mauve-coloured flowers freely in early spring. It is distinct in flower, and free in growth.

RHODOTYPOS KERRIOIDES. (White Kerria) is a charming and easily-grown shrub, very hardy, and bears pure white flowers, somewhat similar to single Roses.

RHUS.—The various kinds of this genus are ornamental shrubs or small trees of simple requirements. In autumn few shrubs are more effective than *R. Cotinus* (Venetian Sumach); it forms a freely-branched shrub, 5ft. or 6ft. high, with roundish, glaucous green leaves; which in autumn turn to shades of purple, crimson, chocolate, &c., while before this its feathery seed-plumes, which succeed the small, inconspicuous flowers, are very attractive, and these have given rise to the popular name of Smoke tree.

R. C. atro-purpurea is desirable for its richly-coloured foliage and purple seed-plumes. *R.*

typhina (Stag's Horn Sumach)

(Fig. 262) forms a small tree with stout branches, the young shoots being covered with brownish hairs; its large deep green leaves are composed of many leaflets, which in autumn change to purplish-red, occasionally suffused with orange; it is a fine lawn shrub and grows freely in town gardens.

R. glabra (*R. coccinea*, *R. elegans*) is another kind of much beauty; but the fern-leaved Sumach (*R. g. laciniata*) (Fig. 263) is a precious shrub, with finely-cut leaves which bear some resemblance to the elegant *Grevillea robusta*, and before they fall assume shades of red, orange, and yellow; it is useful for growing in pots for conservatory decoration, as well as for planting in groups on the lawn. *R. cotinoides* is one of the showiest of shrubs conspicuous



FIG. 263.—RHUS GLABRA LACINIATA.

for their autumn tints, the colours comprising shades of scarlet, rose, yellow, bronze, &c. *R. venenata* (*R. vernix*, *Toxicodendron pinnatum*) is well adapted for planting in damp soils; the leaves are somewhat similar to those of *R. typhina*, but differ in being smooth, entire, and having purplish-red veins; it is handsome and of free growth. *R. Toxicodendron* (*R. japonica*), the Poison Oak, has large trifoliate leaves, which assume many rich shades in autumn; but as its sap is poisonous, care should be exercised in handling them.

RIBES.—The Flowering Currants, with their graceful, pendulous racemes of white, yellow, pink, rose, and crimson flowers, are welcome. No soil or situation seems too bad for them, as they may be planted with success in poor ground. Of late years several hybrids have been obtained, which in point of beauty eclipse the familiar *R. sanguineum* (Fig. 264). The variety named



FIG. 264.—RIBES SANGUINEUM.

R. s. albidum is not, as its name would imply, pure white, as the flowers are suffused with soft pink, with a deeper shade in the centre. *R. s. atrorubens* bears small deep red flowers with much freedom, while those of *R. s. atrosanguineum* are larger, brighter, and represent the best of the red-flowered Currants. *R. Gordonianum* (*R. sanguineum* × *aureum*), also met with under the names of *R. Beatonii* and *R. Loudonianum*, forms a stout bush with large handsome racemes of flowers intermediate in colour between its parents. *R. speciosum* (*R. fuchsoides*, *R. stamineum*) is a Californian species, and when in flower might be considered one of the small-flowered Fuchsias, so much alike are its wine-red flowers with long stamens to those of the popular flower named. On account of the profusion and

bright colour of its flowers it deserves a good place in the garden. It is usually treated as a wall-shrub, for which position it is well adapted, and when grown thus will often reach to a height of 8ft., and then when carrying its hundreds of tiny flowers its beauty is very striking. *R. americanum* (*R. floridum*, *R. pennsylvanicum*) is worthy of mention. Of yellow-flowered kinds, *R. aureum* (Buffalo Currant) is a good example; it forms a bush 6ft. high, and produces its flowers in April and May. The flowers of *R. a. præcox* are generally borne a fortnight in advance of those of the last-named species, while those of *R. a. serotinum* are produced late in the season, on which account it should be included. *R. a. aurantiacum minus* is of close, compact habit, very free-flowering, and rich yellow in colour. A group of this kind, with a few plants of *R. sanguineum atrosanguineum* has a telling effect when in flower. *R. alpinum pumilum aureum* is conspicuous for its golden-yellow foliage, which it retains for the greater part of the growing season. Being a neat, low-growing shrub, it is worthy of a place in the rock garden.



FIG. 265.—ROBINIA HISPIDA.

ROBINIA HISPIDA (Rose Acacia), a native of North America, is one of the most delightful of dwarf-flowering trees. It thrives well in nearly all soils, especially so when rather dry. The pendulous racemes of rose-pink pea-shaped flowers (Fig. 265) appear about June. Worked on standards several feet high, and planted amongst low-growing shrubs, a fine effect is produced by this shrub when in flower. *R. h. inermis* (*R. macrophylla*) is an

ornamental variety of strong growth, with large foliage and very fine flowers. *R. neo-mexicana* is a tree of vigorous growth, and useful for the park and garden; it bears pale rose-coloured flowers in short dense racemes in autumn. *R. viscosa* (*R. glutinosa*), the Clammy Locust, is a beautiful park tree, bearing an abundance of rose-pink flowers in short racemes during summer. It flowers in quite a small state. *R. Pseudacacia* (Locust Tree) is a well-known tree, and beautiful both in foliage and in flower; a good many varieties have been raised from it, and the following are some of the best: *Bessoniana* forms a dense-headed tree, and retains its rich green leaves until very late in the season; it is distinct, and free in growth. *aurea* is conspicuous on account of its golden-coloured foliage; this kind should always be planted in a sunny spot. *Decaisneana* bears an abundance of pale pink flowers; *fastigiata* is of upright habit; and *semperflorens* bears its white flowers nearly the whole of the summer. *Rehderi*, *angustifolia*, and *revoluta* are also of interest.

RUBUS DELICIOSUS, from the Rocky Mountains, is a graceful and very showy Bramble of free growth, perfectly hardy, and bears large pure white flowers with conspicuous golden-yellow stamens. This is unquestionably the finest ornamental Bramble grown, and deserves a rich, well-drained soil, and an open sunny spot. *R. odoratus* produces large clusters of sweet-scented purplish-red flowers from midsummer until autumn; being a free grower, it should be allowed plenty of head-room. The Nootka Sound Bramble (*R. nutkanus*) was introduced from North America by Douglas, in 1826; it bears white flowers in July and August, and is at home when planted by the water-side. *R. roseifolius coronarius* produces very freely delicately-tinted pink rosette-like blossoms of great beauty when planted in a sheltered nook. Another beautiful kind usually treated as a cool greenhouse plant, but one that thrives out of doors in favoured localities, is *R. phœnicolasius* (Japanese Bramble), a rapid-growing climber with pale pink terminal racemes of flowers that are succeeded by bunches of richly-coloured berries. *R. biflorus*, from the Himalayas, is very conspicuous on account of its silvery-white stems, which show up well in winter while the plants are leafless. *R. laciniatus*, *R. spectabilis*, and *R. cratægifolius* are distinct and worthy of note.

SALIX (Willows).—For planting in damp ground, such as the margins of lakes, streams, &c., the numerous species and varieties of *Salix* are well adapted. They range from mere shrubs, 1ft. high, to trees of 80ft. or so, and as the tall kinds are of quick growth, they are suitable for landscape effect. The leaves are mostly green and grey; in winter the red, yellow, and green stems are effective, and in spring are very pleasing with their elegant catkins that are borne so freely. *S. babylonica*, mentioned

elsewhere, is one of the most beautiful of weeping trees, while the cardinal and yellow-barked Willows add colour to the landscape, especially in winter. *S. alba* is another handsome tree, and *S. fragilis* is deserving of extended culture. *S. elegantissima*, *S. purpurea* and its varieties, *S. viridis*, *S. rubra*, *S. aurita*, *S. daphnoides*, *S. petiolaris*, *S. lanata*, *S. Smithiana*, *S. rosmarinifolia*, *S. incana*, *S. cordata*, *S. phyllicifolia* and its varieties, and *S. nigricans*, are good kinds.

SAMBUCUS (Elders).—Amongst these there are some useful ornamental plants, and where shrubs with golden-coloured foliage are desired, *S. nigra foliis-aureis* (Golden Elder) should be noted. The brightest colour is brought out when it is planted in a rather dry soil and on a bank sloping to the south. In order to encourage young and vigorous shoots, hard pruning should be adopted in spring. *S. n. variegata* has its foliage striped with silvery-grey, which colour it unfortunately loses if planted under the shade of tall-growing trees; like the last-named it is improved by severe pruning. *S. n. laciniata* (Parsley-leaved) and *S. racemosa* (referred to under "Berry-bearing Shrubs") are handsome, too. *S. r. plumosa* and *S. r. tenuifolia* are very attractive shrubs of graceful outline. *S. glauca* has foliage somewhat similar to *S. nigra*; in its native habitat it grows into a tall tree, and when laden with its glaucous-coloured berries is very distinct. It fruits in a very young state.

SHEPHERDIA ARGENTEA should be included amongst a list of choice shrubs or small trees. It is a North American subject, grows to a height of about 15ft., and thrives best in a rich, well-drained soil. Its leaves are narrow and silvery on both sides. The small yellow flowers appear in April, and the bright red fruits in September. A useful shrub for small gardens.

SPARTIUM JUNCEUM (Spanish or Rush Broom) deserves special mention on account of the ease with which it grows in dry gravelly soils, where many shrubs would only eke out an existence. It is of fairly rapid growth, assuming a bush 8ft. or so high, and producing the best effects when planted in a mass, as individual plants are of rather ungainly habit; but when massed this defect is not noticed. It is an abundant and continuous blossomer, and its pea-shaped sweet-scented flowers are very conspicuous, as they are borne after the majority of trees and shrubs have displayed their floral treasures.

SPIRÆAS.—The shrubby Spiræas are valuable dwarf shrubs. All the kinds here mentioned are of easy culture and very showy. Although they thrive in sandy soil, one composed of good loam and leaf-mould answers best. They do not give satisfaction planted under the shade of tall-growing trees; while, on the other hand, it is unwise to expose them to the full sun, as the flowers are apt to become scorched and to fade early, besides

the foliage turning from a healthy green to a dull brown. *S. japonica* Anthony Waterer is of recent introduction, and a specially good kind. It is of dwarf, compact, bushy habit, and when its growths are crowned late in the season with deep crimson flowers it is very effective; the flowers are not affected by the sun to the same extent as are those of some of the other Spiræas. *S. j. alba* grows about 16in. high, and bears an abundance of white flowers about midsummer. *S. j. ruberrima* is a taller grower, and of looser habit than either of the above-named; its pink flowers are freely produced, and very attractive. *S. j. Bumalda* is a profuse blossomer, and a capital subject for an edging to beds and shrubberies, its broad clusters of rose-coloured flowers being very pretty. *S. j. glabrata* is fine for massing. It is free in growth, and bears very profusely dense corymbs of deep pink flowers on stout growths well above the deep green foliage. The variety is dense in habit and quite hardy. *S. Douglasi* (Douglas's Spiræa) is very ornamental and useful; its red flowers are borne in terminal panicles. *S. salicifolia* blossoms in July and August, and its rose-coloured flowers are arranged in short panicles. *S. arguta* (*S. multiflora alba*) is the best all-round white Spiræa grown; it is of good habit, hardy, and very free-flowering, and its blossoms are of the purest white. *S. hypericifolia* (Italian May) is another very fine white-flowered kind; it grows about 5ft. high, and when its slender arching stems are clothed with clusters of flowers it is very effective. *S. cantoniensis* (*S. Reevesiana*) forms an elegant bush about 4ft. high, and produces terminal umbels of white flowers. *S. bella* is a pretty Himalayan species, with rose-coloured flowers. *S. Van Houttei* (*S. media* × *S. trilobata*) is another first-rate kind, and produces a sheet of white blossom in May. *S. tomentosa*, a native of the United States, grows 4ft. high, and for the greater part of the summer bears large spikes of red flowers. *S. media* (*S. confusa*) may be readily forced, and on account of its pure white flowers, as well as the ease with which they expand under artificial heat, it has become one of the most useful of Spiræas. *S. discolor* (*S. ariæfolia*), a native of North-West America, is a graceful kind, and as distinct in habit as it is beautiful in flower; it should be transplanted about every fourth or fifth year, as it then produces a better floral display than when left undisturbed for a longer time; its cream-white flowers are borne in plume-like panicles (Fig. 266), in July and August. *S. Thunbergi*, a native of Japan, belongs to the early-flowering group; in fact, it is the earliest to flower in the open air. It forms a low, freely-branched bush, having elegant arching shoots clothed with linear soft green leaves, amongst which nestle its pure white sweet-scented flowers. This is a good plant for forcing, and in some positions is sub-evergreen. *S. mongolica* should not be overlooked; it is a vigorous

grower, and bears an abundance of flowers along the pendulous shoots late in the season. The double-flowered kind, *prunifolia flore-pleno*, should be planted largely, as it is particularly valuable on account of its early-flowering qualities; it grows freely, and its double pure white flowers are borne abundantly along the previous year's wood, and last long in good condition. This is a first-rate wall shrub. *S. Margarita*



FIG. 266.—FLOWERING SPRAYS OF SPIRÆA DISCOLOR.

should be allowed plenty of room to develop, as it is of free growth and carries a great quantity of soft pink flowers. *S. bullata* (*S. crispifolia*) makes a fine rock shrub; in fact, the rock garden is its proper place. It forms a dense bush, rarely above 1ft. high, with neat deep green wrinkled leaves and small corymbs of rose-coloured flowers. *S. decumbens* is also a fitting subject for the rock garden. It forms a neat little shrub about 1ft. high, and bears an abundance of white

flowers. *S. expansa* is of free growth, and bears pretty rose-pink flowers. *S. Lindleyana* is a handsome free-growing kind from the Himalayas, and is a charming shrub for planting near the verge of the lawn, as its rich green pinnate leaves and terminal panicles of white flowers are very effective; in good soils it grows to a height of about 10ft. *S. sorbifolia* (Sorbus-leaved) is another attractive species, and worthy of note. *S. pachystachys* is welcome for its late-flowering qualities; its flowers are pink. *S. semperflorens macrantha* is very handsome and rare. It is free in growth, and its rose-pink flowers are borne with much freedom. *S. triolata* is an old inhabitant of our gardens, but by no means seen as often as one could wish. Its white flowers are borne in corymbs. Other good kinds are *S. Chamædrifolia*, *S. Schinabecki*, *S. bikoviensis*, and *S. salicifolia*.

STACHYURUS PRÆCOX is an early spring-flowering shrub, quite hardy in the open air in the southern counties, and grows freely in ordinary garden soil. Though not showy, its axillary spikes of greenish-yellow flowers are produced in abundance.

STAPHYLEAS (Bladder Nuts) form stout bushes, and are effective in groups. Their small white flowers are borne in drooping racemes with much freedom in May. The two best kinds are *S. colchica*, a native of the Caucasus, and *S. Coulombieri* (*S. pinnata* × *S. colchica*). These thrive in ordinary soil, and delight in an abundance of water during dry weather. Both kinds are excellent for forcing into blossom about Christmas. If one kind only is to be grown, *S. Coulombieri* should be selected, as it is very free in blossom.

STUARTIAS thrive in the open air if planted in rich, well-drained soil, and beyond the reach of biting winds. In very cold counties they should be grown in the conservatory or cold greenhouse. *S. pseudo-camellia* (*S. japonica*, *S. grandiflora*) is an uncommon shrub with pure white single flowers, relieved by yellow stamens. In autumn the leaves assume many shades of crimson, rose, and orange; it is the most ornamental member of the genus. *S. pentagyna* (*S. montana*, *Malachodendron ovatum*) is worthy of mention. *S. virginica* (*S. marylandica*) grows about 10ft. high, and is fairly well known; its cream-white flowers, with red stamens, are borne in May and June.

STYRAX JAPONICUM is a beautiful Japanese shrub, and although its pendent pure white fragrant flowers, with conspicuous yellow stamens, are not large, it appeals to planters by reason of the freedom with which these are borne. A rather dry soil and a position not exposed to east winds should be selected for it. *S. Obassia* is worth growing; the rich green leaves are large and handsome, and in autumn, when they become suffused with yellow and blotched with red, they are very pleasing.

SYRINGAS (Lilacs) are of easy growth in common soil, very floriferous, and attractive when in flower. They are useful for forcing into blossom in the depth of winter. *S. oblata*, *S. Emodi* (Fig. 267), *S. Josikæa*, and *S. vulgaris*, interesting though they be are not so ornamental as those mentioned below.

Of Single-flowered sorts the following are specially meritorious: *S. Persica* (Persian Lilac) is an old inhabitant of our gardens, having been introduced so long ago as 1640; it is of dwarf, erect habit, with lilac and white flowers borne in clusters. Gloire de Lorraine bears fine trusses of rich rose-coloured flowers. Charles X. is distinct, with large compact trusses of reddish-purple flowers. Marie Legrange is one of the very best whites grown, and Princess Marie is hard to beat; the latter bears pure white early flowers in compact trusses with much freedom. Louis Van Houtte has deep red flowers of great size and substance. Géant des Batailles bears medium-sized

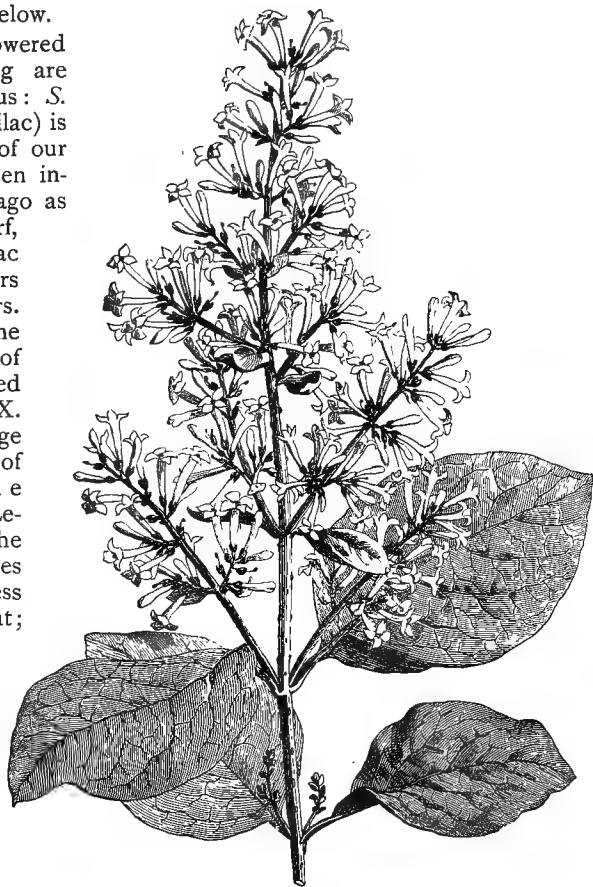


FIG. 267.—SYRINGA EMODI.

trusses of rosy-pink flowers. Souvenir de Louis Spath is a capital sort, with massive spikes of large dark purple flowers. Ville de Troyes has deep red flowers of much substance. Beranger is a wonderfully free blossomer; its bluish-lilac flowers are very pretty.

The following are amongst the best Double and Semi-double varieties: Madame Lemoine is a grand white, with large flowers

borne in great trusses. La Tour d'Auvergne has deliciously-scented reddish-lilac-coloured flowers; very free-flowering. Pyramidale is very choice; colour pale lilac. Leon Simon has medium-sized flowers, light pink, suffused with mauve. Alphonse Lavallée is another first-rate variety, with pale lilac flowers borne very freely. Michael Buchner is a beautiful variety, with well-shaped flowers, pale lilac, margined with rose. Virginité should not be overlooked: its large trusses of delicate pink flowers are very attractive. President Grevy should be included in a list of good Lilacs.

TILIA.—The Limes are favourite park trees, but there are several kinds that are not so well known as they ought to be. The common Lime, or Linden Tree (*T. europæa*), is a first-rate avenue tree, and stands hard pruning well. A rich rather moist soil gives the best growth, and it prefers a somewhat sheltered to an exposed situation. *T. argentea* (*T. europæa alba*, *T. tomentosa*) (the Silver Lime) bears delightfully-fragrant yellowish-white flowers; it varies in height from 40ft. to 50ft. It is very distinct by reason of the under-surface of its cordate leaves being covered with white pubescence, which creates a pretty effect when they are disturbed by wind. *T. cordata* (*T. sylvestris*, *T. parvifolia*) is a small-leaved species, and very late in coming into flower. It succeeds in dry soil better than most of its congeners. *T. platyphyllos* requires plenty of room to develop. It is free in growth, with a tall erect stem and rather drooping branches. It flowers early in the season. *T. p. asplenifolia*, although not so vigorous as the type, is, nevertheless, very ornamental. Its leaves are much cut, the central portion yellowish-green, intensifying to deep green towards the edges. It is an abundant blossomer. *T. americana* (Bass Wood) delights in a cool, moist, rich soil. It is more robust than *T. europæa*, from which it differs also by reason of larger and deeper green leaves, as well as being nearly a month later in coming into blossom. *T. a. pubescens* is a very ornamental variety, more dense in growth than the last-named, and also conspicuous for its large leaves.

ULMUS (Elms).—There are several kinds of Elms useful for the garden as well as the park. Passing over those that are well known we would direct attention to a few that are less familiar. *U. campestris antarctica aurea* (*U. Rosseelsii*) is a free-growing variety, with rich yellow foliage. *U. c. latifolia variegata* has its foliage mottled and striped with silver and grey. *U. c. viminalis variegata* is very distinct, having small leaves splashed and spotted with white on a pale green ground. Amongst Wych Elms, the golden-leaved variety named *U. montana fastigiata aurea* (*U. Dampieri Wredei*) is conspicuous. It is of erect habit and keeps its colour throughout the growing season.

U. m. vars. *macrophylla*, *atropurpurea*, *laciniata*, and *cinerea* are by no means so well known as they deserve to be. *U. alata* is a green-leaved kind with distinct cork-like bark. It rarely exceeds 35ft. in height.

VACCINIUMS are useful shrubs and very free-flowering. Those here mentioned are quite hardy and delight in peaty soil.



FIG. 268.—VIBURNUM OPULUS STERILE.

V. corymbosum (Swamp Blueberry) often grows about 7ft. high, and carries dense clusters of pale pink flowers in May and June on the previous year's wood. *V. pennsylvanicum* (Dwarf Blueberry) is a showy, low, much-branched autumnal-tinted shrub bush, with racemes of pale rose-coloured flowers, succeeded by sweet bluish-black berries. *V. uliginosum* and *V. stamineum* are also noteworthy.

VIBURNUMS are early summer-flowering shrubs, and although of simple requirements, pay for good culture; if treated liberally and given an open, sunny spot, they flower profusely in May and June, and some are very attractive in autumn when in fruit. They are useful for forcing into blossom for house decoration during the winter months. For this purpose they should be lifted in October, planted in pots of suitable size, plunged in the open ground, and the most forward ones brought into heat in December. The syringe should be used freely amongst the top growths, and as the flowers develop the plants should be removed



FIG. 269.—VIBURNUM PLICATUM.

to a colder house before transferring them to the conservatory. *V. Opulus sterile* and *V. plicatum* (Figs. 268 and 269) are specially useful for this purpose. *V. acerifolium*, a slender-habited shrub, grows about 6ft. high, and its rich green three-lobed leaves assume a deep crimson hue in autumn. Its clusters of cream-white flowers are borne very freely, and these are followed by showy berries. *V. Lentago* bears some resemblance to *V. lantana* (Wayfaring Tree), a native of Britain. It grows about 20ft. high, and bears large clusters of white flowers, which are succeeded by dark berries in autumn. *V. dentatum* (Arrow-wood) is quite hardy, and produces cymes

of white flowers in June. The pale green sharply-toothed leaves are smooth, with prominent veins, and the bright blue berries are very pleasing in September. *V. macrocephalum* should, if possible, have a place beyond the reach of east winds. It succeeds best in rich well-drained soil, and when laden with its enormous heads of white flowers is very effective. It is useful for forcing into flower for conservatory decoration. *V. prunifolium* has Plum-like leaves, flowers towards the end of May, and bears black berries in autumn. *V. nudum* (American Withe Rod) grows about 8ft. high, and produces white flowers in the early part of June, and crops of black berries in September. *V. Opulus sterile* is sufficiently known to need nothing more than passing allusion. It is an easily-grown shrub, and the great balls of white flowers borne at the points of the growths are very conspicuous in June. *V. plicatum* (Japanese Snowball Tree) is a particularly handsome shrub when in flower. It is perfectly hardy, free in growth, and flowers abundantly. Although not particular as to soil, it yields the best results when planted in soil composed of equal quantities of lumpy loam and leaf-mould. Good drainage and a sunny position are important. This shrub is well suited for planting in bold groups on the turf, and in June, when its large clusters of snow-white flowers are being displayed on the short spurs along the stiff growths, few plants are more pleasing to the eye. The balls of flowers are larger and of a purer white than those of the well-known Guelder Rose.

ZENOBIA SPECIOSA (*Andromeda cassinæfolia*, *A. speciosa*).—Although introduced to this country nearly a hundred years ago, this is rarely met with. It is a shrub of much beauty. Its white, drooping, Lily of the Valley-like flowers are freely produced in axillary clusters in summer on the old wood, and it grows about 4ft. high. *Z. s. pulverulenta* (*Andromeda dealbata*, *A. pulverulenta*, and *A. speciosa glauca*) is an improved form, and should be known to all lovers of dwarf-growing shrubs; not only are its stems and foliage powdered with white, but its flowers are larger and borne more freely than are those of the type. Peaty soil is not essential to the proper development of these sadly-neglected shrubs, as they grow freely in ordinary well-drained soil. Both the plants named are perfectly hardy near London, and are nearly sub-evergreen. In order to keep the latter true to character, it is advisable to increase it by cuttings or by layers, as the majority of plants raised from seed revert to the type.

Evergreen.

ANDROMEDA POLIFOLIA (Marsh Rosemary) delights in peaty soil, and as it rarely exceeds 1ft. in height, it is well adapted for planting in front of the shrubbery. Its shoots are clothed with narrow rich green leaves, and its pinkish-white flowers, tipped

with red, are borne freely in drooping racemes from May till the end of September. *A. p. angustifolia* and *A. p. major* are also interesting shrubs.

ARBUTUS.—*A. Unedo* (Strawberry Tree) is a beautiful foliage tree, and is referred to under Berry-bearers. In the South and West of England the Arbutuses thrive out of doors, but in the North they sometimes get cut in severe winters unless sheltered. They are peat-loving plants, and require plenty of water during the growing season. Perfect drainage is important, and in every case shelter against cold east winds should be provided. *A. Andrachne* (*A. integrifolia*) grows about 15ft. high, and makes a handsome tree. The greenish-white flowers are borne in terminal panicles in May. Its young bark is tinged with red, and the old bark peels off every spring. It is one of the hardiest and most desirable members of the genus. *A. Menziesii* (*A. procera*) is a North American tree, of free growth, and produces large panicles of white sweet-scented flowers. The deep green leaves are of a beautiful glaucous shade on the under-sides. *A. hybrida* (*A. andrachnoides*, *A. photiniefolia*)—a cross between *A. Andrachne* and *A. Unedo*—is very beautiful. Its deep green, serrated, leathery leaves are larger than those of the well-known Strawberry Tree, and the greenish-white flowers are also larger and produced more freely. In spring the young growths are tinged with red. *A. Unedo rubra* (*A. Croomii*) is another beautiful variety with red flowers. The leaves are larger than those of the type, and, like the last-named, the young bark is stained with red. It grows freely and forms a round, well-balanced head. *A. U. quercifolia* has deeply-cut rich green leaves, bearing some resemblance to those of an Oak. It should always be included in a collection of Strawberry trees. *A. intergerrima* (*A. rotundifolia*) forms quite a dense shrub, of compact habit, with small, roundish, deep green leaves.

ARUNDINARIA.—See Bamboos.

ARUNDO CONSPICUA is an ornamental grass or reed resembling, but less vigorous than, the Pampas Grass (*Gynerium argenteum*). Its long, slightly-serrated leaves, droop gracefully, and its long, arching, feathery plumes are thrown up early in the summer, remaining effective until late in the autumn. *A. Donax* (Great Reed) (Fig. 270), another decorative plant, produces a charming effect when planted by the sides of ponds or on the banks of streams and lakes. In this country it grows from 10ft. to 14ft. high, and its erect stems are supplied with glaucous green flax-like leaves. *A. D. macrophylla* is a very vigorous form with broader and more glaucous-coloured leaves. A capital plant for sub-tropical bedding. *A. D. variegata* is a very showy kind, of dwarfer and more compact growth than the type. It is a trifle

tender, and is well adapted for pots and tubs for conservatory decoration. Its pale green leaves are striped with white.

Arundos should be planted in rich, well-drained soil, and not exposed to cold, biting winds. They are effective when planted in isolated groups on the outskirts of the lawn, as their

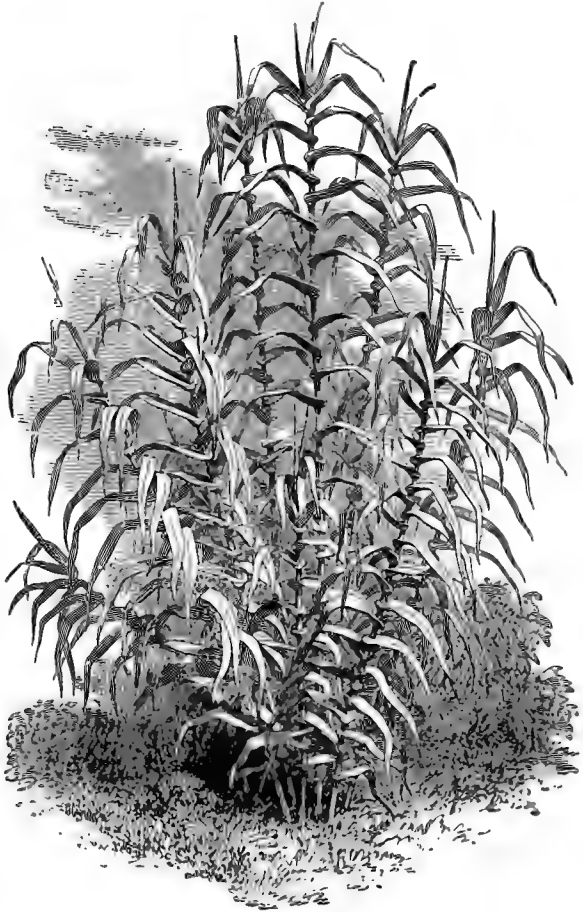


FIG. 270.—ARUNDO DONAX.

characters are there displayed to greater advantage than in the ordinary shrubby border. They delight in full exposure to the sun, and are benefited by copious supplies of water during the growing season. The best time to transplant and divide them is just before growth commences in spring.

AUCUBAS.—See page 459.

AZARAS.—See page 459.

BAMBOOS.—These include *Arundinaria*, *Bambusa*, and *Phyllostachys*, and are the most beautiful of all hardy ornamental-foliaged shrubs, imparting to the landscape a tropical aspect. To produce the best results in this country, a little extra care is necessary. They suffer less from a low temperature than from east and north-east winds in early summer, when growth is tender. It is therefore essential to fix upon a site sheltered from cold winds, especially north and east. Although ordinary soil suits them, they are happier when grown in a rich loam with plenty of cow-manure and good leaf-mould incorporated. During the growing season, an abundance of water should be given to the roots, for which reason ample drainage should be provided. An annual topdressing of leaf-mould will increase the vigour of the plants.

If transplanting, or division of the plants, is necessary, this should be done in early summer, when growth is commencing, as they will then grow away freely, without feeling any ill-effects. As soon as planting is completed, a good watering should be given, to settle the soil about the roots, and repeated at intervals.

Bamboos are particularly useful for sub-tropical bedding, and charming as isolated specimens on the fringe of the lawn, as well as for decorating the banks of lakes and streams. They are also excellent for growing in pots for the decoration of cool greenhouses, provided they are never allowed to want for water. *Arundinaria auricoma* (*Bambusa Fortunei aurea*) is a lovely Japanese kind forming a dense mass about 4ft. high, with greenish-yellow leaves striped with green. *A. Fortunei* (*Bambusa Fortunei variegata*) is also of Japanese origin, with rich green leaves, beautifully variegated with white. It is admirably adapted for planting in the front of the shrubbery, and also for growing in pots for the conservatory. It spreads rapidly, and partly loses its foliage in winter. When grown in pots, it should be well supplied with water, otherwise the lower foliage assumes a rusty-brown colour, and eventually falls. *A. japonica* (*Bambusa Metake*) (Fig. 271) has been cultivated in this country for about fifty years, and beyond doubt is one of the finest species for English gardens. It forms a thick mass, with gracefully-arching growths and broad deep green leaves. It succeeds better than most Bamboos in dry soils, and when planted in sheltered ravines is effective, retaining its foliage all the winter. In exposed situations it occasionally loses some of its older leaves in autumn. It is a free grower, and delights in plenty of root-room. *A. Falconeri* (*Thamnocalamus Falconeri*) is an elegant species, and in sheltered spots is quite hardy here.

The slender stems, often 10ft. high, are clothed with bright green leaves. *A. nitida* (*Bambusa Kan-si*) is a beautiful kind for planting in the shade, and should always find a place amongst choice Bamboos. It is free of growth, graceful of habit, and quite as hardy as *A. japonica*. The slender brown-purple stems, furnished with short branches, are clothed with small glaucous green leaves, which change to deep green with age. *A. Hindsii* (*Bambusa erecta*) is another elegant and distinct kind, of free growth. Its erect stems grow about 7ft. high, and its long leaves are dark glaucous green. *A. Simoni* (*Bambusa Simoni*) is perhaps the handsomest

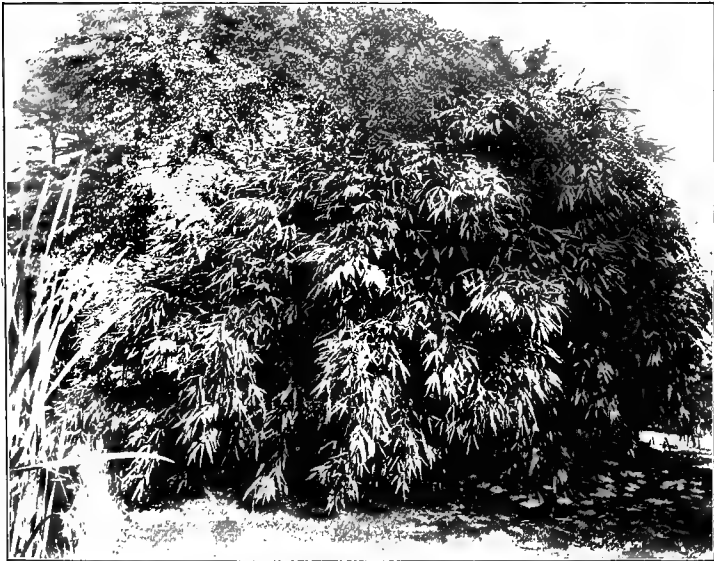


FIG. 271.—*ARUNDINARIA JAPONICA* (*BAMBUSA METAKE*).

of the taller-growing kinds. Although of vigorous growth, it is of elegant and graceful habit, with rich green leaves nearly 1ft. long. It grows about 15ft. high, spreads very rapidly, and when associated with a background of other evergreens is very attractive.

A. Veitchii (*Bambusa Veitchii*) is a distinct Japanese species, with broad leaves 4in. to 7in. long, rich green above, and glaucous on the under-side. It is of free growth and dwarf habit. The edges of the leaves become brown in winter; but in spring, when new growth appears, this defect is remedied. *A. macrosperma* is indigenous to North America, very distinct, and a pretty kind for planting in the shade. *A. pumila* (*Bambusa*

pumila) is of neat, compact habit, and worthy of a place at the foot of the rock garden, or for planting in front of dwarf shrubs. Its slender stems are touched with purple, and the oblong, lanceolate leaves are rich green.

Bambusa marmorata (*B. Kan-chiku*) belongs to the dwarf-growing section. Its slender purple stems and branches are clothed with short bright green leaves; it needs a very sheltered situation. *B. tessellata* (*B. Ragamowski*) has large, handsome, deep green leaves, often 16in. long and 3in. broad. It is very dense in growth, spreads rapidly, is very hardy, and one of the most distinct of the dwarf kinds. *B. palmata* (*B. Kumasasa*), from Japan, is also of dwarf habit, and useful for planting in the shade. It is of free growth, and soon forms a dense clump. Its broad, deep green, serrated leaves are about 1ft. long and very handsome. *B. pygmaea* is the dwarfiest Bamboo in cultivation, and useful for carpeting beds, for edgings, and for the wild garden; it is a bright little plant in winter. *B. Nagashima* and *B. disticha* (*B. nana*) are also of dwarf habit, and worthy of notice. The latter is useful for planting in places where the taller-growing kinds would be out of place.

Phyllostachys aurea (*Bambusa aurea*, *B. sterilis*), also known by the name of Golden Bamboo, has greenish-yellow stems and narrow pale green leaves. It deserves to be more generally planted. It reaches 12ft. or 14ft. high, the growths arching gracefully. *P. nigra* (*Bambusa nigra*) has blackish-coloured stems, often 15ft. high, and small deep green leaves—a pleasant contrast. *P. viridi-glaucescens* (*Bambusa viridi-glaucescens*) is very effective, and grows about 15ft. high when well-established. The leaves are glaucous green, and this Bamboo always wears a cheerful appearance. *P. flexuosa* bears some resemblance to the last-named, and grows about 12ft. high, its deep green stems being touched with purple, the glaucous leaves being remarkably handsome. *P. bambusoides* is of neat habit, distinct, and very beautiful. *P. castillonis* (*Bambusa castillonis*) has gracefully-arching stout stems, and rich glossy green leaves, variegated with cream-white. It is of free growth and graceful habit. *P. Henonis* (*Bambusa Henonis*) is perhaps the loveliest of all the *Phyllostachys*, slender in growth, and with numerous branchlets clothed with short bright green leaves. It flourishes in dry as well as in moist soils. Another beautiful and thoroughly hardy kind is *P. Quilicoides* (*Bambusa Mazeli*), with tall and gracefully-arched stems clothed with dark green leaves of various sizes. *P. mitis*, an elegant Bamboo, but unfortunately rather tender, is well worthy of a sheltered nook, as its arching growths are very effective. It is of vigorous growth, and requires plenty of room to display its beauty to advantage.

BERBERIS (including Mahonias) are useful, ornamental, hardy shrubs of free growth, even in poor soils. All are hardy, and

those here mentioned are amongst the showiest of spring-flowering shrubs. *B. Darwini* is a brilliant shrub, with small polished green leaves completely hiding the pendulous shoots, and in April and May the numerous racemes of orange-yellow flowers are very pleasing. In height it varies from 4ft. to 10ft., according to soil and position. It flowers in quite a small state, and fills in well at the bottom, so that it forms a neat, symmetrical bush. As a hedge-plant it can be recommended: it

bears the knife well. *B. buxifolia* (*B. dulcis*) is a variable and useful shrub, with small, stiff, dark green, Box-like leaves; the flowers are pale yellow; in some positions it is sub-evergreen. *B. stenophylla* (a hybrid between *B. empetrifolia* and *B. Darwini*) (Fig. 272) is a gem amongst Barberries, distinct, free in growth, and very attractive; plenty of room must be allowed, as it spreads

rapidly, and soon forms a dense bush, with long, gracefully-arching, deep green shoots clothed with small, narrow, intense green leaves; the small drooping yellow flowers appear in May. *B. empetrifolia* is a neat trailing bush, with small linear leaves, about 1in. long, arranged in clusters along the slender branches; the bright yellow flowers are produced in the axils of the leaves in May, and frequently a second crop is borne in the autumn. On account of its dwarf habit and slow growth, it is better suited for the rock garden than the ordinary shrubbery. *B. Wallichiana* (*B. Jamesoni*, *B. Hookeri*) (Fig. 273) is a decorative shrub of great beauty, forming a dense bush. The glossy green leaves are arranged in clusters on stiff branches. The attractive pendent flowers are borne freely. *B. ilicifolia* is a distinct kind, of bushy habit, and needs a sheltered position to bring out its true characters. The rich glossy green leaves, with numerous spines and large clusters of orange-coloured flowers, are charming. *B. congestiflora hakeoides*

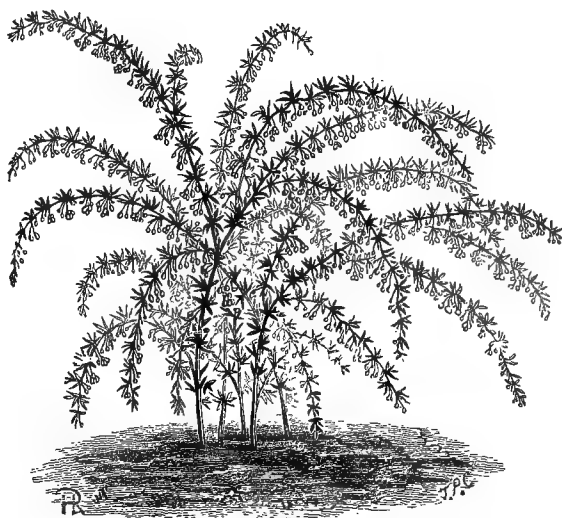


FIG. 272.—*BERBERIS STENOPHYLLA*.

also deserves mention, being quite hardy, and forming a neat, stout bush. It bears an abundance of golden-yellow flowers in early spring. *B. nervosa* (*B. glumacea*, *Mahonia glumacea*) is very distinct, forming a dwarf, compact bush, with deep green leaves. In autumn, when in flower, it is very beautiful. A useful shrub for winter effect, and suitable for the rock garden.

B. repens (*Mahonia repens*) is a low-growing shrub of dwarfer habit than the last-named, with dull green leaves, and very serviceable for edging beds with. *B. Aquifolium* (*Mahonia Aquifolia*), referred to under "Berry-Bearing Trees and Shrubs," succeeds well in hungry soils and under the drip of trees. In spring the young leaves are suffused with purple, becoming green with age, and towards autumn again they change to brownish-crimson. *B. A. fascicularis* (*Mahonia fascicularis*) is a

handsome kind, but one not often planted. Of taller habit than the last-named, it grows freely, and flowers profusely in spring. *B. nepalensis* (*B. Bealei* and *Mahonia nepalensis*) is charming; its leaves often measure 15 in. long. The yellow flowers are succeeded by dark purple berries. *B. japonica* resembles

the last-named, but is of more vigorous growth. The large, leathery, deep green leaves are very handsome.



FIG. 273.—*BERBERIS WALLICHIANA*.

at the base of the interior, are borne on erect stems in July. It loves a moist peaty soil.

BRYANTHUS ERECTUS is a hybrid between *B. empetriformis* and *Rhodothamnus chamæcistus*, and one of the most charming of dwarf Heathworts. It is thoroughly hardy, and should have a peaty, well-drained soil. On no account should it be exposed to the full sun, as it grows more freely, and its small, narrow leaves

BRUCKENTHALIA SPICULIFOLIA merits a place in the rock garden. It is very dwarf, neat in growth, and free flowering. Its pink bell-shaped flowers, stained with purple

are of a richer green in partial shade. The small, delicate, rose-pink *Kalmia*-like flowers are produced at the apex of the growths. As an edging to beds of dwarf-growing American shrubs, or for a shady nook in the rock garden, it is sure to give satisfaction. *B. empetriformis* (*Menziesia empetriformis*, *Phyllodoce empetriformis*) forms a neat, compact shrub, less than 1 ft. high, and bears an abundance of rosy-purple bell-shaped flowers from May until July. A gem for the rock garden. *B. taxifolius* (*Menziesia cœrulea*, *Phyllodoce cœrulea*) is a neat little bush, rarely ever more than 8 in. high, and when its slender stems are clothed with small, rich green leaves, and crowned with purplish bell-shaped flowers in July, is very attractive and uncommon. It should be grown in the rock garden.

BUDDLEIA does not contain many shrubs of value for outdoor decoration, as the majority are too tender for general planting, but *B. globosa* (Orange Ball Tree) is an exception, being distinctly ornamental. The rich orange flowers, like miniature balls, are produced with great freedom in June and July, when the majority of shrubs have done flowering. No soil seems too poor for it, and planters should note a shrub like this that is so distinct in both foliage and flower.

BUXUS.—The best known of this genus is our native *B. sempervirens*, a useful, handsome, and always cheerful-looking tree, thriving well under various conditions alike as regards soil and position. In chalky soils, however, the most luxuriant specimens are produced. A capital hedge-plant, which, used with discretion in the shrubbery border, is effective. A well-grown specimen is by no means out of place even on the outskirts of the lawn, and for planting under the drip of trees the Box Tree is specially adapted. *B. s. microphylla* is a small-leaved, dwarf-growing variety, of much value. The leaves of *B. s. argentea* are greenish-grey, mottled with creamy-white, and those of *B. s. aurea variegata* a mixture of white and yellow on a dark ground. *B. s. aurea-marginata* is noteworthy as forming a neat bush, and its rich green leaves are edged with deep yellow. *B. s. rotundifolia* is conspicuous for its roundish polished green leaves. *B. s. arborescens* is of more vigorous growth, with larger leaves than the type. *B. s. suffruticosa* is familiar in most gardens as an edging to walks, &c. Being of slow growth, very little trouble is necessary to keep it within bounds, and the best time for clipping it is towards the end of May. *B. balearica* (Minorca Box) is not quite so hardy as the type, and prefers a dry to a very damp soil. It is of stout growth, with thick pale green leaves, occasionally tinted with bronze. *B. japonica* is useful and of compact growth, and its golden-leaved variety (*aurea*) is one of the handsomest of the yellow-leaved kinds, and well adapted for winter bedding.

CASSANDRA CALYCVLATA (*Andromeda calyculata*, *Lyonia calyculata*) belongs to the Heath family, and forms a neat, low-growing, much-branched shrub, with small, roundish, pale green, leathery leaves, and in March bears a rich profusion of small waxy-white flowers; useful for planting in masses on the banks of streams or by lake-sides.

CASSINIA FVLVIDA (*Diplopappus chrysophyllus*).—A stout bush of erect habit, with golden-yellow slender stems, small rich green leaves, covered with golden-yellow tomentum on the under-surface, and terminal panicles of white flowers, borne in autumn and continuing in good condition until the middle of November; a good seaside shrub, and valuable for autumn effect. *C. leptophylla* is a companion to the last-named. In this case the stems and under-surface of the leaves, as well as the flowers, are white. *C. Vauvilliersii* is of sturdier, erect growth, and well adapted for the rock garden, or for the front of the shrubbery.

CASTANOPSIS (*Castanea*) CHRYSOPHYLLA is a close ally of the Sweet Chestnut. It is a neat-growing shrub, or small tree, with narrow deep green leaves, covered with a golden powder on the under-surface. This has a pleasing effect when the leaves are disturbed by wind. A rich, loamy, well-drained soil suits it well; it rarely grows higher than 10ft. in this country.

CERASUS LAURO-CERASUS (Common Laurel) is unfortunately planted too freely. In its proper place it is valuable, and when grown in groups, and allowed freedom, is attractive when in flower. It is also useful for hedge planting, or as a shelter to tender shrubs. Being a gross feeder, it should not be too freely planted in the shrubbery border. The Caucasian and Colchic varieties are ornamental, easily grown, and conspicuous by reason of their handsome glossy green leaves. They are also hardier than the first-named. *C. L. latifolia* is a bold, large-leaved variety, and *C. L. angustifolia*, with its narrow leaves, is worthy of recognition. The last-named is not so vigorous in growth as those already referred to, but owing to its neat habit is too ornamental to ignore. *C. L. camelliaefolia* is very uncommon, and worthy of extended culture. Its distinct habit of growth, roundish, deep glossy green leaves, together with its undoubted hardy constitution, are strong recommendations, and planters seeking distinct-looking shrubs should make a note of this. *C. L. rotundifolia* is of compact, vigorous habit, with round rich green leaves. *C. lusitanica* (*Prunus lusitanica*), well known as the Portugal Laurel, grows to a height of about 20ft., and is a very beautiful evergreen, with deep green leaves; a fine shrub for planting in pleasure-grounds. It may be grown as a standard as well as in bush form. On account of its neat habit, it has been grown extensively in pots for standing on terraces, in corridors, &c. Although not showy, its dull white

flowers are borne very freely in long, pendulous racemes. It requires a rich loamy soil, and copious supplies of water while growth is being made. *C. l. albo marginata* has green leaves, distinctly edged with cream-white. *C. l. myrtifolia* is of dwarf, compact habit, with small Myrtle-like leaves. It is of more erect habit than the type, and like it well adapted for growing in standard form. *C. l. azorica* is conspicuous for its larger leaves and bigger flowers than the type.

CHOISYA TERNATA (Mexican Orange Flower).—An exquisite shrub, with fragrant flowers, and hardier than many suppose. It grows freely in ordinary garden soil if sweet and well-drained, and forms a cheerful-looking, freely-branched bush, with glossy green leaves, relieved in April and May by terminal clusters of white Hawthorn-scented flowers. Considering its hardiness and beauty, it is astonishing that it is not more generally grown. Although hardy, it is as well to protect it, from cold winds, especially in the North, while a sunny spot should be chosen for it to thoroughly ripen the wood. When pruning or thinning of the shoots is necessary, this should be attended to as soon as the flowers are over. For forcing it is also valuable, as its flowers, when cut with long stems, are useful for many purposes.

CISTUSES (Rock Roses) are very showy free-flowering shrubs, but unfortunately rather tender. In fact, only in dry and well-drained soils can their real beauty be displayed. Damp, cold, low-lying ground is fatal to them. Sloping sunny banks are necessary to promote thorough ripening of the growth, without which a wealth of flowers is impossible. They are very beautiful when in blossom, and succeed in maritime districts. The following list comprises some of the best kinds: *C. monspeliensis*; flowers white; produced in summer. *C. ladaniferus* (Gum Cistus) grows about 4ft. high, and bears handsome white flowers in June and July. The lanceolate leaves are deep green, and covered with a sticky substance on the upper surface. There is also a spotted



FIG. 274.—*CISTUS LADANIFERUS*
MACULATUS.

variety (*maculatus*) (Fig. 274). *C. villosus* has deep green wrinkled leaves, and is of free growth, whilst it is distinct in habit, and bears freely in summer large lilac-coloured flowers, tinged with purple. The variety named *C. creticus* is deserving of wider culture. In this case the flowers are purplish-red, and borne with great freedom. *C. corbariensis* (a cross between *C. salvifolius* and *C. populifolius*) has flowers blotched with yellow in the centre. It forms a neat bush, and blossoms freely and continuously. *C. florentinus* is a lovely plant for the rock garden, with neat, compact habit. The white flowers are blotched with yellow at the base of each petal. *C. laurifolius* bears large white flowers in summer; it is robust and erect in growth, and perhaps the hardiest member of the genus. *C. albidus* is a much-branched kind, with oblong hairy leaves, bearing in June rose- and lilac-coloured flowers. *C. crispus* is distinct; its purple flowers are produced abundantly in summer. *C. lusitanicus*, *C. salvifolius*, and *C. Thureti* are likewise good kinds.

COTONEASTERS.—See page 460.

CRATÆGUS PYRACANTHA.—See page 459.

DABŒCIA POLIFOLIA (St. Dabeoc's Heath), occasionally met with under the name of *Menziesia polifolia*,

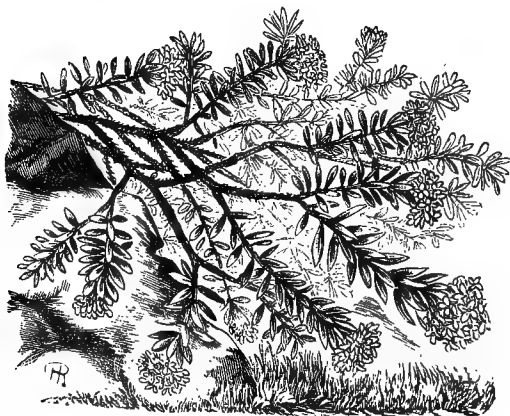


FIG. 275.—DAPHNE CNEORUM.

well adapted for planting in masses in damp soils. It should be planted in the rock garden, also as an edging to beds of dwarf-growing shrubs. It is of compact, bushy habit, and spreads rapidly. Its erect, slender shoots are clothed with narrow bright green leaves, and in summer bears very freely purplish-crimson bell-shaped flowers. Ordinary soil suits this charming little plant, but one composed largely of peat and leaf-mould is best. *D. p. alba* makes a suitable companion to the last-named, and is a continuous blossomer; its flowers are pure white. *D. p. atropurpurea* is conspicuous for its deep purple flowers.

DAPHNES are charming sweet-scented shrubs. Their cultural requirements are very simple, and the flower-display extends over several months. Although they thrive well in ordinary soil, they give the best results when planted in a moist, peaty soil, with



FIG. 276.—DAPHNE BLAGAYANA.

which has been incorporated a quantity of leaf-mould. Good drainage is of importance. *D. Cneorum* (Garland Flower) (Fig. 275) is a good carpet-shrub, with neat deep green leaves and fragrant rose-pink flowers, produced sometimes twice a year—in

spring and autumn. A capital plant for the rock garden. There is a stronger-growing form (*majus*), with larger leaves and flowers; but these are not quite so fragrant as those of the type. There is another variety with variegated foliage; but it is not so valuable as either of the foregoing. *D. sericea* (*D. collina*) forms a neat bush of erect habit, about 2ft. high, with glossy green leaves and terminal clusters of pale pink flowers. A place should be reserved in every rock garden for that rather rare and beautiful species named *D. Blagayana* (Fig. 276), which is of spreading habit, and rather slow in growth. In early spring it carries a wealth of fragrant cream-white flowers. *D. oleoides* is another early-flowering kind of much beauty. The fragrant flower-clusters are white, tinged with pink. It grows about 2ft. high, and is of neat habit. *D. striata* (Snake-barked Daphne), also of dwarf habit, bears a profusion of rosy-purple flowers about midsummer. *D. Laureola* (Spurge Laurel) bears greenish-yellow flowers in January, and is valuable on account of the ease with which it grows in poor soils and under the drip of trees. This species loves partial shade, and its leaves are of a richer green than when fully exposed to the sun. It grows about 4ft. high, and forms a serviceable stock for working the rarer kinds upon. *D. pontica* also thrives well under the shade of trees.

DAPHNIPHYLLUM GLAUDESCENS. — A handsome ornamental Japanese shrub of compact habit, and not unlike certain dwarf Rhododendrons. In this country it has proved thoroughly hardy, and when it comes to be better known is sure to be planted freely. It is by no means particular as regards the quality of the soil, provided suitable drainage is secured. The rich green leaves are glaucous on the under-surface, while the crimson footstalks and the brownish-red bark add a touch of welcome colour. *D. g. Jezoensis* makes a very compact bush, and is useful for planting in the front of the shrubbery. It is of slow growth.

ELÆAGNUS.—These prefer a fairly rich and well-drained soil, and they also flourish in sandy soil where many shrubs merely exist. During the winter months, the variegated kinds in particular are very bright in the garden, and valuable either for placing as isolated specimens on the lawn, or for adding colour to the shrubbery; they are also useful for covering walls, and are capital dry-weather shrubs, as they do not show ill effects from long drought. Their hardiness is beyond doubt, and if planted in a sunny position, the gold- and silver-leaved kinds produce pretty pictures. As the colour is constant, planters should use them freely; in fact, the variety named *E. pungens aurea* is almost equal in its colouring to some of the fine foliage Codiaëums (Crotons). All form dense round bushes, and should be allowed freedom to develop; beyond the

removal of wrongly-placed growths they give little trouble. The following are the kinds most worthy of recognition: *E. macrophylla* bears greenish-yellow flowers in mid-winter; it is of robust, spreading habit, and its roundish leaves are thick in texture, bright green above, and silvery on the under-sides. *E. pungens* also flowers in winter, from November until the middle or end of January; it grows about 8ft. high, and is of good habit, with oblong deep green leaves, undulated at the margins, the under-surface being shaded with silvery-grey. *E. p. aurea* is the most ornamental of the variegated Oleasters, and makes a fine lawn shrub, but is less vigorous in growth and dwarfer than the type; the broad leaves are wavy at the margins, the central portion being deep yellow. In some instances the leaves are almost wholly yellow. The leaves of *E. p. tricolor* are sulphur-yellow, with light and deep green stripes. *E. p. Simoni* succeeds admirably on dry banks and similar positions, as also does *E. glabra*. *E. g. variegata* has leaves edged with creamy-white.

EMPETRUM NIGRUM (Crowberry) is a little shrub of Heath-like appearance, and delights in moist, peaty soil and shady situations. Being of very dwarf habit, it is valuable for the rock garden, and may be turned to good account as an edging to beds of dwarf shrubs. The pink flowers are borne in May, and are succeeded by small round dark berries (Fig. 277). *E. rubrum* bears purplish-coloured flowers and red berries.

ERICAS (Heaths) are valuable for their showiness when in flower, hardiness, neat growth, and the length of time their flowers remain in beauty. The colours vary from pure white, through pink and rose, to deep red. They are of simple culture in peaty soil, but grow and flower freely in loamy soil, provided lime is not present. A yearly top-dressing of good leaf-mould is very beneficial to the plants. Their value in the rock garden, as well as for edgings to beds of permanent shrubs, is well known. With a careful selection of varieties a display of blossom may be kept up for the greater part of the year. *E. cinerea* (1ft. high) bears in June and July a wealth of purple flowers. There are several varieties, differing in the colour of the flowers—*alba*, *rosea*, *atropurpurea*, *atrosanguinea*, *pallida*, and *coccinea* being the best. *E. ciliaris* (about 18in. high) bears deep pink or crimson flowers

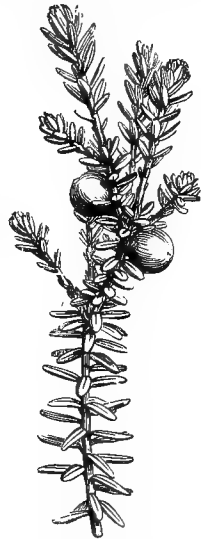


FIG. 277.—EMPETRUM NIGRUM.

from midsummer onwards. *E. arborea* assumes quite a tree-like habit, and carries a rich profusion of small flowers from February to May. *E. Mackai* (*E. Mackaiana*) is of dwarf habit, and has pretty pink flowers. *E. Tetralix* is a charming Heath with terminal racemes of pale pink flowers in July, while the varieties *alba* and *rubra* are useful and showy too. *E. carnea* (Winter Heath) is very neat in growth, and bears an abundance of pink flowers from mid-December until spring. The white-flowered form (*alba*) makes a good companion. Both are thoroughly hardy, and useful either for edgings to beds or as undergrowth to such things as Azaleas. They are also worthy of a place at the foot of the rockery. *E. stricta* is of neat, erect habit, grows about 5ft. high, and bears terminal clusters of reddish-purple flowers abundantly in summer. *E. lusitanica* (*E. codonodes*) is an abundant blossomer. Although not possessing such a hardy constitution as some Heaths, it is well deserving of a sheltered nook. In favoured localities it makes a handsome bush, and from about the end of January (in mild winters) till May, when its slender twigs are bearing their pendent white flowers touched with pink; it is one of the most attractive objects in the American garden. *E. mediterranea* forms a neat and pretty bush, with pitcher-shaped pink flowers, produced early in the year. The white-flowered form (*alba*) is also noteworthy, and *hibernica* is valuable, too, and later in coming into flower than the type, but the one named *hybrida* is not only the earliest, but also the most profuse blossomer of the group. The flowers are a lovely shade of pink. This kind is not planted half so freely as its merits entitle it. *E. vagans* (Cornish Heath) is an erect species, very free and popular, with pinkish-white flowers in summer and autumn. Its varieties, *alba*, *rubra*, and *grandiflora*, are pretty and very free. *E. calluna vulgaris* is well-known, but some of its more interesting and beautiful varieties are not so familiar in gardens as they might be. *Hammondi* is of free growth and a choice Heath, with an abundance of pure white flowers. *cuprea* forms a neat tuft and is very distinct, while its yellow leaves assume a bronzy hue in winter. *Alporti* is another compactly-habited kind, as well as free-flowering. *coccinea* is conspicuous for its deep red flowers. Other good varieties are *rosea*, *Foxii*, *Searlei*, *alba*, and *lanulosa*.

ERIOBOTRYA JAPONICA (*Mespilus japonica*).—A handsome shrub, with enormous deep green leaves. The pendulous racemes of white flowers appear late in summer, and when grown under glass the pale orange fruits (Fig. 278) are freely borne. It is a useful and an ornamental wall-shrub.

ESCALLONIAS are referred to under "Wall Shrubs and Climbers"; but the most useful kind of all, *E. Philippiana*, is not included, as it does not need this protection, and may be

planted with safety in the open shrubbery. The long pendulous branches are well clothed with narrow pale green leaves, and in June and July numbers of tiny white flowers are produced. *E. sanguinea*, *E. punctata*, and *E. exoniensis* are all good.

EUCALYPTUS.—Of this genus only *E. Gunni* is hardy, and even this can only be planted in the warmer counties. *E. coccifera* is almost as hardy, and, where it succeeds, is ornamental. *E. globulus* (Gum Tree) grows very rapidly until late in the season, consequently the wood is not sufficiently ripened

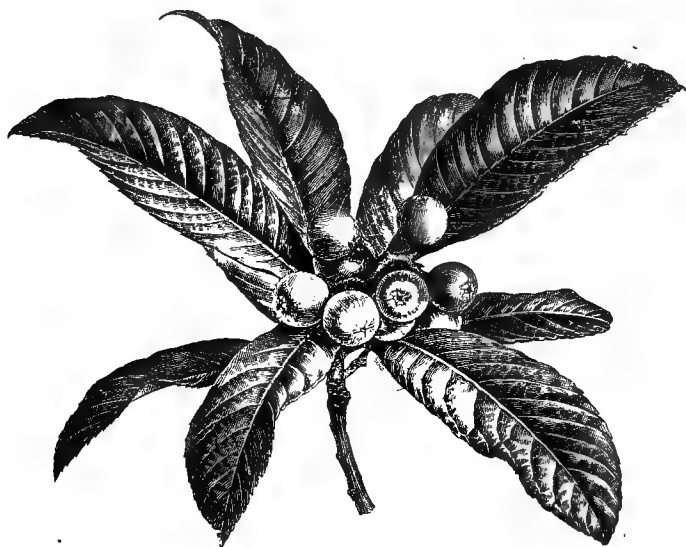


FIG. 278.—ERIOBOTRYA JAPONICA.

to withstand an English winter without protection; it is, however, well adapted for sub-tropical bedding. The lemon-scented *E. citriodora* is worth cultivating indoors, as its leaves are fragrant.

EURYBIA.—See ·Olearia.

FABIANA IMBRICATA (False Heath) is hardy only in sheltered spots in the open air North of London. It is of somewhat similar habit to the well known Heather, and in June bears pure white tubular-shaped flowers, which last in condition for several weeks. It is a useful plant for an unheated greenhouse, but requires good drainage. Ordinary soil will suit it, especially if a little peat and leaf-mould is incorporated with it. Copious supplies of water should be given during growth.

GAULTHERIA.—See page 458.

GRISELINIA LITTORALIS, planted in rich, well-drained soil, and a sunny spot, is quite hardy in the South and West of England, forming a neat bush, with erect stout stems and roundish, thick, pale green leaves; it is, moreover, a good sea-coast shrub. *G. lucida* and *G. l. macrophylla* are handsome glossy-leaved shrubs, but only thrive out of doors in favoured localities.

HELIANTHEMUMS (Sun Roses).—These are charming plants of dwarf habit, well adapted for the rock garden and as margins to beds of dwarf-growing shrubs. A bank sloping to the south suits them admirably, as they only flower freely when exposed to the sun. They succeed in ordinary soil, which, must, however, be well drained, a cold, stiff, heavy soil being the most unsuitable for them. *H. formosum* forms a much-branched bush 3ft. or 4ft. high, and in summer bears a profusion of yellow flowers spotted with black. During severe winters it sometimes gets cut, hence the advisability of a sunny bank, so as to enable it to thoroughly ripen its growths. *H. Libanotis* grows freely, and carries a wealth of yellow flowers in July. *H. polifolium* is a compact-growing species, with white flowers. *H. ocymoides* (*H. algarvense*) grows about 2ft. high, and is of diffuse habit. The large clear yellow flowers are spotted with purple at the base. *H. vulgare* and its beautiful varieties (single and semi-double) have richly-coloured flowers varying from white to yellow and orange, and from red to deep crimson.

HYMENANTHERA CRASSIFOLIA.—See page 458.

HYPERICUM HOOKERIANUM (*H. oblongifolium*) is a vigorous, hardy, free-blossoming Himalayan species, with deep green leaves, and in August carries clusters of lovely buttercup-yellow flowers of large size. This is undoubtedly one of the most meritorious of the stronger-growing Hypericums, and is well suited for grouping on the turf.

ILEX AQUIFOLIUM (Holly) is a splendid evergreen, and indispensable in ornamental planting. A tree, 30ft. high, with its lower branches clothed with prickly, polished-green leaves sweeping the ground, is indeed a handsome picture. Although it flourishes in the shade, it is perhaps the finest evergreen for planting as isolated specimens in the park, on the outskirts of the lawn, or in any position with full exposure. As a hedge-plant, its value is beyond question, and in this position it forms a dense, impenetrable, and ornamental breakwind. Holly is easily accommodated, and grows freely in all soils unless the position is a damp and boggy one. Groups of Hollies, with a few spring-flowering trees intermixed, such as Almonds, Peaches, Hawthorns, &c., produce a telling effect in March and April, when the delicate-tinted blossoms of the last-named are seen to excellent advantage against a background formed by deep green Holly leaves. The autumn and winter effect, when the Holly is carrying

its wealth of cheerful coloured berries, is equally pleasing, and effective, too.

With regard to the best time for transplanting Hollies, a point about which many cultivators differ, it may be taken for granted that the operation may be successfully carried out between early autumn and late spring, provided the ground is in a suitable condition to receive them. Moist weather should be chosen for the purpose, and care should be exercised in lifting them to have a good ball of soil to the roots, and if the weather is dry, to water freely overhead and at the roots immediately after planting; if the atmosphere should continue dry, and strong winds prevail, the plants should be watered overhead every other day or so. Early autumn is perhaps preferable to spring, as the roots become established in the fresh soil before winter, and are enabled to commence growth in the following spring without feeling any ill effects.

The importance of frequently transplanting Hollies in a young state cannot be over-estimated, as they are encouraged to make large quantities of fibrous roots, which are of great value in after years, especially if large trees have outgrown their positions, and it becomes necessary to transfer them elsewhere. Hollies are amenable to many forms of culture, and beautiful in whatever form they are grown, the standard, bush, pyramid, and weeping forms fitting them for a variety of positions in both the garden and the pleasure-ground. They can be propagated by seeds, cuttings, layering, budding, and grafting. The type is raised from seed, which should be gathered as soon as ripe, and mixed with sand, placed in a heap, and kept there until spring or the following autumn. The heap should be turned over every fourth or fifth week, and at the sowing time the seed should be separated from the sand, and sown either in slightly-raised beds 4ft. broad, or in drills, and covered with fine soil. In about two years from the time of sowing, the seedlings will be large enough for transplanting in nursery rows.

The variegated forms are generally increased by budding in summer, and by grafting in spring; but this method is not altogether necessary, or even advisable, as cuttings root freely if young, well-ripened pieces of the current year's growth are taken off in August and inserted in a sandy bed on a sheltered border, and covered with handlights or frames. They should be kept moist, very little air admitted, and, of course, shaded from the sun until roots have been emitted. The weeping varieties are worked on the green-leaved form. In addition to those referred to at page 459, the following represent the cream of the various groups:

Green-leaved: *I. dipyrrena* is quite hardy, and uncommon in this country. It grows freely, and forms a much-branched tree

of pyramidal habit, with long and rather narrow serrated leaves. *I. crenata* is a dwarf slow-growing species, with small, ovate, glossy green leaves. *I. latifolia* is a noble-looking Holly, with Magnolia-like foliage. In the South of England it is hardy, but in the northern counties requires the protection of a wall. It is vigorous in growth, with leaves 9in. long by 3in. broad. They are oblong-lanceolate, and toothed at the margins. *I. cornuta* deserves a place on account of its distinct appearance. The stiff leaves are supplied with from three to five formidable spines.

Of forms belonging to *I. Aquifolium* the following are meritorious: *nigrescens*, large, broad, smooth green leaves. *ferox* (Hedgehog Holly), with its curled spiny leaves, the upper surface being furnished with numerous short prickles. *recurva* (*tortuosa*), sometimes called Screw Holly, also has small curled leaves. *latispina* is free in growth, with broad leaves and long spines. *Hodginsi* is a grand variety, and well adapted for avenues, and is of good growth; the broad leaves are beset with short spines, and it carries an abundance of berries. *atrovirens* (*Madeirënsis atrovirens*) is another handsome variety, with large flat leaves of a pale green colour. *platyphylla* is a first-rate variety, with broad polished green leaves, pyramidal habit, and a good berry-bearer. *ovata*, although not of quick growth, should not be passed over. *Hendersoni* is an invaluable kind for decorative planting, free in growth, with handsome, broad, smooth, glossy green leaves. *scotica* is also worthy of mention. *donningtonensis* is conspicuous for its long, sharply-pointed, spiny leaves, and is a beautiful kind.

Golden-leaved: *aurea angustifolia* is of free growth, with narrow prickly leaves, pale green in the centre, and edged with yellow. *aurea regina* (Golden Queen) has long been recognised as a handsome Holly; the large leaves have a bold, irregular, deep yellow margin, while the central portion is of a polished green, speckled with silvery-grey. Golden King is a new and even finer variety than the last-named; in habit it is similar to the well-known Hodgins Holly, from which it is a sport. The leaves are larger than those of Golden Queen, and the colouring is more intense: a fine acquisition. Madame Briot is showy, and very free; the large greenish-yellow leaves are margined with clear yellow. *Cookii* is distinct, but less decorative than those mentioned above. *Wateriana* (*aurea pumila* and Waterer's Dwarf Golden) is a gem, growing freely, and forming a compact bush, with smooth green leaves, shaded with yellow in the centre, and bordered with deep yellow; for small gardens this is a grand Holly. *flavescens* (Moonlight) is conspicuous by reason of its leaves being blotched and suffused with yellow. *aurea marginata bromeliæifolia* is an excellent kind, with large ovate leaves and few spines; it is a rich green, with a bold margin of rich

yellow. *Lawsoniana* is an effective variety; the leaves are large, and blotched with yellow.

Silver-leaved: *argentea medio-picta* (*albo-picta*), popularly called Silver Milkmaid, is very distinct, and of good habit. With the exception of a bordering of deep green, the whole of the leaf is creamy-white. *ferox argentea* (Silver Hedgehog Holly) is well worth a place, being of dense growth; the leaves are blotched



FIG. 279.—KALMIA LATIFOLIA.

with silvery-grey, and covered with short spines. *argentea elegantissima* is a lovely variety, with prickly leaves, rich green in the centre, and cream-white margins. *argentea marginata* (*albo marginata*) is very free in growth, with large polished green leaves, having broad white margins. *handsworthensis argentea* is another attractive sort, with leaves marbled with grey, and edged with cream-white. *argentea regina* (Silver Queen) is very showy, and

one of the most meritorious of the section. Being free in growth, and of excellent habit, it is well adapted for pleasure-grounds. The leaves are large, and broadly-margined with white.

KALMIA.—Although the genus is not a large one, comprising only about half a dozen species, it is specially valuable where dwarf-growing shrubs are required. Generally, it is supposed that peaty soil is essential, but it has been proved that these shrubs are a success when grown in loam, especially if a quantity of leaf-mould has been incorporated with it; soil containing lime and chalk is injurious to them. *Kalmias* are well adapted for forcing into blossom in winter and early spring. For this purpose plants may be potted up in the autumn and taken into heat in batches according to the requirements of the place. After flowering, they should be placed in a gentle heat to encourage new growths, and the syringe used freely. Later on they should be hardened off and planted out on a warm sunny border to ripen the wood properly.

The first kind to flower in the open air is *K. glauca* (Swamp Laurel), a dwarf-growing shrub rarely seen more than 18 in. to 2 ft. high. It is a useful front-line plant in the shrubbery, and its great clusters of bright pink flowers are borne in April. The linear lanceolate leaves are glossy green above and glaucous green beneath. *K. latifolia* (American Mountain Laurel) (Fig. 279) is one of the most charming of dwarf-flowering shrubs, and when planted in masses produces a lovely picture. It has broad shining green leaves, and terminal clusters of pale rose flowers, changing to white with age. It is also attractive for its foliage alone. *K. l. myrtifolia* has small Myrtle-like leaves and smaller flowers than the type, but is very effective. *K. angustifolia* (Sheep Laurel) grows less than 3 ft. high, and bears dark red flowers freely in May and June. *K. a. ovata*, *K. a. rubra*, and *K. a. rosea* are attractive and easily grown.

LAURUS NOBILIS (Sweet Bay) may be grown either as a pyramid or standard, delighting in rich soil, and requiring good drainage, as it soon wears a sickly appearance if water lodges about the roots. A position screened from east winds is advisable. It is a fine tree for growing in pots and tubs for placing in vestibules, halls, and cool conservatories in winter. The lanceolate aromatic leaves are of a rich polished green. There are about half a dozen varieties, differing in size, form, and colour of the leaves, but none are of greater decorative value than the type.

LEDUMS are attractive shrubs of neat growth, quite hardy, and as they flower early are valuable for both forcing and room-decoration during winter, as well as for adding variety to the shrubbery-border in April and May, when their growths are crowned with small flowers. Although they succeed in loamy soil, they give the best results when planted in one mixed with peat and

leaf-mould. Water should be given liberally while growth is being made. Several kinds are available, but it is only necessary here to mention *palustre*, *latifolium*, and *glandulosum*. *L. palustre* (Marsh Ledum) is the kind most generally met with, and forms a dwarf, much-branched bush, about 2ft. high, with small, narrow, deep green, delightfully-aromatic leaves, conspicuous for the rusty tomentum on the under-surface. The terminal clusters of Rosemary-like flowers are white, and borne very freely. *L. latifolium* (*L. palustre latifolium* and *L. grænlandicum*), well known as the Labrador Tree, the leaves of which have been used as a substitute for tea, differs from *L. palustre*, being more vigorous and compact in growth, with larger leaves and finer clusters of white flowers, that are sometimes suffused with pink when first expanded.

LEIOPHYLLUM BUXIFOLIUM (*L. serpyllifolium*, *L. thymifolium*, *Ammyrsine buxifolia*, *Ledum buxifolium*). — This delightful little Sand Myrtle is a gem amongst dwarf-growing *Ericaceæ*, but rarely met with outside good collections of hardy shrubs. It grows about 10in. high, is of compact habit, with small, narrow, rich green Box-like leaves, and small white flowers and unopened rose-pink buds, and is most attractive. A sandy peat soil suits it best. It is serviceable for edgings to beds of dwarf American shrubs, as well as worthy of a place in the rock garden. *L. b. prostratum* (*L. Lyoni* and *Ammyrsine prostrata*) is equally hardy and very showy, but is better adapted for the rock garden.

LEUCOTHOËS.—Although these shrubs have a preference for damp, peaty soil, they flourish in good loam provided it is free from lime. All the Leucothoës are very satisfactory planted on the margins of lakes and streams. *L. axillaris* (*Andromeda axillaris*) grows about 2½ft. high, and bears white flowers in May and June. *L. Davisæ* is a compact-growing species, with small deep green leaves and clusters of white flowers. *L. racemosa* (*L. spicata*, *Andromeda spicata*) is of good habit and bears slender spikes of white flowers. *L. recurva* (*Andromeda recurva*) is of dwarfer habit than the last, and it produces in summer racemes of pale pink bell-shaped flowers. *L. Catesbæi* (*Andromeda Catesbæi*) grows freely, and carries a profusion of white flowers.

LIGUSTRUMS (Privets) are represented in many gardens only by *L. ovalifolium* (oval-leaved) and its golden-leaved form. The first-named is useful for hedges on account of its quick growth, but, owing to its hungry roots, soon exhausts the soil, and for this reason should not be planted too freely, especially in the vicinity of the kitchen garden. *L. o. foliis aureis* (*L. californicum aureum*) is a showy, useful, and popular yellow-leaved Privet, well adapted for town gardens, window boxes, and for winter bedding. Though less vigorous than the type, the rich

colouring of the foliage is constant, particularly when grown in partial shade. It thrives well in dry soils, and is improved by hard pruning. *L. japonicum* (*L. macrophyllum*, *L. Roxburghii*, *L. Kellermanni*, *L. syringæflorum*) forms a handsome free-growing shrub, and bears loose panicles of slightly fragrant cream-white flowers in July. *L. coriaceum* (*L. lucidum coriaceum*, Fig. 280) is of sturdy habit, slow growth, has roundish deep glossy green leaves, and is very shy flowering.

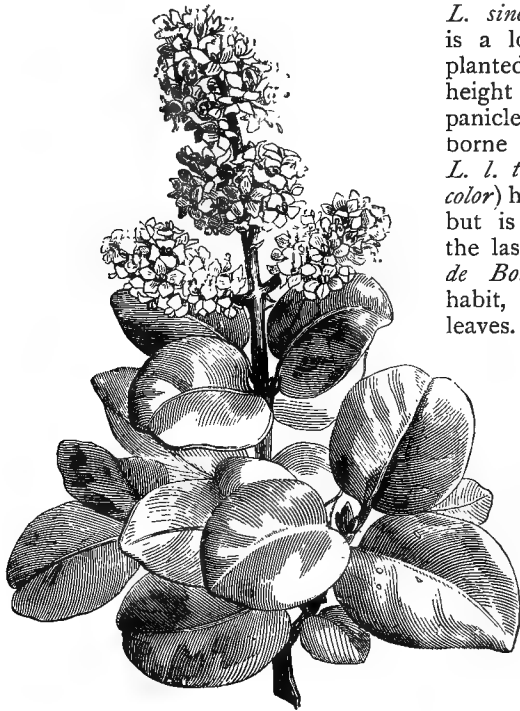


FIG. 280.—LIGUSTRUM LUCIDUM CORIACEUM.

L. lucidum (*L. magnoliæfolium*, *L. sinense latifolium robustum*) is a lovely species, and when planted in rich soil reaches a height of from 10ft. to 16ft.; the panicles of white flowers are borne abundantly in summer. *L. l. tricolor* (*L. japonicum tricolor*) has prettily-marked foliage, but is not quite so hardy as the last-named. *L. l. Triomphe de Bordeaux* is of branching habit, with rich glossy green leaves. *L. l. alivoni* is also ornamental, and *L. sinense* (*L. chinense*, *L. Fortunei*) should not be omitted from a list of attractive free-flowering shrubs. The latter is really sub-evergreen, and succeeds admirably in dry soil, assuming a freely-branched bush of pleasing outline. Its large loose panicles of white flowers are borne about the middle of June, and last long in condition.

Privets are not noted for their beauty as berry-bearing shrubs, but the last-named species (*L. sinense*) deserves special mention, as it is superior in this respect to all the other members of the genus, and is very effective, the small round dark berries hanging on the bushes for the greater part of the winter. *L. Quihoui* (*L. brachystachium*) is the last Privet to blossom, frequently disporting its long terminal panicles of fragrant cream-white flowers in October and November. It is free, rather straggling or loose in habit, and distinct. As it flowers so late in the

season, it is specially valuable for shrubbery or pleasure-ground planting.

OLEARIAS.—The hardiest of these is *O. Haastii* (Daisy Bush), a choice dwarf-growing shrub, free in growth, forming a dense, upright, much-branched bush, 5ft. high, with small Box-like leaves and pure white, sweet-scented, Daisy-like flowers in July and August. The flowers are carried abundantly, even on small plants, and last in condition for several weeks. *O. Gunniana* (Fig. 281), though not as hardy as the first-named, will, nevertheless, thrive if provided with a sheltered spot. In groups on the turf, a pleasing effect is obtained by planting *Gladiolus*, *Lilies*, &c., between them, as a long succession of flowers is maintained.



FIG. 281.—OLEARIA GUNNIANA.

OSMANTHUS.—The Osmanthus are cultivated principally for their handsome Holly-like foliage, but their clusters of small white and cream-white flowers are deliciously scented, and borne in the axils of the leaves very freely on good-sized plants in autumn. The soil should be rich and well drained, and they should be planted in a position shielded from east winds. Their value for walls is referred to elsewhere, and they are well adapted for planting as isolated specimens on the lawn, and for growing in pots for placing on balconies, in vestibules, halls, &c., they have few equals. Another use for which they are well suited is winter bedding, and the best for this purpose is the variety named *purpureus*. They are also serviceable for filling window boxes. Numerous varieties are now in commerce, differing from the type in the size, form, and colour of the leaf. All are decidedly ornamental shrubs or small trees of neat habit and free growth. *O. Aquifolium* (*Olea Aquifolium*) is a beautiful shrub, and in good soil forms a large well-balanced bush, with broad, leathery, Holly-like leaves of a pleasing shade of green. *O. ilicifolius purpureus* is one of the finest of all the Osmanthuses. In habit it resembles *O. ilicifolius*, but the young leaves are wholly purple, and with age become purplish-bronze. It is hardier than the type. *O. i. latifolius variegatus* has leaves margined with

cream-white, and *O. i. aureus-marginatus* leaves edged with yellow. *O. i. rotundifolius*, whose leaves are nearly round, is best adapted for the rock garden. *O. i. myrtifolius* is of dwarf habit and free, and forms a neat, dense bush, with small, thick, sharply-pointed, Myrtle-like leaves; it deserves a prominent position in the shrubbery.

Although the Osmanthuses grow on their own roots, they may be worked on stocks of the Common Privet in spring, and placed in warm, close cases until a union has been formed, and then removed to cooler quarters and grown on until the following spring, at which time they will be nice-sized plants for transferring to the open ground.

OZOTHAMNUS ROSMARINIFOLIUS (Snow Flower).—A shrub of elegant habit, whose small white Daisy-like flowers, if cut with long stems, are very useful for indoor decoration, and last a considerable time in perfection. Unfortunately, this shrub is not hardy all over the British Isles. It thrives in ordinary soil, but prefers one composed of peat, loam, and leaf-mould in equal proportions. The drainage should be good.

PERNETTYAS.—See page 458.

PHILESIA BUXIFOLIA is of dwarf habit, rarely exceeding 4ft. It is slow in growth, and quite at home in the rock garden. In very cold localities it should have a place in unheated glass structures. Its deep red drooping Lapageria-like flowers are borne with moderate freedom.

PHILLYREA.—There are about four species. A useful group of hardy shrubs, and with the exception of *decora*, referred to under "Berry-Bearing Trees and Shrubs," all have small leaves, mostly of a deep green colour, and are indigenous to the Mediterranean region. They are by no means difficult to accommodate, and there are few positions in which they will not thrive. They are well adapted for planting under the shade and drip of trees. *P. angustifolia* is a dense round-headed bush; it makes a nice lawn shrub, and its small white flowers are produced very freely. *P. a. rosmarinifolia* is of dwarfer habit. *P. latifolia ilicifolia* and *P. l. rotundifolia* are pleasing shrubs of neat growth. *P. media* (*P. variabilis media*) is a much-branched bush or small tree, and useful for planting in exposed situations. The variety *buxifolia* (Box-leaved) and *oleafolia* (Olive-leaved) are also worthy of note. *P. decora* (*P. Vilmoriniana*, *P. laurifolia*) is the most ornamental of the genus. It is perfectly hardy, beautiful in foliage, and distinct, either when bearing its small fragrant flowers, or its round black berries in August.

PHLOMIS FRUTICOSA (Jerusalem Sage) is valuable chiefly for its accommodating nature, as it succeeds admirably in gravelly soils and on dry banks. It is of free, bushy growth, with

deep green wrinkled leaves, and rich yellow flowers produced in whorls during summer.

PHYLLOSTACHYS.—See Bamboos.

PIERIS.—Decorative hardy shrubs, generally planted in peaty soil, but thriving in rich well-drained loam, to which has been added a quantity of leaf-mould. Like the rest of the *Ericaceæ* they have a great dislike to lime. They delight in being kept moist at the roots, and during the growing season (especially in dry weather) should be occasionally watered overhead. Being surface-rooting plants an annual top-dressing of vegetable matter not only tends to keep the roots cool but increases the vigour of the plants. *P. floribunda* (*Andromeda floribunda*) is perfectly hardy, with thick green leaves, and bears a profusion of white flowers in branching terminal racemes. The buds are formed in winter, but do not expand until the end of March. For forcing into blossom about Christmas time it is also useful. *P. japonica* (*Andromeda japonica*) is a charming dwarf early-flowering species of rather slow growth, with handsome foliage and drooping racemes of white bell-shaped flowers. There is a variegated form of the last-named that deserves to be mentioned, and is known as *P. j. variegata*. It is rather slow in growth, with pale green leaves, irregularly margined and splashed with white, and this bright variegation is happily constant. *P. formosa* (*Andromeda formosa*) is a rare and beautiful Himalayan species with deep green, finely-serrated leaves, tinged with brownish-red in spring, and erect pure white flowers. As this species is somewhat tender, it should be planted in a sheltered nook. *P. ovalifolia* (*Andromeda ovalifolia*) is a tall-growing species, hardier than the last-named, and with flesh-coloured flowers.

PIPTANTHUS.—*P. nepalensis* (*Baptisia nepalensis*, *Anagyris nepalensis*, *Thermopsis laburnifolia*) bears a wealth of pale yellow pea-shaped flowers in early summer in the open air in this country. It is of quick growth and not at all exacting as to soil, but dislikes a north and east aspect, as it is apt to suffer from cold winds and hard frosts; therefore, it should be grown against a wall in districts north of London.

POLYGALA CHAMÆBUXUS (*Chamæbuxus alpestris*).—This is useful for either the rock garden or as an edging to beds or borders of dwarf shrubs. Its racemes of fragrant cream-coloured flowers, tipped with purple, are borne in May. The purple-flowered variety (*purpurea*) is equally dwarf and sturdy in habit, and the more attractive. Polygalas are showy, dwarf in habit, and delight in moist, peaty soil.

QUERCUS.—Evergreen Oaks, especially *Q. Ilex*, are splendid trees for pleasure-grounds, as well as for standing as isolated specimens on lawns. They vary much in habit and height. For

instance, *Q. coccifera* forms a dense bush about 10ft. high, while *Q. Ilex* is, if we except the Mammoth Conifers, one of the largest of evergreen trees hardy in this country. They are not so free in growth as the majority of the deciduous sorts, and as they are rather sparsely furnished with fibrous roots, great care should be taken in transplanting them, always securing, if possible, a good ball of earth to the roots. *Q. Ballota* (*Q. cyclophylla*, *Q. Ilex Ballota*) forms a handsome tree of 20ft. or so high, with furrowed, greyish bark, and short, roundish, serrated, pale green leaves, having a white substance on their under-sides.



FIG. 282.—*QUERCUS SUBER*.

Q. coccifera (*Q. kermesiana*), noted above, is thoroughly hardy, and rather slow in growth, with small, oval, smooth, deep green, spiny leaves.

Q. cuspidata, a Japanese species, with its variegated, broad, and narrow-leaved varieties, is handsome.

Q. Suber (Cork Oak) (Fig. 282), an old inhabitant of gardens, has distinct rugged bark, and forms a small round-headed tree, which rarely exceeds 15ft. in height in this country.

Q. Turneri is well adapted for avenue-planting, being shapely and free in growth, with large deep green serrated leaves.

Q. phillyræoides (*Q. rotunda*), with smooth, rich green, serrated leaves, is of bushy habit and distinct appearance.

Q. acuta (*Q. Buergerii*, *Q. angustifolia*) is, unfortunately, rather scarce in gardens; it is nevertheless very distinct. *Q. densiflora* (*Q. echinacea*) is a handsome species, with deep green leathery

leaves. It requires protection from biting winds. *Q. agrifolia* (*Q. arcoglandis*) and *Q. serrata* deserve mention, and are rather slow in growth. *Q. glandulifera* forms a much-branched tree, with a well-balanced head, and is useful for decorative planting. Another kind, *Q. glabra*, is attractive and hardy, and forms a good-sized bush, with large smooth green leaves, but should be protected from east winds. *Q. Ilex* (Holm Oak), a well-known dense round-headed tree, grows freely in ordinary soil, and reaches a height of 40ft. The spreading branches are clothed with deep polished green narrow leaves, which, if not pruned in, almost

sweep the surface of the ground. It is not of rapid growth, but is of great duration. Of the several varieties belonging to this species, the following are the most meritorious: *latifolia* (*Q. Ilex oblonga*), *Fordii*, *rotundifolia*, *Gramuntia*, *diversifolia*, and *crispa*.

RHAMNUS ALATERNUS is a neat shrub or small tree, rarely exceeding 15ft. high, with deep glossy green leaves, and bears small white flowers very freely in spring. *R. a. angustifolius* has narrower leaves, and the colour is a pleasing shade of green.

R. a. a. variegatus has silvery-grey leaves margined with white, and is very effective. *R. a. aureus* has broader leaves than the last-named, and these are speckled with yellow on a dark green ground. Rhamnuses succeed in ordinary soil, and the silver-leaved variety is well adapted (although perfectly hardy) for growing in cold glass structures, as the variegation is much finer than upon specimens grown out of doors.

RHAPHIOLEPIS.—See page 461.

RHODODENDRONS are exceedingly beautiful flowering and foliage shrubs, and happy in loam as well as in peat. The flowers are varied in colour and often sweet-scented. The foliage, too, affords pleasing variety with its light and deep green, bronze, purple, and even variegated forms. With a careful selection of kinds a brilliant display of blossom may be maintained from the end of February until the latter part of June, and in some seasons till nearly the end of July. The flowers of the early-blossoming sorts are sometimes damaged by spring frosts, and east and north-east winds are injurious. As soon as the flowers are over, the seed-vessels should be picked off, unless seed is wanted.

Rhododendrons should have a surface-dressing of leaf-mould in spring, and copious supplies of water at the roots during dry weather will be of immense benefit to them. The best effects are produced when planted in masses according to the colours of the flowers, care being taken to allow sufficient room, so that the characters of each sort can be displayed to advantage, and if bulbs such as *Liliums* are planted between them, a charming effect is obtained. In addition to growing them as bushes, they are also effective as standards with a clean stem 4ft. high, and placed at intervals along the outskirts of the lawn, with *Scillas*, *Triteleias*, or even *Violas* grouped around them.

Of the Himalayan species, the best are as described below:

R. Thomsoni forms a neat bush, and is quite hardy; the loose trusses of deep crimson flowers are borne in May. *R. campanulatum* has bell-shaped rosy-lilac flowers, spotted with purple; it grows freely, and forms a well-balanced bush 6ft. high. *R. fulgens* is a strikingly handsome species, with bright red flowers. *R. niveum*, with deep green Laurel-like leaves, covered with white

tomentum on the under-sides, bears pale lilac flowers, with deeper blotches. *R. ciliatum* deserves a place in front of taller-growing shrubs, being neat in growth and having small hairy leaves and rose-tinted flowers produced freely on young plants. *R. campylocarpum* is one of the loveliest of dwarf-growing species, with small deep green leaves. It is perfectly hardy, and bears soft primrose-yellow flowers in quite a small state. *R. glaucum* is another dwarf-growing species not generally cultivated, though distinct, beautiful, and hardy. The pale purple flowers are borne very profusely on well-established plants.

Of the American species *R. maximum* is very handsome, with delicate rose-coloured flowers. It is useful for the woodland. *R. catawbiense* is of vigorous growth, with broad flat leaves and lilac-purple flowers; its variegated form deserves mention, as its foliage is distinctly marked with yellow. *R. californicum* has large rose-purple flowers, spotted with yellow.

R. Sminowi, a native of the Caucasus, is a valuable species of recent introduction, and as yet rare in this country, but

as its merits become better known is sure to be planted freely. It is of rather slow growth, and forms a dense bush, with large pale green leaves covered with white tomentum on the under sides, and in spring bears loose trusses of rosy-lilac flowers, the broad petals being crimped at the margins.



FIG. 283.—RHODODENDRON PONTICUM.

R. ponticum (Fig. 283) is noteworthy as being one of the parents of a host of beautiful hybrids that adorn our gardens and pleasure-grounds. It is better adapted for the woodland than the garden. The variegated form, *albo-marginatum*, is very showy. *R. ferrugineum* (Alpine Rose) rarely exceeds 2ft., and has rose-coloured flowers. It is useful for edgings to beds and

borders planted with dwarf-growing shrubs, and deserves a place on the rockery. *R. f. atrococcineum*, *R. f. myrtifolium*, and *R. f. variegatum* are all worthy of a place in the rock-garden.

R. hirsutum and *R. h. album* are dwarf-growing sorts of compact habit, with red and white flowers respectively. Of

all the dwarf-growing Rhododendrons, *R. racemosum* is pre-eminent. It is perfectly hardy, of neat growth, and particularly useful for the rock garden. The leathery leaves are small, deep green above, and glaucous beneath. The small flowers are pink, and the unopened buds are bright rose-pink, and borne in axillary and terminal clusters in early spring. *R. Fortunei* is one of the most delightful of all the hardy sweet-scented Rhododendrons. The fragrant bell-shaped flowers, produced in dense trusses, are white suffused with delicate pink. The leaves are quite smooth and of a beautiful glaucous grey colour. It is quite hardy. This charming species has been crossed with some of the Himalayan species, as well as with some of the finer hardy varieties, with the result that the *Fortunei* hybrids are amongst the most handsome of outdoor Rhododendrons. The following are specially good varieties: *Luscombei* is rare, with delicately-tinted flowers; *Duke of York* carries great clusters of bright pink flowers, spotted with brown on the upper petals—very free flowering; *Duchess of York* is a capital companion to it, the flowers being soft pink, running to rose-pink towards the edges of the roundish petals, the upper ones being spotted with green; *Mrs. W. T. Thiselton-Dyer* is perhaps the most beautiful of the *Fortunei* hybrids, the compact trusses of rose-pink flowers blotched with maroon being very handsome. *Profusion*, *H. M. Arderne*, and *High Beech Hybrid* all merit attention.

Other choice hybrids and crosses are: *Manglesii* (*R. Aucklandi* × *album elegans*), which is vigorous and quite hardy. Its handsome trusses of large well-shaped flowers are white, with dark spots on the outer segments. *præcox* (*R. ciliatum* × *dauricum*), one of the first to blossom in the open air, is of dwarf, compact habit, and very floriferous, the colour being a delicate shade of rose. As it flowers so early in the year—often about the middle of February during mild winters—it is in great demand for forcing. It is sub-evergreen. *Wilsoni* (*R. ciliatum* × *glaucum*) is intermediate in character between its parents. The flowers are pale pink, with a rosy-pink exterior. *kewense* (*R. Griffithianum* × *Hookeri*) (Fig 284), an exceptionally valuable addition to the garden, is quite hardy near London, beautiful in foliage, and dainty when in blossom. The flowers are large, white, with a faint suffusion of pink or rose, and produced very freely in loose trusses in May. *nobleanum* (*R. caucasicum* × *arboreum*), flowering very soon after *R. præcox*, is therefore useful for a similar purpose; and *Cunningham's White* (*R. maximum* × *R. concessum*) is another first-rate sort, the flower-trusses being large, well-formed, white, with dark spots.

Rhododendrons are readily increased by seeds (in the case of species), cuttings, layers, and grafting. For the seeds, which should be sown soon after they are gathered, a peaty, well-drained

soil is advisable, and shallow pans or boxes are preferable to deeper ones, and these should be placed in a warm greenhouse to assist vegetation. Such sorts as *R. ponticum*, *R. maximum*, &c., germinate readily if sown in frames in the open ground. The seed being very fine, care should be taken not to cover it too deeply, and a fine-rosed water-pot should be used for watering. When large enough, the seedlings should be pricked off into boxes, &c., and in due time transferred to nursery rows in the outdoor garden. Cuttings of the current season's well-ripened shoots emit roots if taken off in August and September, dibbled in light soil, and made quite firm at the base. They should be placed in a warm, moist, close case and shaded from the sun.

Layering is an excellent method, but not always convenient. Autumn is the best time for this purpose, and if treated in

exactly the same way as the Rose, and the soil kept damp, roots will be emitted freely.

Grafting is the method by which the hybrids are largely increased, and saddle grafting is the best although not the easiest system, but whip, or tongue, grafting is practised with much success. This

operation is best

conducted between autumn and March. The scions should be about the same thickness as the stocks, but never thicker, and when securely tied and a little mastic placed over the tying material, remove to a close case, where a temperature is maintained of from 60deg. to 70deg., and shaded from the sun. After a little growth has been made, a chink of air should be admitted, and, later on, the plants hardened off, and a neat stake placed against each one to prevent it from being knocked off. The following season the plants will be fit for planting outside. The stocks most in demand for grafting are *R. ponticum* and *R. catawbiense*, but any thoroughly hardy sort answers well. Some operators take the stocks (which should be healthy two-year-old seedlings) out of nursery rows at grafting-time and, after they are worked, lay them in boxes of soil in heat; but the best results are obtained when they have been previously established in pots. Stocks for autumn working should be potted up in spring.

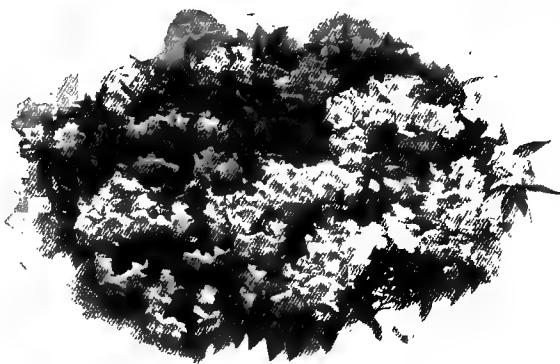


FIG. 284.—RHODODENDRON KEWENSE.

ROSMARINUS OFFICINALIS (Fragrant Rosemary) is very familiar, and when planted in very moist soil and a sunny aspect produces an abundance of small soft blue flowers. It also grows freely and flowers well on dry banks. The varieties with yellow- and silver-striped leaves are less ornamental than the type.

RUSCUS (Butcher's Brooms).—These are useful shrubs for undergrowth. They succeed in ordinary soil, and *R. aculeatus* forms quite a carpet of deep green leafage. It is referred to under "Berry-Bearing Trees and Shrubs." *R. hypoglossum* is of taller and more slender habit than the first-named. The small soft yellow flowers are produced in the centre of the deep glossy green leaves in April and May, and succeeded by richly-coloured berries. In the case of *R. Hypophyllum* (*R. microglossus*) the small flowers are borne on the under-sides of the leaves. *R. racemosus* (Alexandrian Laurel), now recognised as *Dancea racemosa*, is quite distinct from either of the foregoing. It is of elegant habit, and not so dense in growth as *R. aculeatus* (Fig. 285). Its oblong, polished green leaves are sharply pointed, and the yellowish-green flowers are produced at the tips of the growths.

SKIMMIAS.—See page 457.

TAMARIX.—The members of this genus, especially *T. gallica*, should be largely grown, as they are of extreme elegance, easy culture, and quite hardy. They succeed admirably on sandy banks, and by the sea-coast grow luxuriantly. *T. gallica*, the most familiar kind, grows about 12ft. high, and its slender, drooping branches, clothed with narrow rich green leaves, are very beautiful, and in August bears a profusion of rose-pink flowers in slender spikes. *T. germanica* (*Myricaria germanica*), *T. hispida*, *T. parviflora*, *T. tetrandra purpurea*, and *T. libanotica*, are also of graceful habit.

TRACHYCARPUS EXCELSUS (*T. Fortunei*, *Chamærops excelsa* *C. Fortunei*) is the only Palm suitable for outdoor culture. It is very handsome, with large fan-shaped leaves of a refreshing shade of green. It should be planted in rich well-drained soil, and a position sheltered from cold winds is advisable for this



FIG. 285.—RUSCUS ACULEATUS.

Japanese Palm. It imparts quite a tropical aspect to the garden, and is noble on the lawn.

ULEX (Furze, or Gorse).—For planting in masses in pleasure-grounds and embellishing dry, gravelly banks and similar places, *Ulex europæus*, an attractive free-flowering native shrub, is well adapted. Its rich yellow flowers appear in spring and last long in condition. When left to itself it is apt to get leggy, but if cut down breaks away freely from the bottom. The double-flowered form (*flore-plena*) is a decided improvement on the type. It is quite as hardy, more compact in habit, and seems always in flower, and, for general planting, is to be preferred to the first-named; in fact, it is the showiest member of the genus. *U. e. strictus* (Irish Furze) is of erect, slender growth, and bears small deep yellow flowers. *U. nanus* should be included because of its neat dwarf habit and lateness in blossoming. It begins to flower about midsummer, and continues until the end of November, thus prolonging the flowering time for several months. As Gorse are only sparsely provided with roots they are by no means easy to transplant, for which reason they should be planted in their permanent positions in a young state. They are readily increased by seed, but the double-flowered variety should be propagated by cuttings, which may be taken off in August with a heel of the old wood attached, and dibbled in light soil on a north border and covered with hand-lights. They should be watered overhead occasionally and shaded from the sun. When rooted, they should be potted off singly and grown on in pots until ready for planting out in their flowering quarters.

VACCINIUM VITIS-IDÆA (Mount Ida Whortleberry) is a fairly well-known plant, indigenous to the British Isles and the Northern parts of Europe. It forms a neat carpet, dense in growth, and rarely exceeds 10 in. in height, with small, deep glossy green, Box-like leaves, and in April and May bears drooping, terminal racemes of pale pink bell-shaped flowers. It is very effective in September, when laden with bright red berries, which are often employed for culinary purposes, and much relished by some people. *V. V.-I. major* is distinct, ornamental, and of taller growth than the type. *V. crassifolium* (*V. carnosum*), the thick-leaved Whortleberry introduced from North Carolina upwards of 100 years ago, is of trailing habit, and bears axillary clusters of small bell-shaped flowers profusely in June. *V. Myrsinites* (*V. nitidum decumbens*), another dwarf-growing sort, deserves mention, as it produces its pale rose-coloured flowers in axillary clusters with much freedom. *V. ovatum* (*V. prunifolium*) forms an erect, much-branched shrub, 3 ft. to 5 ft. high, with small deep green Pernettya-like leaves, and bears terminal and axillary racemes of flesh-coloured pendulous flowers in May and June. It is a

North American species, and was introduced upwards of seventy years ago.

VERONICA.—This is an extensive genus, consisting of about 160 species, the headquarters of which is New Zealand. Unfortunately they are not thoroughly hardy throughout the British Isles, although in the warmer parts they flourish out of doors. They are not particular as regards soil, so long as it is well-drained, a water-logged condition being the least satisfactory. They are neat-growing shrubs, and succeed well near the sea, and some of them, like *V. cupressoides*, are well adapted for the rock garden. Those here mentioned are some of the best sorts for general planting. *V. Traversii* is not only the best known, but it is also one of the most distinct, hardy, and beautiful of New Zealand Veronicas. It grows about 4ft. high, and its erect stems are clothed with deep green narrow leaves arranged in opposite pairs, and its spikes of light or mauve flowers are produced in August. It is useful for winter bedding, and on account of its neat habit is well adapted for window-boxes. *buxifolia* is a very neat-growing kind of slender habit, with distinct rich green Box-like leaves. *Andersoni variegata* is a pretty silver variegated dwarf-habited shrub, better adapted for growing in pots for conservatory decoration than for planting in the open air, unless as an edging to beds, or similar positions, for summer effect. *speciosa* is a compact, vigorous grower, with large glossy green leaves, and produces very freely large racemes of purple flowers. *chathamica* is a low-spreading bush, with dark purple flowers, and deserving of a place in the rock garden. *Lyallii* is worthy of note; it is slender in growth, and its racemes of lilac-coloured flowers are borne with great freedom. *ligustrifolia* is another pretty sort, and bears an abundance of white flowers. *pinguifolia*, a dwarf compact-habited kind, is very hardy, with small glaucous-grey leaves; it is of free, bushy growth, and useful as an edging to beds. *glauco-cærulea* forms a pretty, much-branched bush of dwarf habit, conspicuous for its dark stems and glaucous leaves. *amplexicaulis* is an abundant blossomer; the smooth leaves are glaucous-grey, and the flowers white. *salicifolia*, with its long narrow leaves and long racemes of white flowers, are both distinct and handsome. Blue Gem is of good habit and free growth; its dense spikes of deep blue flowers are effective. Purple Queen is a cross between *V. Andersoni* and *V. Traversii*, and flowers freely; its habit is dwarf and bushy, and the Box-like leaves are glossy green. The purplish-violet flowers are borne on stout spikes in September. La Seduisante is another excellent variety, with large spikes of deep purple flowers; its bronze-green leaves are very beautiful, too. White Star is a dwarf, compact, free-growing, and floriferous variety, with thick, ovate, pale green leaves, broadly margined with creamy-yellow. A warm soil and sunny spot are necessary to get the true leaf colour.

cupressoides bears great resemblance to some of the dwarf Conifers, and is suitable for the rock garden; it is of low growth. *cupressoides variabilis* is of dwarfer habit than the last-named, and forms a dense spreading tuft, and is pleasing in the rock garden. *lycopodioides*, another bushy, spreading kind, is conspicuous for its slender whipcord-like growths and small dark green leaves. *Loganioides*, also of dwarf habit, introduced from New Zealand about ten years ago, is well adapted for the rockery; and *V. Hectori*, a much-branched shrub of dwarf, erect habit, is worthy of notice too.

VIBURNUM TINUS (*Laurustinus*) (Fig. 286) is a valuable shrub, flowering from mid-winter until April out of doors. It is also useful for growing in pots for the conservatory, as its flowers under glass



FIG. 286.—**VIBURNUM TINUS.**

lose the pink shade and come pure white. It is perfectly hardy, attractive even when out of flower, and succeeds in ordinary soil. Of this there are several varieties, the following being the most distinct: *purpurea* is the darkest-leaved *Laurustinus*, free in growth, neat in habit, and very pretty. The leaves of *variegatus* are irregularly variegated with white. *lucida* is conspicuous for its large polished green leaves and handsome clusters of pure white flowers; this is the best kind for forcing purposes. *Freibelti* is also useful for forcing; its flowers are larger and of a purer white than those of the type. *pyramidalis* and *rotundifolia* are also pleasing.

VINCA.—The hardy members of this genus are low-growing shrubs, serviceable for planting on rockeries, dry banks, or rambling over old tree-stumps, and as they succeed in poor soils and under the drip of tall trees, their value is considerably enhanced. *V. major* (large Periwinkle), a European plant with broad, glossy green leaves, bears an abundance of showy deep blue flowers in May; it spreads rapidly, and is useful for planting by the side of woodland walks. *V. m. elegantissima* is characterised by its broad handsome leaves variegated with cream-white; the variegation is constant. *V. minor* (small Periwinkle) is a small green-leaved kind, less vigorous in growth, and not so ornamental as those already referred to. Of the last-named there are several attractive varieties, the principal of which

are: *violacea*, with deep violet-coloured flowers; those of *flore-albo* are white; *azurea*, deep blue; the leaves of *foliis-argenteis* are beautifully striped and mottled with silver; while those of *foliis-aureis* are marked with yellow. The Vincas are readily propagated by division and by cuttings.

YUCCA.—This is a very ornamental group of *Liliaceæ*, comprising about a score of species, tender and hardy, but not more than nine or ten can be considered suitable for culture out of doors in this latitude. Yuccas are amongst the most graceful of all hardy plants, and delight in a fairly rich, moist, and well-drained soil. Those here mentioned are perfectly hardy, and produce charming effects planted either singly or in groups on the lawn. They are also well adapted for planting on or near the rockery, on sloping mounds, and look well in the centre of beds, with dwarf shrubs or suitable bedding plants grouped round them. They have few equals for winter bedding, and for filling vases for decoration during winter,

Y. recurvifolia (Fig. 287) can be well recommended. *Y. gloriosa* (Adam's Needle) is a well-known species, having been introduced from North America upwards of 300 years ago.

It is of a vigorous growth, with flat and sharply-pointed leaves, and on warm soils throws up its great flower-spikes in July and August. The pendent bell-shaped flowers are white, tinged with

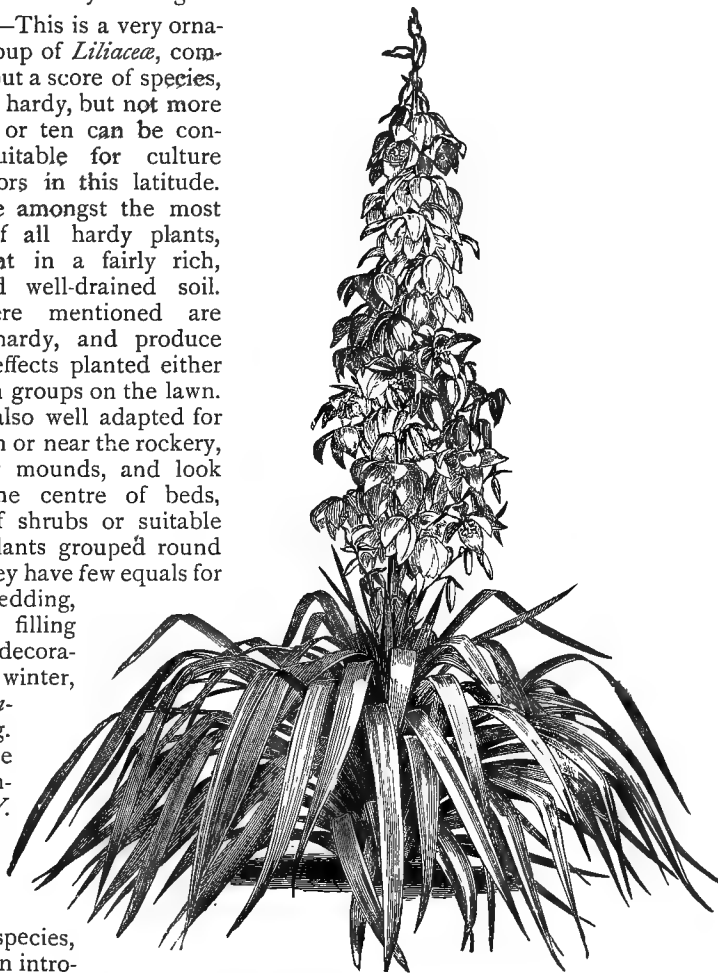


FIG. 287.—YUCCA RECURVIFOLIA.

purple on the exterior. *Y. g. acuminata* bears some resemblance to the type, but differs in its leaves being narrower and of a deeper green. *Y. g. Ellacombei* is another beautiful variety, free

in growth, with broad leaves.

Y. g. superba is distinct from the foregoing, on account of its dwarfer habit, and flowering in quite a small state; the greenish-white flowers are borne in branching panicles.

Y. g. variegata is a pretty variegated form and quite constant. *Y. glauca*, a stemless species, deserves a sheltered nook; its leaves are broad and glaucous green.

Y. filamentosa (Silk Grass), a beautiful North American species, has been cultivated in this country since 1675. It is almost stemless, and along the edges of the arching leaves are numerous thread-like filaments, which give the plant a characteristic appearance. The spikes carry an abundance of pure white flowers.

Y. f. flaccida, also nearly stemless, is a distinct variety, with leaves nearly 2oin. long, with short thread-like appendages along the leaf-margins.

Y. f. glaucescens is a lovely glaucous-leaved form.

Y. f. variegata is a lovely variety, with cream-white variegation. Although it succeeds out of doors, it grows more freely, and the leaf colour is more beautiful when grown under glass.

Y. angustifolia

(Fig. 288) is a dwarf sort, with long, narrow, recurving leaves, supplied with narrow threads. All points considered, *Y. recurvifolia* (*Y. pendula*, *Y. recurva*), a native of the Southern

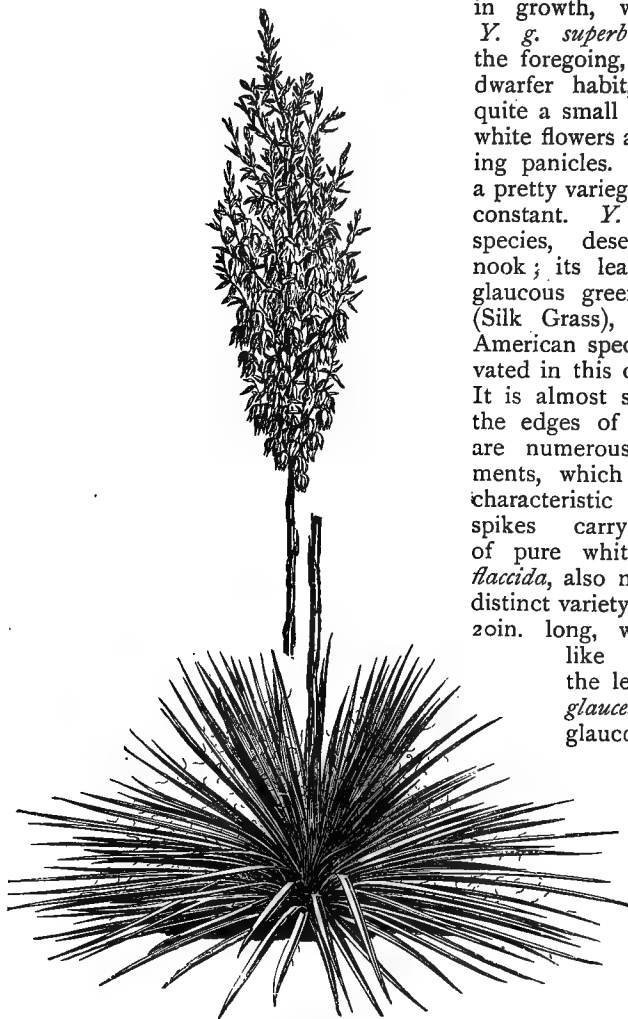


FIG. 288.—YUCCA ANGUSTIFOLIA.

United States, is the most elegant of all the hardy *Yuccas*, and, if only one kind be grown, this is the one that should be selected. It is thoroughly hardy, and its long, flat, glossy green leaves droop gracefully, whilst its handsome flower-spikes are borne on medium-sized plants.

Yuccas may be increased by root-cuttings. Cut the thick fleshy roots into pieces, plant in sandy soil, and place in gentle heat. The soil must be kept moist, but not too wet, or the roots will rot. When the young plants have made a few leaves, they should be potted into small pots, later on removed to cooler quarters, and when large enough planted outside. The caulescent kinds may be propagated by division of the stems, each piece having an eye, and treated as recommended above. Seed rarely comes to perfection in this country, but if imported seed is sown in light soil in boxes or pans, and stood in a genial heat, it will germinate freely.

Berry-Bearing Trees and Shrubs.

The trees and shrubs that can be brought under this heading are numerous, but it is proposed to only mention those specially valuable for effect. It is difficult to determine why the cultivation of berry-bearing subjects is so much neglected in gardens and parks, as they are ornamental and inexpensive, and do not require special culture. Not only are they prized for their berries in autumn and winter, but some are attractive in spring, when their branches are wreathed in flowers of rich and varied colours, thus revealing two seasons of beauty. It is, however, in the autumn, when the majority of the other occupants of the shrubbery have lost their beauty, that the berry-bearing shrubs arrest attention. There is considerable variety, too, in both the size and the form of the berries, and the colours comprise light yellow and deep orange, white, brown, black, purple, many shades of pink and rose through reds to deep crimson.

In addition to the qualities above mentioned, some of the berry-bearers are attractive by reason of their handsome ever-green foliage, which gives them additional beauty.

EVERGREEN.—In this section the following are reliable: The *Skimmias* are useful plants of compact growth, with thick deep green leaves. They are perfectly hardy, easily accommodated, and very beautiful in spring, when bearing terminal panicles of deliciously-scented white flowers. They are grand pot shrubs, and well suited for planting out in beds in cool glass structures. The best three sorts are *S. Foremani*,

S. Fortunei, and *S. japonica* (Fig. 289). The bright red berries last in good condition through the winter, in fact those of *S. Foremani* will remain bright for two years if birds do not trouble them. *Berberis Aquifolium* (*Mahonia Aquifolia*) is an accommodating shrub, and forms a good undergrowth. In winter its rich green foliage assumes a purplish-bronze hue. Its clusters of blue-black berries are freely produced. *Berberis Wallichiana* is an attractive and uncommon Barberry. The long, violet-purple coloured berries are quite distinct from all its congeners. The varieties of *Pernettya mucronata*, or Prickly Heaths, are charming, and where dwarf evergreens are valued they should find a home. They grow best in a well-drained, moist, peaty soil, and in a sunny position, as a greater show of berries results than when planted in the shade. *Pernettyas* may also be advantageously grown in pots for the decoration of rooms and conservatories in winter and early spring. The following are amongst the best varieties:



FIG. 289.—SKIMMIA JAPONICA.

carnea lilacina, soft pinkish-lilac; *coccinea*, light scarlet, large and handsome; *alba*, white, shaded with blush; *nigra maior*, nearly black; *atro-rosea*, rich rose; *macrocarpa*, deep crimson, very large; and *rosea purpurea*, rose, touched with purple.

Gaultheria procumbens (Partridge Berry) is one of the best carpet or dwarf-growing evergreens, and is admirably suited for the front lines of low-growing shrubs. Its small white bell-shaped flowers are borne in July, and are succeeded in autumn by bright red berries, at which time its foliage is shaded with chocolate-brown. In order to ensure regular crops of berries, the plants should be lifted and divided about every third or fourth year. *Hymenanchera crassifolia* is a beautiful New Zealand shrub, deserving of a sheltered spot in the garden. It grows to a height of about 4ft., and its pure white berries are

seen to advantage against the small deep green leaves. *Aucuba japonica* is so well known that description is unnecessary. As it is dioecious, care should be taken to have a few male plants intermingled with, or adjacent to, the female kind, so that the flowers of the latter may become fertilised. The Fire Thorn (*Crataegus Pyracantha*) is a grand subject for training against a wall. Its dense clusters of scarlet-coloured fruits are borne unstintingly, whether situated in a south or a north-east aspect. There is a yellow-berried variety named *C. P. crenulata*, which creates an agreeable change in the shrubbery.

Azara microphylla (Fig. 290) is a handsome and quite hardy shrub. The arching shoots or branches are well clothed with small deep green glossy leaves, and although the small flowers are not showy they are very fragrant. In favourable situations it bears freely its orange-coloured berries. The Hollies (*Ilex*) take precedence over all other evergreen berry-bearing shrubs or trees. They are of elegant habit, hardy, and free in growth. With the exception of wet or boggy soils there is scarcely a soil or position in which they will not thrive. They may be grown either as pyramids (bushes) or standards. Taste and position must decide which form of growth should be selected. The following are good berry-bearing sorts. Green-leaved varieties: *balearica*, *laurifolia*, *camelliaefolia*, *Shepherdii*, *Hodginsi*, *platyphylla scotica*, *fructu-luteo* (yellow-berried), *ciliatum*, and *opaca*. Variegated sorts: Silver Milkmaid (Fig. 291), *aurea marginata*, *a. pumila*, *lucida*, *argentea marginata*, *pendula tricolor*, and *argentea pendula*. The varieties of *Hedera arborea* are beautiful in winter, and well deserving of a word. They produce pretty effects on the fringe of the lawn treated either as single specimens or planted in groups. If the last-named method be adopted *Galtonia candicans*, Lilies, and such-like bulbs may be planted between them with excellent

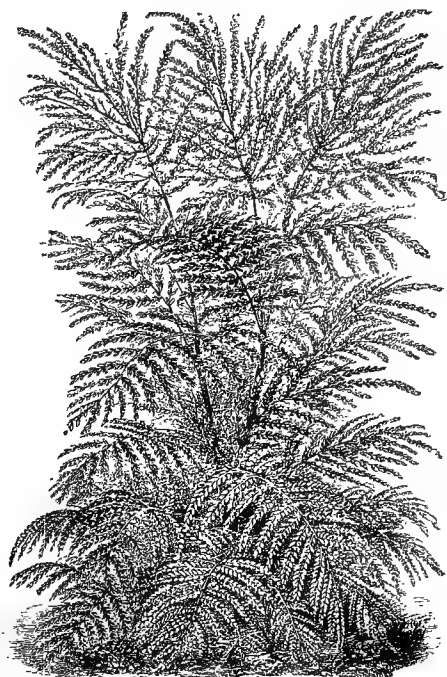


FIG. 290.—AZARA MICROPHYLLA.

effect, as the Ivies form a nice background for the bulbous subjects. They are also suited for planting in various places in the rock garden, and few shrubs are better adapted for winter bedding than Tree Ivies. Another use to which they might with advantage be put is as pot shrubs for placing in vestibules, rooms, &c., during winter when in berry. *H. arborea*, *H. a. elegantissima*, and *H. a. fructu-luteo* are the best.

The Cotoneasters form an important group of hardy berry-bearers. As trees and shrubs valued for their flowers, the Cotoneasters merit a place in select collections, and as they are perfectly hardy and of such simple cultural requirements, it seems strange that they have not been more extensively employed in gardens. The best known member of the evergreen section is undoubtedly *C. microphylla*, a low spreading bush, with small deep green leaves; it is very beautiful when laden with bright red

berries in winter. Its pale pink flowers are showy, too. *C. m. glacialis* (*C. congesta*) is well adapted for the rock garden. It is dwarfier in habit than the last-named, with paler green leaves, and flowers more deeply stained with pink. A very attractive neat shrub. *C. buxifolia* is vigorous and valuable for shelter. Its long branches are clothed with deep green Box-like leaves, and in spring bears clusters of white flowers, which are in due time succeeded by richly-coloured

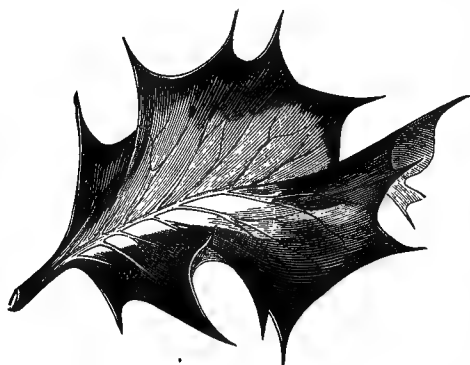


FIG. 291.—HOLLY SILVER MILKMAID.

berries. *C. thymifolia*, a neat, dwarf-growing, Himalayan species, deserves a place in the rock garden. It is slow in growth, and its numerous short branches are supplied with narrow dark green leaves. It bears an abundance of pinkish-white blossoms and attractive berries. *C. rotundifolia* is a distinct and charming species rarely exceeding 5ft. in height. The brightly-coloured berries are borne with exceptional freedom, and often remain on the bushes until February and March.

The Strawberry Tree (*Arbutus Unedo*) is highly appreciated on account of its white bell-shaped flowers and red strawberry-like fruits appearing simultaneously. It must, however, to succeed well be planted in a sheltered spot. The Laurel-leaved *Phillyrea decora* (*P. Vilmoriniana*) is a fine shrub of dwarf spreading habit. It is hardy, with thick deep green leaves and round black berries, which latter are preceded in spring by white Hawthorn-scented flowers. This is a very useful shrub for

forcing, though rarely used for this purpose. Gardeners are advised to note its freedom in blossom in the early spring. The Butcher's Broom (*Ruscus aculeatus*) is a dwarf-growing shrub, with small deep glossy green leaves; in the early part of the winter it carries an abundance of bright red berries. *Rhaphiolepis japonica* (*R. ovata*) is a shrub of medium growth, with ovate deep green leaves and white fragrant strawberry-like flowers; in the winter months its round black berries, which are carried at the apex of the growths, are most attractive. It is a useful shrub for forcing.

DECIDUOUS.—This is a delightful class and cannot be dispensed with. The Thorns (*Crataegus*) are familiar to all who care for flowering shrubs, and their value cannot be over-estimated. They are of easy culture, charming when in flower, and showy in autumn, when the leafless branches are heavily-laden with richly-coloured fruits. They are of reasonable price. The Cockspur Thorn (*C. Crus-galli*), *C. Crus-galli ovalifolia* and *C. prunifolia*, are all very handsome. The brightly-coloured berries are borne in large clusters with much freedom, and remain on the trees until mid-winter. Apart from their berries they deserve wider recognition on account of the rich shades of crimson which the foliage assumes in autumn. *C. tanacetifolia* (Tansy-leaved) is a robust-growing species, which bears a profusion of yellowish-green fruits. *C. Azarolus* bears heavy crops of orange-red berries, which are both distinct and effective. *C. Aronia* (Aronia Thorn) grows freely in sandy soil, and in autumn is very showy when laden with large yellow fruits. *C. coccinea*, a free-growing North American species, carries a wealth of bright red berries. *C. Carrieri* is one of the most ornamental of the Thorns, and a thoroughly vigorous grower. Its large orange-red fruits remain on the tree longer than is the case with most Thorns. *C. parvifolia* is a charming small tree, with greenish-yellow berries. *C. heterophylla* holds its deep red berries until February. *C. Douglasi*, *C. pinnatifida*, *C. mexicana*, *C. punctata*, and *C. sanguinea* are also good.

The Barberries comprise several delightful shrubs. *Berberis sinensis* thrives well in poor soils, and bears great quantities of richly-coloured berries, which hang on the bushes for a long time. *B. aristata* is an attractive winter shrub, with brownish-red bark; its red berries are borne freely. *B. vulgaris asperma* is very showy in autumn, as its richly-coloured berries are borne in great profusion. *B. v. foliis-purpureus* is, apart from its pleasing purple foliage, very attractive by reason of its abundant crops of berries in autumn. *B. canadensis*, *B. macrocarpa*, *B. virescens*, and *B. lycium* should be included in a list of select berry-bearing shrubs. The Spindle Trees (*Euonymus*) are conspicuous towards the close of the year when their brilliant-coloured capsules are hanging on the wiry twigs. The

broad-leaved variety (*E. latifolius*) is more valuable than the European species (*E. europæus*), as the foliage is larger and of a richer green, which becomes suffused with purplish-red in the autumn, the seeds bolder, and the capsules are more highly coloured. *E. e. atropurpureus* is easily recognised by its purple foliage, and produces an abundance of capsules and seeds. Another variety, *E. e. aucubæfolius*, is distinct from its congeners on account of its leaves being blotched with yellow in much the same way as those of *Aucuba japonica*. *E. verrucosus* and *E. Hamiltonianus* are capital free-growing sorts.

The Snowberry (*Symphoricarpus racemosus*) must of course be included. Its pure white berries are borne in clusters at the points of the growths, which in mild winters remain on the plants until well on in the New Year; it needs, however, to be kept within bounds. *S. Heyeri* is of dwarf habit, and its snow-white berries are smaller in size than those of the Common Snowberry. *Cotoneaster frigida* is of good growth, and its large clusters of red berries are borne freely. It is sub-evergreen in mild winters. *C. bacillaris* and *C. b. floribunda* are equally beautiful. Another first-rate sort of dwarf habit is *C. affinis*. *C. Simonsi* holds a high place amongst shrubs valued for their berries. It is of free, erect growth, often reaching 8ft. high, and carries great crops of bright red berries every season. *C. Nummularia* is a much branched small tree of elegant habit. Its white flowers are succeeded by round, almost black berries. One of the loveliest of low-growing kinds is *C. horizontalis*, which should not be omitted, as it is a fine plant for the rockery, but needs plenty of room, as it is of free growth. Its branches are horizontal, and brightened with small deep green leaves, which turn to a reddish-brown in autumn. The Guelder Rose (*Viburnum Opulus*) is very ornamental, either when grown in the shrubbery or when planted in hedgerows, as is well illustrated in Sussex. The leaves die off a rich crimson shade, and the red berries are produced in abundance in autumn. *V. cassinoides* is a profuse berry-bearer. It forms a compact bush, with thick, ovate, lanceolate leaves, and its rose-coloured berries are very attractive. *V. lantanoides* succeeds best in moist soil. Its dark berries are, unfortunately, only sparsely produced. Its leaves are very showy in autumn. *V. dentatum* grows about 8ft. high, and is beautiful in flower and fruit. Its bright blue berries are borne towards the close of summer.

The Scarlet-berried Elder (*Sambucus racemosus*) luxuriates in a cool, moist soil. Its richly-coloured berries are profusely borne. *Elæagnus longipes* is a charming shrub, of good habit, and succeeds well in sandy soils. Its oblong red fruits are speckled with small white dots. *E. angustifolia* assumes the proportions of a small tree about 20ft. in height, with narrow pale green leaves, silvery-white

on the under-sides. The pale yellow flowers are very fragrant, and borne in the leaf-axils. The silvered fruits are attractive. *E. argentea* (Silver Berry) is another species of great decorative value. It does not grow so large as the last-named, but its silvery leaves, yellowish sweet-scented flowers, and globular fruits, are distinct and pretty.

E. hortensis (Fig. 292) is free in growth and handsome in fruit. It succeeds admirably in dry soils. The Sea Buckthorn (*Hippophaë rhamnoides*) is one of the most beautiful of berry-bearers. Like the Elæagnus, it grows freely in dry soil. Its orange-coloured berries are retained throughout the winter, and no shrub is more effective than this when allowed free growth on the margin of lake or pond-side.

Daphne mezereum and its varieties should not be forgotten, the red and orange-coloured berries being very attractive. *Pyrus Aria* (White Beam) should be planted in exposed situations. The fruits are large and of a bright scarlet colour. *P. A. lutescens* is a grand variety, with glaucous leaves, and in late summer creates a pretty picture when laden with its large clusters of berries. *P. A. undulata* is another beautiful and easily-grown sort, with glaucous leaves. *P. intermedia* is vigorous, and very handsome in autumn when bearing its immense clusters of berries. *P. lanata*, also vigorous in growth, has large leaves and bears great crops of showy fruit. *P. pinnatifida* is a beautiful tree, of erect, close habit, with deeply-cut leaves. It is an exceptionally free berry-bearer. *Pyrus Aucuparia* (the Mountain Ash) is another excellent kind. Its white flowers are borne in



FIG. 292.—ELÆAGNUS HORTENSIS.

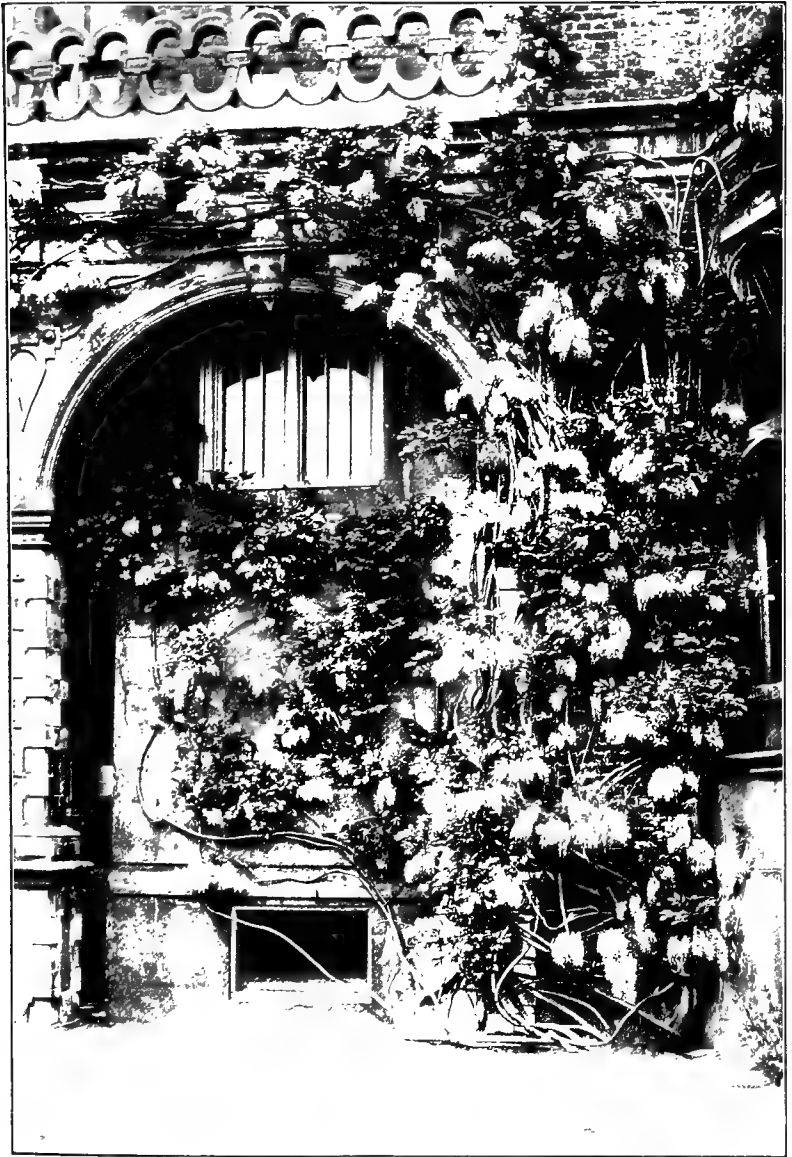
May, and succeeded in autumn by clusters of scarlet berries. *P. A. fructu-luteo* is an abundant berry-bearer. Its berries are yellow. These Mountain Ashes are good town trees. *P. Sorbus americana* (American Mountain Ash) is a handsome species for park decoration. It bears immense clusters of richly-coloured berries. It is free in growth, with bright green leaves set on red petioles. *P. S. malviformis* deserves mention on account of the rich profusion of berries borne in autumn.

There are a few climbers conspicuous for their berries. For covering trellises, arbours, &c., *Celastrus articulatus* is well adapted. It bears a rich display of red berries along its leafless shoots in winter. A place against a warm, sunny wall should be found for *Vitis heterophylla humulifolia*. In colour it stands alone, being of a rich peacock-blue. The European Box Thorn (*Lycium europæum*) is a rapid climber of the simplest culture, and in free, open soil it will make shoots 10ft. to 12ft. in length in one season. Though not large the berries are pleasing in colour. The single Roses must be included, though not always regarded as shrubs. No flowers are freer or more brilliant in colour. They wreath pillar and wall with magnificent colour in summer, and give beauty to the autumn months when the hips, or hips, ripen. The Japanese Rose (*R. rugosa*) and its white-flowered form should be extensively planted. Both kinds grow freely, flower abundantly, and carry a profusion of large, roundish, rich red fruits in autumn. *R. macrophylla* is very decorative. Its pink flowers are succeeded by long red berries. *R. nutkana* forms a thickly-set bush and grows to a height of about 8ft. The clear red berries of *R. tomentosa subglobosa* are also attractive. *R. cinnamomea*, *R. lucida*, *R. villosa*, *R. pisocarpa*, *R. caroliniana*, and *R. Kamschatiana* are likewise beautiful kinds, and bear abundantly brightly-coloured fruits. Of dwarf-growing varieties the Scotch Rose (*R. spinosissima*) is very charming. It flowers with delightful freedom, and the blossoms give place to showy berries, which when ripe are quite black in colour.

Wall Shrubs and Climbers.

Walls are of great assistance to the gardener. Besides affording protection from cold winds, &c., they enable him to grow many beautiful shrubs in the open air that otherwise would require glass protection. The following is a selection of suitable shrubs for walls:

DECIDUOUS.—*Pyrus* (*Cydonia*) *japonica* and its numerous varieties are beautiful spring-flowering shrubs of easy culture. The flowers comprise shades of pink, rose, red, crimson, &c. The type is one of the most delightful, flowering with such freedom as to completely cover its long branches with bright red flowers. *P. j. nivalis* bears delicate white blossoms about



WISTARIA SINENSIS AT HOLLAND HOUSE, KENSINGTON, W.
The Residence of the Earl of Ilchester.

a week or so later than the common kind. Another free variety is the deep red *cardinalis*. *P. Maulei* (Fig. 293) is less vigorous in growth than the other kinds, but delightful when its orange-coloured flowers smother the shoots in April. *P. japonica atropurpurea*, *P. j. Moorloozii*, and *P. j. flore-pleno* are also conspicuous for their showy flowers. The double-flowered Kerria (*K. japonica flore-pleno*) is a favourite wall-shrub; and rightly so, for its orange-yellow rosette-like flowers are highly effective. No soil, however poor, comes amiss to this shrub, which is also known under the name of *Corchorus japonicus fl.-pl.* *Punica granatum* (Pomegranate) forms a suitable wall-shrub, but in the Southern parts of England does not need such protection. It grows freely even in poor soils, and its bright scarlet flowers are borne with great freedom. *P. g. rubra fl.-pl.* is a pretty shrub, similar in habit to the type, with well-formed double red flowers.

Given plenty of head-room, a fairly rich soil, and a sunny position, *Wistaria chinensis* (*W. sinensis*) grows freely and flowers abundantly. Its purplish-lilac flowers are borne in drooping racemes during May and June.



FIG. 293.—PYRUS MAULEI.

W. multijuga

is a Japanese species, but not much known, doubtless owing to its shy blossoming character in a young state. It should always be planted in positions favourable to the development of its long racemes of pale purple flowers. *W. frutescens* produces freely short erect racemes of pale blue fragrant flowers.

There is no class of climbing plants more beautiful, from a foliage point of view, than the different forms of *Vitis* under which are now included *Ampelopsis*. The rich and varied shades of colour assumed by the decaying foliage in autumn is exceedingly handsome. The uses to which this section of plants may be put are numerous. Besides clothing walls, they are grand subjects for rambling over

porches, arbours, and such-like places. No particular soil is necessary.

The Virginian Creepers (*Ampelopsis*) are perhaps the most easily grown of all hardy climbing plants, and in autumn most effective, the foliage turning to brilliant colours. Veitch's Virginian Creeper (*A. Veitchii*) is well known; when established, it attaches itself to the driest walls. *A. hederacea* is of rapid growth, and when trained up the trunks of old trees, and allowed to ramble amongst sparsely-leaved branches, is very ornamental. In autumn its deeply-lobed leaves assume many shades of brown, chocolate, and crimson. *A. muralis* is a self-clinging climber of quick growth. The foliage of this kind is even more brilliant than that of *A. hederacea*.

Vitis Coignetia is perfectly hardy and of easy culture.



FIG. 294.—JASMINUM OFFICINALE AFFINE.

Towards the close of the summer its handsome leaves turn a rich crimson and claret. *V. Tinturier* is too brilliant in its autumn colouring to pass over unnoticed. *V. cordifolia* succeeds better in a moist than in a dry soil. It is a vigorous and beautiful sort. *V. californica* is another vigorous sort, with handsome foliage which turns to crimson in autumn. *V. Thunbergi* is rather rare in this country. It is a very strong grower, with larger leaves than *V. Coignetia*, and very beautiful. Where vigorous ornamental vines are

needed, this one should be noted. *Actinidia Kolomikta* is another vigorous climber, conspicuous for the rich colouring of its leaves in September. It is well adapted for covering arbours, trellises, &c., and succeeds best in a light rich soil. *Xanthoceras sorbifolia* displays its terminal racemes of cream-white flowers streaked with blood red in the centre better against a wall than when planted in the open shrubby border, unless the latter happen to be a favoured one. Its Sorbus-like leaves are pale green and very beautiful.

The Winter Jasmine (*J. nudiflorum*) is a bright mid-winter flowering shrub, and if associated with a background of small-leaved evergreens its value is much enhanced, as its rich canary-yellow flowers are seen to greater advantage. *J. n. aureum* is a very ornamental sort with yellow leaves. The flowers are yellow.

The popular summer-flowering kind (*J. officinale*) has pure white fragrant flowers, which are borne freely. *J. o. affine* (Fig. 294) is a sturdy grower, with large flowers produced in terminal clusters, and may be considered an improvement on the type. The Italian Yellow Jasmine (*J. humile*) is a pretty summer-flowering kind, with deep golden-yellow flowers. *Aristolochia Sipho* (Fig. 295) is a vigorous climber, and requires plenty of head-room; its large overlapping heart-shaped leaves are extremely ornamental, while its yellowish pipe-like flowers, streaked with purple, are curious. For hiding unsightly objects, covering old ruins, arches, &c., it is well adapted. *Bignonia capreolata* succeeds admirably on a warm wall, and if planted in rich soil with good drainage its reddish yellow tubular-shaped flowers are borne liberally. *Tecoma radicans* grows freely and attaches itself to walls, &c., by means of its aerial roots. Its trumpet-shaped bright red flowers are produced in clusters at the apex of the summer shoots. *T. (Bignonia) grandiflora* is a very ornamental quick-growing climber. Its deep orange red drooping flowers are larger than those of *T. radicans*, and produced more freely. It delights in a rich soil.

Periploca græca is a rapid climber, with lanceolate deep glossy green leaves, and great clusters of purplish-brown flowers. It thrives in all soils, and is suitable for covering arbours, trellises, &c.

The green and variegated Box Thorns (*Lycium barbarum* and *L. b. variegatum*) are slender ornamental climbers of free growth, succeeding well in sandy soil. *Abelia triflora* deserves a place on a wall, and should not be planted in the shrubbery unless the position be very favourable, as it is apt to get injured in severe winters. East winds are very harmful to it. It thrives in any well-drained soil. *Plagianthus Lyalli*, a rare and beautiful New Zealand shrub, deserves a place against a wall. It belongs to the Mallow family, and in early summer bears clusters of pure white flowers with rich yellow anthers. Ordinary soil suits



FIG. 295.—ARISTOLOCHIA SIPHO.

it. The Moonseed (*Menispermum canadense*) has large handsome leaves and small yellowish flowers, succeeded by black berries. It grows well in poor soils and bleak situations. *M. dauricum* is of quick growth and very ornamental. *Corylopsis spicata* produces its spikes of greenish-yellow fragrant flowers in advance of its hazel-like leaves, and on account of its hardiness and floriferousness it should be planted freely. *Exochorda* (*Spiraea*) *grandiflora* and its more beautiful congener *E. Alberti*, are useful free-flowering ornamental white-flowered shrubs. Both are quite hardy and of easy culture.

Room should be found in every garden for a plant or two of *Chimonanthus fragrans*, as the fragrant flowers are very welcome



FIG. 296.—CLEMATIS MONTANA.

during the winter. When planted in rich moist soil, and pruned at the proper time, it flowers with delightful freedom, and occasionally ripens seeds. *Indigofera Gerardiana* is an ornamental shrub, well suited for this mode of culture. Its neat soft green leaves and racemes of lovely pink pea-like flowers are borne in great abundance. It flowers freely in dry soil. *I. G. alba* is a lovely white counterpart of the type, and deserving of extended culture.

Two early-flowering Honeysuckles (*Lonicera fragrantissima* and *L. Standishii*) produce small white and cream-white flowers in January and February; but what they lack in size is fully compensated for by their fragrance. *Prunus triloba* is one of the

most charming of early spring shrubs. In the bud state its semi-double flowers are rose-pink, but when fully expanded they become suffused with pale pink. The flowers are borne so freely as to completely hide the long shoots. *Fremontia californica* has large cordate leaves, and produces its rich yellow flowers freely on short peduncles along the branches. If possible, it should be planted in sandy loam. *Lippia (Aloysia) citriodora* (Lemon-scented Verbena) should be represented in gardens where shrubs with fragrant leaves are cherished. It should have the advantage of a sunny position, and be supplied with water occasionally while growth is being made.

Clematises are better adapted for rambling over old tree-stumps, verandahs, pergolas, trellises, and arches than for walls. Notwithstanding that they lose value when trained against walls, they are nevertheless effective. The varieties are grouped under the sections to which they belong, and the reader is referred to page 362 for remarks on pruning.

C. montana (Fig. 296) is one of the most beautiful of white spring-flowering climbers, but wants a large space to develop. The varieties belonging to the *Patens* group are hardy in most situations, but should not be planted on an eastern wall. The following is a selection of the best varieties: Lady Alice Neville, Miss Bateman, Lord Derby, Miss Crawshay, Edith Jack-

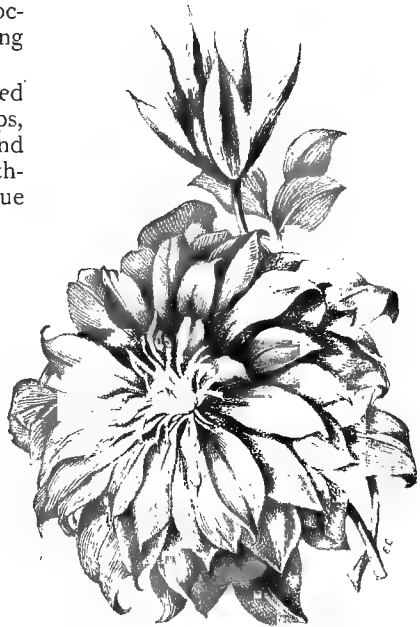


FIG. 297.—CLEMATIS COUNTESS OF LOVELACE.

man, The Queen, Albert Victor, Lord Londesborough, Fair Rosamond, Mrs. Quilter, Sir Garnet Wolseley, and Lord H. Lennox.

Although the members of the *Florida* section are hardy, they produce finer flowers when treated as pot-plants. The flowers are double or semi-double, and produced in the summer. Belle of Woking, Enchantress, J. G. Veitch, Venus Victrix, Duchess of Edinburgh, Lucie Lemoine, Elaine, Countess of Lovelace (Fig. 297), and Mrs. G. M. Innes are all effective.

The varieties of the *Jackmanni* group are very hardy and free-flowering. They commence to blossom in July, and continue

until October. Star of India, Guiding Star, Alba, Jackmanni, Mrs. Barron Veillard, Tunbridgensis, Rubra Violacea, and Victoria are free in blossom.

The flowers of the *Viticella* group are borne during summer. Mrs. James Bateman, Thomas Moore, Hendersoni, Earl of Beaconsfield, and Lady Bovill are very fine.

The flowers of the *Lanuginosa* group are very large and delicately coloured. Fairy Queen, Grand Duchess, William Kennett, Blue Gem, Beauty of Worcester, Duchess of Teck, The Shah, and Lady Caroline Neville are also of great beauty; Nivea and Pallida, however, are two of the finest of the group.

EVERGREEN.—Escallonias are ornamental shrubs with showy flowers, the best known being *E. macrantha*, which has thick glossy green leaves and pink flowers. *E. rubra*, *E. Ingrami*,

and *E. sanguinea* are deserving of attention too.

E. Langleyensis is a most valuable addition to the list of beautiful hardy free-flowering shrubs. It is a cross between *E. Philippiana* ♀ and

E. sanguinea ♂. In foliage it resembles the female parent, while its rose-pink flowers are produced as freely as those of *E. Philippiana*.

Photinia serrulata, a native of China and Japan, is conspicuous for its large, Laurel-like, deep glossy green leaves, which in spring are suffused with brownish-red.

It is effective either in the open shrubbery or trained against a wall. *Akebia quinata*

is a quick-twining shrub of elegant growth, with deep green leaves, and pale purple flowers, borne in short racemes in March. Although

not showy they are valued on

account of the fragrance they emit. This shrub should not be planted on a cold, eastern aspect, as the biting winds cut the tender growths.

Smilaxes are of hardy constitution, and may be used as wall-coverers, but are really better adapted for rambling over ruins, tree-stumps, &c. Any common soil suits them. *S. asperma* (Prickly Ivy) is fairly well known, but the variegated form is

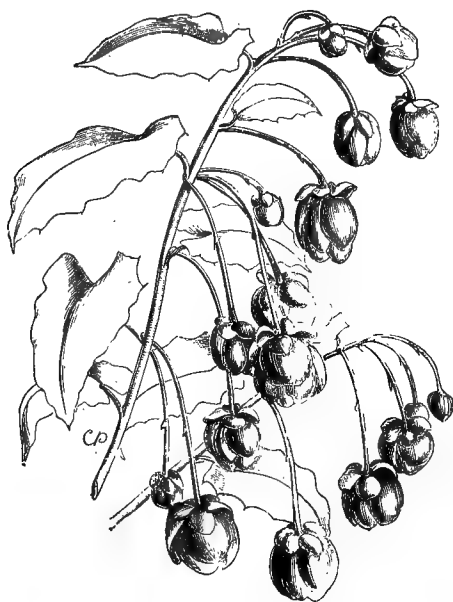


FIG. 298.—BERBERIDOPSIS CORALLINA.

less common and decidedly ornamental. *S. China* (Chinese Smilax) was, when first received in this country, treated as a hothouse plant, but subsequently was found to be able to withstand English winters out of doors. It is free in growth, with round stems, and nearly spineless. The roundish leaves are of a pleasing shade of green. *S. rotundifolia* is another attractive free-growing sort. Ceanothuses are valuable, as the flowers of most of the members are of pleasing shades of blue, a colour by no means common amongst hardy shrubs. *C. azureus* is of neat growth and very free-flowering. Gloire de Versailles is of more spreading habit, with larger leaves and graceful racemes of pale blue flowers. Lucie Lemoine, *papillosus*, *divaricatus*, and *Veitchianus* are showy, free-flowering shrubs, and desirable for walls with a south or south-west aspect.

Cratægus Pyracantha, with its immense clusters of richly-coloured berries, is particularly attractive in winter. It succeeds well in hungry soils and cold situations, where many shrubs fail to make headway.

Berberidopsis corallina (Coral Berry) (Fig. 298) merits a place on a sunny wall, where the spiny-toothed, bright green leaves, and drooping crimson flowers are attractive. It delights in fibrous loam, to which has been added rough peat and leaf-mould. *Olearia macrodonta* has Holly-like leaves, pale green above and silvery-white beneath. The dense heads of white blossom are produced in summer. Unless in the South and West of England or other favoured parts, it should never be planted in the open air without some protection. *O. stellulata* (*Eurybia Gunniana*) is a very ornamental member of the Daisy-bush tribe. A rich well-drained soil, with a sunny aspect, protected from cold winds, should be chosen for it. Its pure white flowers smother its long deep green shoots.

The Trumpet Honeysuckles (*Lonicera sempervirens* varieties) are of vigorous growth, and bear clusters of richly-coloured



FIG. 299.—LONICERA
SEMPERVIRENS.

flowers. *L. s. minor*, *L. s. superbum*, and the well-known type (Fig. 299) are the best. The Japanese Golden Honeysuckle (*L. brachypoda aureo-reticulata*) has small green leaves netted with golden-yellow. Its long sprays are useful for mixing with cut flowers for table decoration. *Garrya elliptica* (Fig. 300) is a charming winter-flowering shrub, whose graceful catkins are often 10 in. in length, and are produced at the ends of the previous summer's well-ripened wood. No special kind of soil is necessary for the cultivation of this Californian shrub. *Bridgesia (Ercilla) spicata* attaches itself to dry walls as freely as the Ivy. *Cotoneaster microphylla* is a free grower,

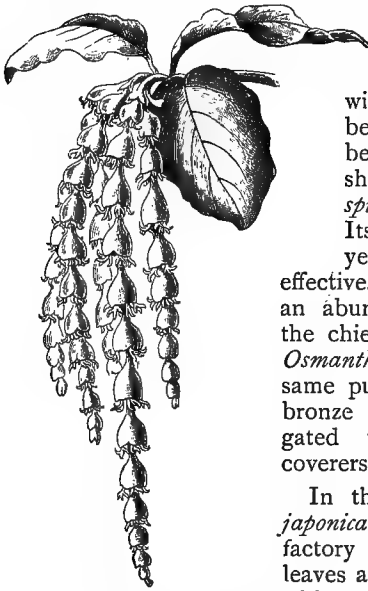


FIG. 300.—GARRYA
ELLIPTICA.

with deep green leaves, tiny white flowers in spring, and red berries in autumn. A charming shrub.

Rhaphiolepis japonica (R. ovata), with leathery ovate leaves and strawberry-like flowers in spring, and black berries in winter, is a most useful shrub for low walls. *Desfontainea spinosa* also succeeds well against a wall. Its stiff Holly-like leaves, with red and yellow trumpet-shaped flowers, are effective. A rich soil, good drainage, and an abundance of water in early spring, are the chief essentials to its successful culture. *Osmanthus ilicifolius* is well adapted for the same purpose. *O. i. purpureus* has purplish-bronze foliage, and is effective. The variegated varieties are also serviceable wall-coverers.

In the warmer parts of England *Eurya japonica latifolia variegata* would prove satisfactory on a wall. Its lanceolate silvery-grey leaves are bordered and blotched with cream-white. *Carpenteria californica* is a lovely white-flowered shrub, which in these islands should at least be afforded the protection of a wall. Its bunches of fragrant flowers are relieved by clusters of golden-yellow stamens. Rough loam and peat suit it admirably, but care should be taken not to expose it to cold draughts. *Benthamia fragifera* makes a handsome shrub where it thrives. Its great beauty lies not so much in its flowers as in its large, globular, reddish-yellow fruits. A cold, wet soil is unsuitable for the well-being of this fine shrub. *Elæagnus pungens*, with its gold- and silver-leaved forms, are easily grown, and are of great ornamental value. The Japanese *Euonymus* species are effective wall shrubs. *Euonymus japonica macrophyllus* has handsome deep green leaves, and is beautiful at all

seasons. *E. j.* Duc D'Anjou and *E. j. latifolia alba variegata* are desirable kinds. *E. radicans variegata* is of quick growth, and soon forms a dense mass of foliage, and attaches itself to walls freely. Silver Gem is a bright silver-leaved shrub, and valuable for winter bedding.

Magnolia grandiflora (Fig. 301) makes a handsome wall shrub. Its large glossy green leaves are always pleasing, while its big, pure white, fragrant flowers are much admired. Free, open loam suits it famously; perfect drainage should be secured, and an eastern exposure avoided. *Passiflora cærulea* (Blue



FIG. 301.—MAGNOLIA GRANDIFLORA.

Passion Flower) is well adapted for planting against a south wall; while Constance Elliot is of free growth, and produces a wealth of pure white sweet-scented flowers.

Pittosporum crassifolium succeeds against a wall. It is neat in growth with alternate narrow light green leaves, and bears dark purple flowers abundantly. *P. Tobira* also deserves a place against a wall as it is a handsome shrub, with deep green leaves, and clusters of fragrant white flowers in summer. It is a useful seaside shrub.

Though generally considered a greenhouse plant, the Camellia is hardier than many imagine. We have had under our notice

plants which have been grown in the open air for many years, and withstood severe winters without any protection. Apart from the beauty of the flowers, the rich green leafage is also handsome. Planted in fairly rich well-drained soil, with a sheltered

aspect, Camellias flourish famously. *Myrtus communis* (Myrtle) is a neat wall shrub, with small deep green leaves and pure white flowers. *Holbællia* (*Stantonia*) *latifolia* (Fig. 302) is a vigorous climber, with bright green leathery

leaves and fragrant purple flowers; it delights in full sunshine. *Aristolelia Macquii* and its variegated form are handsome wall shrubs, but somewhat tender, especially *A. M. variegata*.

A list of wall shrubs would be incomplete that did not include the names of a few good Ivies, but as the varieties are many in number we shall only mention some of the most distinct, handsome, and robust. Of green-leaved kinds, *Hedera amurensis* (*macrodonta*) is a choice variety of more than ordinary merit. It is of rapid growth, attaches itself to dry walls, and has the advantage of filling in well by side growth at the bottom. Its large, overlapping, heart-shaped leaves are richly bronzed in winter.

A variety with even larger leaves

than the first-named is *Helix dentata* (Fig. 303), a form of *colchica*. *viridis* is a cheerful-looking Ivy, with grass-green foliage. The Bird's-foot Ivy (*H. pedata*) is distinct and pretty, with grey veins. *Helix lucida* (Fig. 304) is very attractive; the leaves are glossy green in spring and summer, and heavily

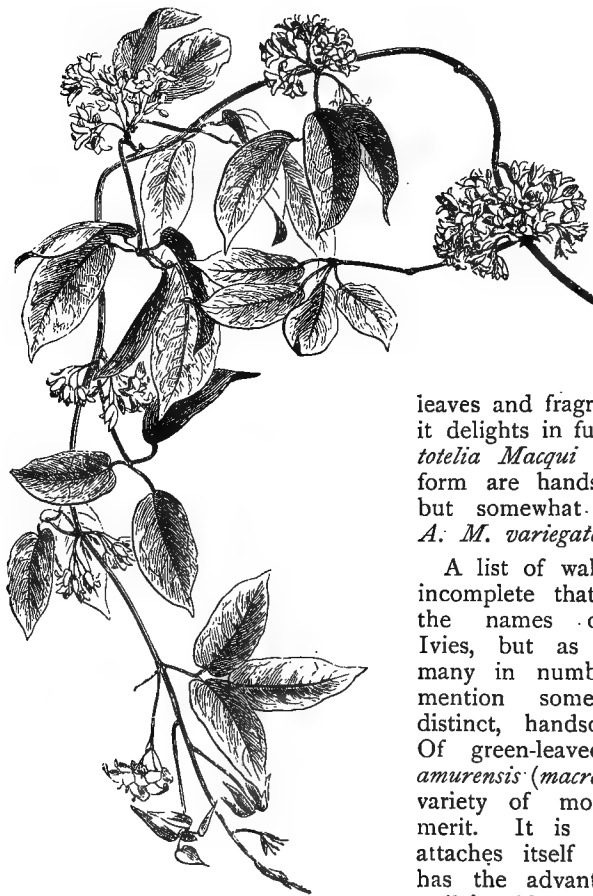


FIG. 302.—HOLBÆLLIA
LATIFOLIA.

bronzed in winter. The most distinct and effective of Ivies with medium-sized leaves is the variety named *nigra* (*atropurpurea*), and it should be included in every garden on account of its brilliant colouring in winter, which is purple-brown, shaded with black. Emerald Green is of close, compact habit, and very attractive; *triloba*, *gracilis*, and *canariensis* are of good growth, and add pleasing variety. Amongst silver-leaved kinds, *Crippsii* deserves to be extensively planted; its hardiness is beyond question, while its soft grey leaves, with white venations and markings, are effective. *maderensis variegata* is, unfortunately, not quite hardy in all parts of the country, but is well adapted for planting in cool conservatories, vestibules, corridors, &c. Its leaves are conspicuous for the broad, irregular white margins, while the central portion is heavily splashed with silvery-grey on a darker ground. *marginata elegantissima* is a grand Ivy, of rapid growth, with medium-sized triangular pale green leaves, washed with silvery-white, and irregularly bordered with creamy-white; one of the best of its class. *marginata rubra* is another excellent free-growing silver-edged sort which towards autumn becomes tinged with red. Of golden-leaved kinds, *spectabilis aurea* is beautiful, but for constancy in colour *chrysomela* is the best of the yellow-leaved group. In spring its leaves are greenish-yellow, which later on assume a bright golden



FIG. 303.—*HEDERA HELIX DENTATA*.



FIG. 304.—*HEDERA HELIX LUCIDA*.

spectabilis aurea is beautiful, but for constancy in colour *chrysomela* is the best of the yellow-leaved group. In spring its leaves are greenish-yellow, which later on assume a bright golden

hue. *succinata* has small foliage of a lovely soft yellow, with conspicuous greyish veins, but is of rather slow growth, though a charming subject for a low wall facing south. *angularis aurea* is a good golden form of the well-known Jersey Ivy. *arborea aurea* is both distinct and handsome. In a young state the leaves are wholly yellow, but with age they become shaded with green.

Weeping Trees and Shrubs.

Amongst weeping kinds we may number some of the most beautiful forms of tree life. Little, unfortunately, seems to be known of this fascinating class, but planted judiciously in park and garden they add a distinct feature to the home landscape. The evergreen sorts present characteristic beauty throughout the year, while the deciduous kinds are distinct.

DECIDUOUS.—*Populus tremula pendula* (Weeping Aspen) does well in dry soils. P. Parasol de St. Julian (*P. tremuloides*) is of fine drooping habit, pleasing, too, in either summer or winter. Few trees are more effective than *Betula alba pendula Youngi*. Its long, slender, drooping branches, crowded with small green leaves, are as charming as the silvered bark in winter. *B. a. tristis* should be planted where space is restricted. Its long, elegant branchlets fall almost perpendicularly, while the centre growth arches gracefully. *B. a. laciniata pendula* is a graceful cut-leaved Birch, of free growth, with pendulous branchlets and deep green leaves. The tall, slender stem is pure white. Many of the Elms are graceful. *Ulmus suberosa pendula* is very distinct and ornamental. *U. campestris microphylla pendula* is a small-leaved variety of elegant drooping habit. *U. c. pendula nova* grows freely, and has graceful twiggy branches. The Weeping Wych Elm (*U. montana pendula*) is a very beautiful tree, far too uncommon in gardens, but so strong and graceful that we hope planters will think of it.

The Prunuses are free-flowering shrubs, and very beautiful in spring when mantled in blossom. *Prunus* (*Cerasus*) *Mahaleb pendula* is a much-branched shrub, with white flowers. *P. (C.) Avium pendula* is also very beautiful, but more vigorous in growth. *P. (C.) semperflorens* (All Saint's Cherry) produces a profusion of white flowers in summer and richly-coloured fruits in autumn. It is generally grafted on stocks of the common Cherry, on which it unites readily, and soon forms a round head with long, graceful branches hanging evenly on all sides. *P. (C.) pendula rosea* has rose-coloured double flowers which almost hide the long, pendulous branches. Here we have a precious flowering tree, so beautiful that we hope every gardener, or those interested in tree-planting, will use it freely. *P. serotina pendula* is another easily-grown and weeping shrub.

Pyrus prunifolia pendula is easily recognised by its umbrella-like form. We know of few trees so thoroughly pendulous as this, and it therefore deserves special notice.

Salix purpurea pendula (American Weeping Willow) forms a dense head and thrives well in hungry soils and bleak situations. *S. caprea pendula* (Kilmarnock Weeping Willow) is distinct, vigorous, and beautiful, particularly so when in flower in early spring. The dark green leaves are large and clothed with white tomentum on the under-surface. *S. babylonica*



FIG. 305.—*SOPHORA JAPONICA PENDULA*.

(Babylonian Willow) is one of the most beautiful and best known of all weeping trees, and is well adapted for planting by lake or stream. *Acer Wieri laciniatum* (Wier's cut-leaved Silver Maple) is welcome upon the outskirts of the lawn, its long, slender, drooping shoots being clothed with delicately cut foliage.

A tree that might be used oftener with good effect is *Fagus sylvatica purpurea pendula*, whose richly-tinted foliage adds pleasing variety to the garden and park. It thrives in dry as well as in moist soils. The green-leaved weeping form (*F. s. pendula*)

is distinct, but inferior to the purple-leaved variety. For general effect, *Sophora japonica pendula* is worthy of wider recognition. Its winter effect (Fig. 305) is perhaps more conspicuous than its summer beauty. The fragrant Lime family comprises several kinds of graceful habit, including *Tilia petiolaris* (*T. americana pendula*) and *T. dasystyla*. *Alnus incana pendula nova* is an elegant tree, well adapted for moist situations. *Fraxinus excelsior pendula* (Weeping Ash) may be successfully grown in any soil or position that suits the Common Ash; it is a handsome tree. *F. e. aurea pendula* is a yellow-leaved form of the last-named. Its bark is also yellow, which makes it valuable for winter effect. It should, however, be planted in exposed situations so that its foliage in spring and summer, and bark in winter, may be seen to the best advantage.

The Siberian Pea Trees (*Caragana arborescens pendula* and *C. pygmaea*) are distinct and useful for small gardens. Their pea-shaped flowers are very attractive. The Weeping Dogwood (*Cornus florida pendula*) is hardy and of good growth, and its leaves die off a brilliant red in autumn. *Laburnum vulgare pendula* is deservedly popular. Its long drooping racemes of golden-yellow pea-shaped blossoms are effective. *Larix europæa pendula* is one of the most picturesque of weeping trees, especially in early spring. It succeeds best when planted in a fairly moist rich soil.

EVERGREEN.—The number of evergreen trees of pendulous habit are not numerous, but the list comprises a few handsome kinds. *Picea Morinda* (*Abies Smithiana*) is a Fir of simple culture, and thrives well in cold, wet soils, a recommendation of no mean value. *Cupressus Lawsoniana pendula vera* is of loose growth, and quite distinct; it is not fastidious as to soil. *C. L. filifera* has long thread-like branchlets, which hang gracefully; it succeeds best in well-drained soil. *C. L. intertexta* is another very fine pendulous Cypress. Hardy, free in growth, and of beautiful outline, this variety is well adapted for growing as isolated specimens on the lawn. *C. nootkaensis pendula* is a decided weeping variety of the Nootka Sound Cypress, having long drooping branchlets of a rich green shade.

Thuya (Biota) orientalis pendula (Whipcord Thuya) is as free in growth as the common kind. The long whipcord-like growths are graceful and effective, and form quite a contrast to the somewhat formal habit of *T. (B.) orientalis*. *T. occidentalis pendula* is a very ornamental variety, with elegant drooping branches. Though little known, *Juniperus communis oblonga pendula* is by no means without attraction, as its sharp-pointed leaves hang on long, slender branchlets. *J. virginiana pendula* is a free grower of excellent habit, with numerous branches of a decidedly weeping tendency. *Cedrus Deodara* adds variety to a selection of ornamental trees. Although the Sacred Cedar is of weeping habit,

the variety named *robusta* is much more so, and worthy of a place amongst choice weeping trees.

Of Yews, *Taxus baccata Dovastoni* (Fig. 306) is very effective. *T. b. D. aurea pendula*, with pale green leaves, striped and margined with golden-yellow, is equally handsome. *T. b. pendula* is a splendid shrub for small gardens. Worked on stocks a few feet from the ground its pendulous branches fall evenly on all sides, and soon assume an umbrella-like form; its foliage is of



FIG. 306.—*TAXUS BACCATA DOVASTONI*.

the darkest green. One of the most beautiful and useful of weeping trees is the pendulous form of *Ilex Aquifolium*; its deep glossy green leaves are always pleasing, and the bright red berries add colour to it in winter. *I. A. argentea pendula* has long arching shoots clothed with grey and soft green foliage. Another beautiful silver-leaved kind is *I. A. pendula picta*. Of golden-leaved sorts *I. A. pendula aurea* is deserving of wider culture, being of free growth and very ornamental.

Conifers.

ABIES (Silver Firs).—The Silver Firs comprise some of the most beautiful Conifers for park decoration. Although perfectly hardy, shelter from piercing winds should be given, and a good loam enriched with vegetable matter is the soil that suits them best. Good drainage is essential.

A. amabilis (*Picea amabilis*) is a charming and uncommon Fir. It is of noble outline, somewhat similar in appearance to *A. Nordmanniana*, with spreading branches and deep bluish-green leaves arranged closely together and powdered with white on the under-sides. *A. balsamea* (*Picea balsamea*), well known as the Balm of Gilead, forms a medium-sized pyramidal tree in the way of *A. pectinata*. It is well supplied with light green leaves, and its dark purple cones are borne freely. As it is apt to start growth early in spring, it should only be planted in positions not likely to encourage early growth. *A. brachyphylla* is a remarkably fine Silver Fir from Japan, and is a valuable tree for park decoration. It is perfectly hardy, exceedingly handsome, with an erect stem, horizontal branches down to the ground, and clothed with rich green leaves having white lines on the under-sides. It prefers a moist soil, and is seen to better advantage when screened from east winds. *A. bracteata* (*A. venusta*, *Picea bracteata*) is a North American species, with a straight, rather slender trunk, and pyramidal habit, the branches being clothed with handsome thick dark green leaves closely set together. Its distinct and beautiful cones are about 4in. long and 2in. in diameter, with long, narrow, leaf-like bracts, which give additional beauty. An exposed situation should be selected for this Fir, as it has a tendency to grow early in spring, and generally suffers from late frosts.

A. cephalonica (*A. panachaica*, *Picea cephalonica*), frequently called Grecian Fir, forms a good-sized tree, of distinct appearance and free growth. Its branches are horizontal and clothed with stiff deep green leaves, silvery on the under-sides. Although hardy, it is liable to disfigurement by sharp spring frosts unless planted in exposed positions. Large trees bear great quantities of rich velvety-brown cones, and are very beautiful. *A. concolor* (*Picea concolor*) is a handsome, very hardy North American Fir, of free growth on exposed, well-drained soils. It has a straight trunk, spreading branches, close habit, and pleasing glaucous green leaves. *A. c. violacea* (*Picea concolor violacea*) is a remarkably beautiful variety, and one of the most charming of its class—thoroughly hardy, free in growth, and quite distinct, with bluish glaucous leaves. *A. firma* (*A. bifolia*, *A. holophylla*), a Japanese Silver Fir, was introduced to this country by Mr. J. G. Veitch, in 1861. In habit it bears some resemblance to the Common Silver Fir. Its trunk is erect, and the branches are

horizontal, clothed with short, shining green, stiff leaves, arranged in a spiral manner, with faint silvery lines on the under-sides. A beautiful tree, well adapted for the park, but unfortunately little planted. *A. grandis* (*Picea grandis*), discovered by Mr. Douglas in 1831, is a North American species, with stout spreading branches and rich green leaves, silvery on the under-sides. The elegant cones are cylindrical in shape, 6in. long, $2\frac{1}{2}$ in. in diameter, and of a brownish colour. Although not exacting in its requirements as

to soil, it prefers a damp, rich loam. *A. Lowiana*

(Fig. 307), a massive-looking Californian species, bears some resemblance to *A. con-*

color. It is free in growth, of pyramidal outline, with horizontal, rather pendulous branches, clothed with long, soft green leaves.

The cones are borne in clusters, and chestnut-brown in colour; a grand tree for the park. *A.*

magnifica (*A. campylocarpa*, *Picea magnifica*) is of fairly fast growth, and a fine Conifer for ornamental planting. *A. Ma-*

riesii, of Japanese origin, is a beautiful Fir for the lawn, perfectly hardy, quite distinct, and especially useful for decorative planting.

It is of pyramidal habit, the vigorous spreading branches being clothed with deep green leaves.

A. nobilis (*Picea nobilis*), indigenous to California, is a noble, hardy Fir, with stout erect trunk, furnished with stiff branches and rich green leaves, having glaucous lines on the under-sides. Its attractive cones are about 6in. long, and borne freely. *A. Nordmanniana* (*Picea Nordmanniana*) (Fig. 308) is perhaps the most ornamental and the best known of all the

vigorous-growing Silver Firs. It succeeds admirably on all soils,



FIG. 307.—*ABIES LOWIANA*.

(Young Plant.)

and unlike most of its congeners does not start into growth sufficiently early to be damaged by spring frosts. The horizontal, rigid branches are furnished with glossy green leaves, and the egg-shaped cones are from 5 in. to 6 in. long and $2\frac{1}{2}$ in. in diameter.



FIG. 308.—*ABIES NORDMANNIANA*.

A valuable tree for the park and lawn. *A. pectinata* (*Picea pectinata*), the well-known Silver Fir from Central and Southern Europe, is extensively employed for game preserves and break-winds to tender trees and shrubs in England. *A. Pinsapo* forms

a handsome tree, 70ft. high, of pyramidal habit, with short, sharply-pointed, bright green leaves arranged all round the branches. The cones, which are abundantly produced on large trees, are very handsome, about 6in. long and $2\frac{1}{2}$ in. broad. This tree should be allowed plenty of room to display its beauty.

A. Veitchii (*A. Eichleri*, *A. nephrolepis*, *Picea Veitchii*) is a beautiful species from Japan, with a slender trunk covered with greyish bark. The spreading branches are clothed with light green leaves covered with silvery-white on the under-sides. It is quite hardy in the British Isles, vigorous in growth, decidedly attractive, and well adapted for either the lawn or the pleasure-ground. *A. Webbiana* (*A. chiloensis*, *Picea Webbiana*) is a vigorous-growing species of pyramidal habit, with deep green leaves having silvery lines beneath. Its cones are about 7in. long, and very beautiful. This uncommon Fir has suffered somewhat by injudicious planting. It breaks into growth rather early in spring, and occasionally becomes disfigured by late frosts. This can be overcome by planting on a cold soil and in exposed situations. *A. W. obovata* is a charming but little known Silver Fir. In habit and general appearance it is similar to the type, but differs from it by reason of its conspicuous snowy whiteness on the under-surface of the deep green leaves.

ARAUCARIA.—Practically only one species of *Araucaria* is sufficiently hardy to withstand our winters out of doors, and that one is the distinct and well-known Chili Pine and Monkey Puzzle, *A. imbricata*, from Chili. Magnificent specimens of this Conifer are scattered over the British Isles, and those at Dropmore, near Maidenhead, are perhaps the finest of all, one tree—about 70ft. high, its lower branches sweeping the ground—having a spread of nearly 40ft. in diameter. A rich and moist (but not very wet) loamy soil, thoroughly well drained, suits it best, as then its growth is fairly rapid, and the leaves are of a deeper green than when planted in dry soils. This species should not be planted, as is unfortunately too often the case, in gardens where room is restricted, as it requires plenty of head-room to display its beauty. When planting as a specimen, at least 30ft. to 35ft. apart should be allowed. It should not be planted in smoky atmospheres, and it cannot be recommended for town gardens.

BIOTA ORIENTALIS and its varieties.—See *Thuya*.

CEDRUS.—For ornamental planting the Cedars are well adapted, and they add grace, distinctness, and beauty to the landscape. They are all hardy, but the Sacred Cedar and its elegant varieties are liable to get damaged in spring, especially if planted on low-lying and insufficiently drained land. A rather sandy soil suits them best.

C. atlantica (Atlas Cedar) (Fig. 309), a species from Northern Africa, makes a beautiful park tree, and thrives on poor soils, and

is happier on cold, stiff soils than its congeners. It is also valuable for planting in exposed situations, and very handsome when



FIG. 309.—CEDRUS ATLANTICA.

carrying its shapely cones. *C. a. aurea* is conspicuous for its golden-yellow foliage, and this colour is happily constant.

C. a. fastigiata is an erect-growing, glaucous-leaved variety, of close habit, and well adapted for planting in positions where the type would be inadmissible on account of the spread of its branches. *C. a. glauca* is similar in habit to the type, with glaucous leaves, which, when associated with trees having deep green foliage, are seen to great advantage. It has a vigorous leader, and its branches droop gracefully with age. This is specially useful for decorative planting. *C. Deodara* (see page 478). *C. D. erecta* differs from the sacred Cedar by reason of its more upright habit, short, stiff branches, and beautiful glaucous leaves. *C. D. robusta* is a free-growing variety of distinct habit, with larger leaves than the type. It is rather sparsely supplied with branches, which are given off horizontally, the lower ones sweeping the ground, and with age they all assume a weeping habit. Of free growth, it is a useful, ornamental tree, and as it is rather late in commencing to grow, is less liable to damage from late frosts than are its congeners. *C. D. variegata* differs

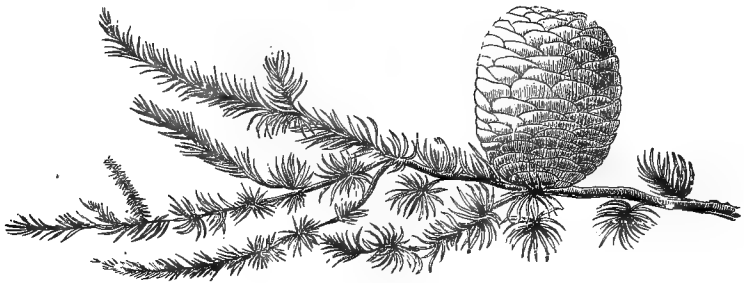


FIG. 310.—CEDRUS LIBANI.

from the type because a number of its young growths and leaves are creamy-white in colour. *C. D. verticillata* has short branches clothed with glaucous leaves; it is of rather drooping habit, and slow in growth. *C. D. viridis* is also of graceful, weeping habit, with long, slender branches, but in this case the leaves are of a rich grass-green.

C. Libani (Cedar of Lebanon) (Fig 310) is a noble park tree, which has been cultivated here since 1683. It is of good growth and distinct habit, reaching to a height of 80ft., with a spread of branches frequently 50ft. The cones are about 4in. long, and are borne with great freedom. No soil, however poor, comes amiss to this picturesque tree, but it grows more rapidly when planted where its roots are within easy reach of water, such as by the margins of lakes. A grand tree for the landscape, and many fine examples are to be found in English gardens.

The species of Cedars are increased by seeds, which may be sown in cold frames in spring in well-drained soil, the seeds

being slightly covered with finer soil. Plants raised from seeds sown in heat are less vigorous in growth than those raised under the cool treatment. The variegated forms may be grafted in spring on their respective types, and placed in close cases. The Larch is sometimes used as a stock, to which the Cedars readily



FIG. 311.—*CEPHALOTAXUS PEDUNCULATA FASTIGIATA*.

unite, and although growth is rapid in a young state it has been proved that plants worked on the Larch are shorter lived than those on the Cedar stocks.

CEPHALOTAXUS.—A small genus, indigenous to China and Japan, and useful for the park and garden. They thrive in

ordinary soil, especially if a little peat and leaf-mould is incorporated with it. They also prefer partial shade to full exposure to the sun, as in the last-named position their leaves, especially



FIG. 312.—CRYPTOMERIA JAPONICA.

those of *C. drupacea* and *C. Fortunei*, wear an unhealthy appearance. Protection from east and north winds is important. *C. drupacea* forms a low, straggling bush with horizontal branches

and short, flat branchlets. The leaves are arranged in opposite pairs, and are of a greenish-yellow hue. *C. Fortunei* is one of the most handsome members of the genus, with spreading branches plentifully supplied with narrow leaves, rich green above and soft green below. *C. pedunculata* (*Taxus Harringtoniana*) is a distinct Japanese shrub, with horizontal branches and deep green leaves; it grows about 8ft. high, and is of bushy, pyramidal habit. *C. p. fastigiata* (*Podocarpus koraianus*) (Fig. 311), also from Japan, in habit bears some resemblance to the Irish Yew. It is of slow growth, quite hardy, and well adapted for winter bedding and window boxes. Its narrow leaves, about 2in. long, spirally arranged around the erect shoots, are deep green above and paler below.

CRYPTOMERIA.—Only one species is found in this genus, and that is thoroughly hardy in the British Isles. It enjoys a rich, deep soil, thoroughly well drained and beyond the influence of cold east winds. *C. japonica* (Japan Cedar) (Fig. 312) is a charming tree, and useful also for avenues. Of free growth, with a straight trunk covered with rough brown bark, it forms a much-branched tree of pyramidal habit. The spreading branches are inclined to droop, and are very effective when carrying the spikes of male catkins. *C. j. elegans* is an elegant tree, less vigorous than the type, with a straight, upright trunk, and horizontal branches clothed with narrow, sharply-pointed leaves, tender green in spring, but which in autumn assume a brownish-crimson hue, giving it a distinct and pleasing appearance. A beautiful tree for the lawn as well as for winter bedding, and in a young state is useful for window boxes. *C. j. e. nana* forms a bushy shrub in the rock garden. Like the last-named the foliage becomes stained with rich crimson, which shade it retains until spring. *C. j. Lobbii* differs from the type by reason of its more compact, sturdy habit, and smaller and deeper green leaves, as well as being of more rapid growth. *C. j. L. nana* is a much-branched spreading bush, growing only a few feet high. *C. j. spiralis* is useful for the rockery, but is more curious than beautiful.

CUNNINGHAMIA.—Unfortunately *C. sinensis* is hardy only in sheltered parts of the British Isles. Suitably placed it makes a handsome specimen, but in localities where severe frosts are prevalent the foliage becomes discoloured, and is then anything but decorative. It prefers a light, well-drained soil, and on no account should it be exposed to east winds. Propagation is best effected by seeds, as plants raised from cuttings do not as a rule give satisfaction.

CUPRESSUS.—This very ornamental group now comprises the Retinosporas of gardens. Their habit is equally varied, some being columnar, or fastigiata, others spreading and pendulous, and a few quite globose. The following list, although not complete,

comprises the best kinds for general planting: *C. Goveniana* (*C. californica*) is a low tree with ascending spreading branches and pendulous bianchlets, clothed with rich green and slightly fragrant



FIG. 313.—CUPRESSUS LAWSONIANA.

scale-like leaves. In spring it produces an abundance of small yellow male catkins, even on young plants, which gives it a distinct and pleasing appearance. It needs a sheltered position. *C. Knightiana* is a rare Mexican species, but unfortunately

it is not sufficiently hardy for general outdoor culture in the British Isles. In the warmer counties of England and Ireland it grows freely, and is an object of great beauty. It has a distinctly pyramidal habit, with reddish-brown bark and small bluish-green leaves. Planted in warm soil and a sheltered position, Knight's Cypress forms a really handsome tree. *C. Lawsoniana* (Fig. 313) is a well-known, thoroughly hardy, and easily-grown Conifer. It affords a striking garden picture in spring when laden with its small male catkins; these are borne on quite small plants, and give an additional charm. Though not particular as regards soil or position, the finest and most shapely specimens are produced in a moist, rich soil. A splendid lawn tree, as well as a useful and cheap hedge-plant. It is very variable when raised from seeds, which are produced abundantly in this country.

Of the numerous varieties of Lawson's Cypress differing in habit, vigour, and leaf-coloration, the under-mentioned are amongst the most meritorious: *C. L. albo-maculata* is neat in growth, with short, compact branches, and a portion of its young growths as well as its leaves are stained with creamy-white. *C. L. albo-spica* is of vigorous dense habit of growth, and, like the last-named, conspicuous for its silvery variegation, which it fortunately retains, even when planted in somewhat shady positions. *C. L. albo-variegata* originated at the Coombe Wood Nursery of Messrs. Veitch, and is a neat, compact variety of upright habit; the young growths and leaves are marked with white. It is a pretty variety. *C. L. Alumi* is a distinct and pleasing variety, but seems to be little known outside good collections of trees and shrubs. It is of fastigiate habit, with bluish-green leaves, and can be well recommended for small gardens; it grows freely in the shade. *C. L. amabilis* belongs to the glaucous-leaved group, and is quite distinct, both in habit and in leaf from the last-named. It is of bushy habit, but not so free in growth as the type; still, it grows with moderate freedom, and is serviceable for ornamental planting. It retains its colour well, and is effective in winter. *C. L. argentea* varies in its leaf-colour, and is of more than ordinary merit; it is of compact or rather spreading habit, with slender branches, and leaves of a beautiful glaucous or silvery hue, varying in intensity according to position and soil; it is a lovely lawn tree. *C. L. a. variegata* is a good companion to the last-named, from which it differs in its young shoots and leaves being marked with creamy-white. *C. L. Bowleri* is another charming variety, of compact, dense habit of growth. It is freely branched, and its small branchlets droop gracefully. *C. L. compacta* is of globose habit and slow growth, and deserves a place in the rock garden. *C. L. Darleyensis* is a graceful and uncommon variety, of free growth, with leaves and shoots of a bronzy-yellow hue; it is effective in

winter, and well adapted for lawns and small gardens. *C. L. erecta viridis* (Knap Hill Cypress) is of erect, dwarf, bushy growth, the branches being clothed with bright green leaves. It is very distinct and popular. For winter bedding, and also for planting beside terrace walks, and in positions where the more vigorous growers would be inadmissible, it is useful. Its sub-variety, *argentea*, is a pretty variegated form. *C. L. Fraseri* is of much the same habit as *Alumi*, but the foliage is of a far more glaucous hue. *C. L. glauca* is of shorter stature, denser in growth than the type, very effective, and very useful for decorative planting. *C. L. gracilis* forms a bushy specimen for the lawn, with slender branches and leaves of a cheerful green; it grows freely on dry soils, and is a lovely variety for placing in vases for winter decoration. *C. L. lutea (flavescens)* is the best of the golden-leaved varieties; it is of good habit, the young growths and leaves being quite yellow, which colour it retains longer than any of its class. *C. L. nana* is a very dwarf-growing variety, rarely exceeding 2ft. in height, and is better adapted for the rockery than for the ordinary shrubby border. It is slow in growth, and forms a dense bush, with stiff erect branches and deep green leaves. Of all the Silver-leaved Lawson's Cypresses, that named Silver Queen stands head and shoulders above its congeners. It is free in growth, with a hardy constitution, very handsome, and well adapted for the garden or park. It is very vigorous, and retains its silvery-grey tint for a long time. *C. L. Wisselii*, a very rare and graceful variety, is well adapted for gardens of restricted areas. It is distinct, compact, with erect

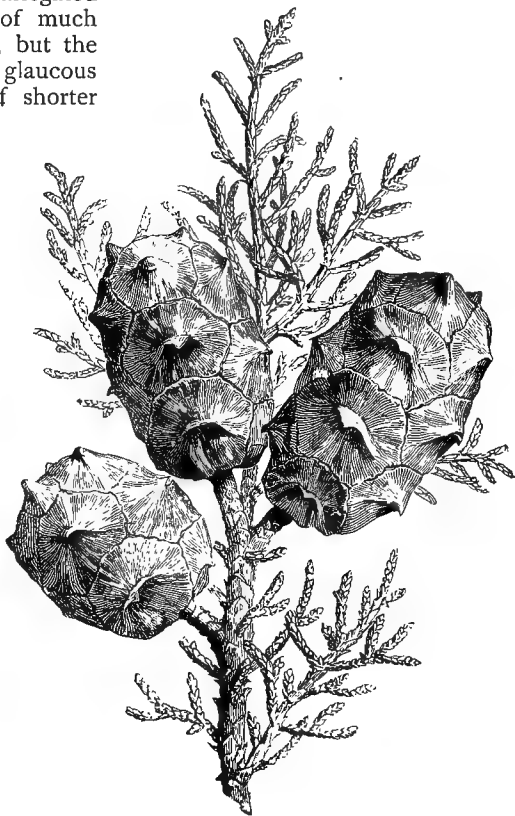


FIG. 314.—CUPRESSUS MACROCARPA.

growths close to the main stem, clothed with lovely glaucous foliage. A choice variety. *C. L. Youngi* is of quick growth and erect habit; the ascending branches are long and, towards the ends, droop gracefully; the leaves as well as the shoots are deep green.

C. MacNabiana (*C. glandulosa*) rises to a height of about 12ft.; it is a much-branched compact tree, of pyramidal habit, with short glaucous leaves, and is rather rare.

To Mr. Hartweg belongs the credit of having discovered the elegant *C. macrocarpa* (Monterey Cypress) (Fig. 314) in Upper California, while collecting for the Royal Horticultural Society, upwards of fifty years ago. It is a beautiful tree, vigorous and free in growth, with ascending branches and very distinct foliage of the brightest green. The light brown cones are about 2in. long, and borne in small clusters. It grows about 50ft. high, and is a valuable species for the park, especially in the South and West of England. It flourishes amazingly by the sea-coast. *C. m. fastigiata* differs from the type on account of its branches being more upright and closer to the main stem. *C. m. Crippsii* is an attractive and distinct variegated variety. It is free in growth and quite hardy. The golden-leaved variety (*lutea*) is one of the most promising of recently-introduced Conifers. It originated a few years ago in a bed of seedlings of *C. macrocarpa* in the nurseries of Messrs. Dicksons, Chester. It is of about equal hardiness to, and of the same habit as the type, and the golden-coloured leafage is happily permanent. For growing in pots or tubs for winter decoration as well as for winter bedding, this charming variety should meet with a large demand. It is a grand seaside tree.

C. nootkatensis (*Thuya nootkatensis*, *Thuyopsis borealis*), the well-known Nootka Sound Cypress, is a very graceful kind, and suitable for all sorts of decorative planting. Besides being one of the hardiest, it is perhaps the least exacting of the Cypress family, and is vigorous and of elegant habit, with drooping branchlets. It is a native of British Columbia, and was discovered by Mr. Menzies nearly a century ago, but does not seem to have been grown in England until fifty years ago. *C. n. albo-variegata*, though not so vigorous, is more compact than the type. Its terminal branchlets and leaves are variegated with creamy-white. *C. n. aurea variegata* is a yellow counterpart of the last-named, and should have an open spot, as the variegation is apt to fade when overshadowed by other trees. *C. n. compacta* is a pretty form, of dense growth, and useful for small gardens. It is very distinct. *C. n. glauca* is a beautiful variety with glaucous leaves, which have a very pleasing effect, especially after a shower of rain. It is a charming sort for small gardens, and valuable also for ornamental planting. *C. n. gracilis* is another elegant sort, of rather dense, free growth, with slender,



FIG. 315.—*CUPRESSUS NOOTKATENSIS LUTEA*.

drooping branchlets and rich, grass-green leaves. *C. n. lutea*, the golden-leaved form (Fig. 315), is vigorous and graceful. It is an excellent subject for planting on the edge of the lawn, as its character is constant, even when placed in partial shade, but it delights in full exposure.

C. obtusa (*Retinospora obtusa*, *Thuja obtusa*).—This is a tall-growing tree, reaching a height of about 100ft. in Japan (its native home). In this country it forms a pleasing pyramidal tree of moderate growth, and is excellent for ornamental planting. The numerous spreading branches, with elegant frond-like branchlets, are furnished with light shining green leaves. This species succeeds best in a moist soil, and prefers shelter from cold, piercing winds. *C. o. aurea* is of similar habit to the type, with golden-yellow foliage, and is very striking in the winter months. *C. o. compacta* is a beautiful form, of dense habit, and quite distinct; useful for lawns. *C. o. erecta viridis* also makes a capital lawn shrub. It is compact in habit, dwarf, and very attractive in winter. *C. o. filifera* is a particularly graceful variety, thoroughly hardy, and of good growth, even in poor soils. It is of bushy habit, with long thread-like growths of a rich green colour; a choice lawn Conifer. *C. o. gracilis aurea* is a handsome golden-leaved Conifer of pyramidal outline, with slender, spreading branches, and elegant drooping branchlets. The colour of its leaves is soft yellow, which with age gradually gives place to soft green. *C. o. pygmaea* should have a place in the rock garden. It grows about 1ft. high, and is a distinct and cheerful-looking little Conifer.

C. pisifera (*Retinospora pisifera*, *Thuja pisifera*), introduced from Japan at the same time as *C. obtusa*, grows freely, forming a handsome specimen, with open, spreading branches and feathery light green foliage. *C. p. albo-picta* differs from the type in the young branchlets and leaves being speckled with white, which gives it a distinct and pleasing appearance. *C. p. nana aurea* makes a good rock-garden shrub, as it is rather too slow in growth for the ordinary shrubbery border. It forms a neat bush, and if planted in full sunlight its rich golden colour shows up well during the winter. *C. p. plumosa* is a splendid tree, well adapted for lawns and park decoration. It is of compact pyramidal habit, and free in growth, with plume-like branches and rich green leaves. This kind bears hard pruning well, and is beautiful for winter bedding. *C. p. p. argentea* deserves special mention. It is very distinct and of graceful habit, and the young growths and foliage are marked with cream-white; the variegation is constant. *C. p. p. aurea*, a yellow-leaved kind, is much valued for ornamental planting, and is a grand tree for the lawn and useful for winter bedding; a rich, moist, well-drained soil suits it best, and it should be planted in a sunny position to bring out the full beauty of its foliage. *C. p. squarrosa*

is another graceful variety, of rather dense growth, with short spreading branches clothed with lovely glaucous leaves. It is a beautiful lawn tree.

C. sempervirens (upright Roman Cypress) is common in the Mediterranean region, whence it was introduced upwards of 350 years ago. In habit it bears some resemblance to the Lombardy Poplar, but is less vigorous and not of such rapid growth. It is commoner in the South of England than in the North, and prefers a rather warm soil to a cold, wet one. The Romans planted this Cypress extensively around their residences, and on account of its habit, and the great age to which it lives, it has long been a favourite tree for burial grounds. *C. s. fastigiata* (*C. pyramidalis*) is even of closer growth than the type. *C. thyoides* (White Cedar) was discovered in 1736 in the Eastern United States, where it forms a pyramidal tree of close habit, 60ft. high. It grows best when planted in moist soil, but makes little progress in a dry, sandy one. *C. t. glauca* is quite distinct from the type, being of more compact habit, while the leaves are of a pretty glaucous tint. *C. t. variegata* is a very desirable golden-leaved form. *C. torulosa* (*C. Tournefortii*) is a pyramidal tree with slender horizontal branches and drooping branchlets. In Northern India it grows to a great height, but in the British Isles is only a success when planted in favoured parts, as it is somewhat tender. Where it succeeds, however, it is very beautiful. *C. t. majestica* is vigorous, handsome, and hardier than the type.

Propagation may be effected by means of seeds and cuttings. The former germinate freely if sown in sandy soil in shallow boxes or pans, and stood in a gentle heat. The seedlings should be pricked off and later on removed to a cold frame; when large enough they should be planted out in nursery rows. Cuttings emit roots if pieces 3in. to 4in. long are taken off in August and dibbled in light soil in a cold frame; they should be watered occasionally and shaded from the sun.

FITZROYA.—The only member of this genus generally cultivated in British gardens is the Patagonian Cypress, *F. patagonica*, introduced to this country by Mr. W. Lobb from the mountains of Western Patagonia fifty years ago. In its native home it varies in height from 50ft. to 70ft., but in England is generally seen as a small tree or bush of rather slow growth. It is quite distinct from any other Conifer, and a vigorous, healthy specimen, with its numerous branches and elegant drooping slender branches, is very attractive. Unfortunately, it only makes satisfactory growth in sheltered situations, but even in cold localities it is worth growing in unheated glass structures. A soil composed of rough peat, leaf-mould, and loam in equal proportions forms a suitable compost for planting it in. Ample drainage should be provided, otherwise the plant will make little headway. Cuttings taken off

towards the close of the summer, dibbled in light soil, and stood in a close, intermediate frame, emit roots readily.

GINKGO BILOBA (*Salisburia adiantifolia*).—This is a monotypic genus, well known as the Maidenhair Tree, and is one of the most remarkable of deciduous Conifers. It is a native of China and Japan, and although introduced into England more than two centuries ago, has not been planted so freely as it merits. It is a beautiful park tree, and one of the few *Coniferae* suitable for planting in the vicinity of towns. In its native habitat it grows to a height of 100ft., but there are few specimens in England which exceed 60ft. It is distinct and rather slow in growth, having a usually straight trunk, covered with rough greyish bark, horizontal or pendulous branches, and thick yellowish-green, smooth, fan-shaped leaves, closely resembling in shape the pinnules of the Maidenhair Fern. Its autumn tints are charming. *G. b. fastigiata* is an erect form, of good growth, and worthy of a place in small gardens. *G. b. macrophylla*, a strong-growing variety, originated in France about fifty years ago. The leaves are larger than those of the type, divided into three and five lobes, and beautifully undulated at the margins. The leaves of *G. b. variegata* are striped and splashed with soft yellow, but unless this form is planted in an open situation the variegation becomes indistinct. It is less vigorous than the type.

A deep sandy soil suits the Maidenhair Tree, and, although perfectly hardy, shelter from cold winds is advisable. It makes little progress in wet, badly-drained soil, and in such it should never be planted. The Ginkgo may be propagated by seeds, also by layering, when the lower branches are low enough for the purpose. In layering, an incision should be made through a joint, and a little damp soil or moss pressed into the cut. This, again, should be covered with light soil, which should never be allowed to become thoroughly dry, otherwise root formation will be slow. Cuttings also root if taken off with a heel of the old wood attached and planted in sandy soil in autumn or early spring; young, well-ripened shoots may also be taken off in summer and placed in a warm propagating-case. The variegated and pendulous forms may be increased by grafting on the type in spring before growth commences.

JUNIPERUS.—The Junipers are well adapted for the garden and the park. They are indigenous to the Northern Hemisphere, especially the temperate parts of Europe, and vary considerably both in habit and in the colour of the foliage; some are erect, medium-sized trees; others are mere bushes, and yet others are of trailing habit. No special kind of soil is necessary, as they thrive in any ordinary kind, especially if leaf-mould and a little peat are incorporated with it at planting-time.

J. chinensis is a distinct and beautiful species found in China, Japan, and the Temperate Himalayas. It is a variable tree, but is generally of low pyramidal or conical habit, with short branches, and glaucous or light green prickly leaves. In any form it is a valuable tree for the shrubbery or small lawn, and succeeds in cold soils. *J. c. albo-variegata*, introduced by Mr. R. Fortune, from China, is a compact variety, with variegated foliage, the colour of which is apt to fade unless the tree is planted in the open. It is also of variable character, and shorter in stature than the type. *J. c. aurea* is a distinct and pleasing variety of compact, upright habit, the young growths being of a rich golden-yellow, which colour is intensified by full exposure to the sun. In winter the leaves assume a bronzy hue, which gives additional beauty. It is useful for small gardens and for winter bedding. *J. c. glauca* is a free-growing, pretty variety, with glaucous leaves. *J. c. Smithii* is vigorous in growth, quite distinct, and very beautiful.

J. communis is a British species, varying in height from 8ft. to 20ft., according to soil and situation. It prefers partial shade, and is suitable for planting beside woodland walks; it also makes an excellent covert shrub, as it is not subject to the attacks of ground game. *J. c. alpina aurea* should have a place on the rockery, as it is a charming Conifer of low growth; in spring and summer its foliage is pale yellow, and in winter the whole becomes bronzed, which gives it a distinct and picturesque appearance. *J. c. compressa* is a neat dwarf shrub, of conical habit, less than 1ft. in height, and, like the last-named, is worthy of a place in the rock garden. *J. c. hibernica* (Upright Irish Juniper) has erect branches, closely packed together, and small glaucous green leaves; it is useful for planting by the sides of walks, as it occupies little room, is ornamental, and well adapted for small lawns. *J. c. nana*, from Northern Europe, is a

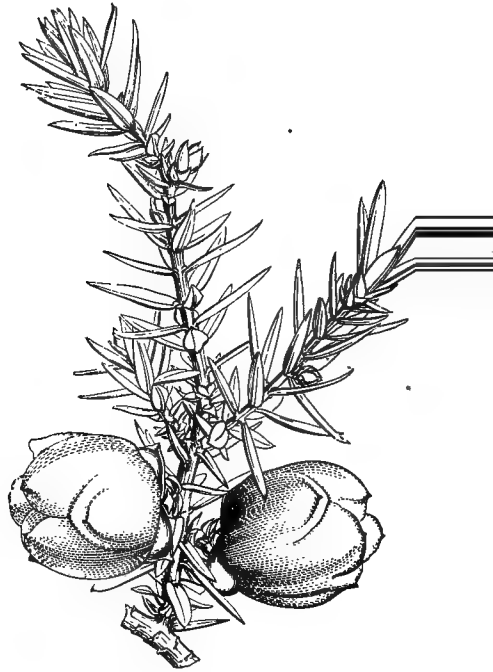


FIG. 316.—*JUNIPERUS DRUPACEA*.

pretty variety, of low growth, with short branches and small sharply-pointed glaucous leaves. *J. c. oblonga* requires a rich soil. It forms a medium-sized bush with bright green leaves. *J. c. suecica* (Swedish Juniper) is of robust and compact habit, and its branches are well clothed with glaucous leaves.

J. drupacea (Plum-fruited Juniper) (Fig. 316) is a distinct species, introduced from Asia Minor about fifty years ago. It is a handsome Conifer for small lawns, and when planted in loamy, well-drained soil and sheltered situations, forms a tree of upright habit, with leaves of a rich green shade. *J. excelsa*, an elegant species from Asia Minor, was introduced to this country in 1806. It is free in growth, much branched, and its slender branchlets are clothed with greyish leaves; both distinct and handsome. *J. e. Perkinsii* is distinctly free in growth, very beautiful, of pyramidal habit, and its glaucous leaves show up well in winter. *J. e. stricta* forms an ornamental tree, with pale green leaves; it is of closer habit than the type. *J. japonica aurea* bears some resemblance to *J. chinensis aurea*, but differs from that form in its branchlets being longer and more pendulous. The leaves are yellow, becoming brown as winter approaches. It is rather slow in growth. *J. littoralis* (*J. conferta*), a beautiful Japanese kind, is of prostrate habit, and forms a dense carpet. Its glaucous leaves and reddish-brown bark—especially of the young wood—are particularly pleasing in winter. It is free in growth and a delightful rock-garden shrub. *J. occidentalis Burkei* forms a neat tree of pyramidal outline, with drooping branchlets. *J. pachyphleæ* is a rather rare species, indigenous to New Mexico, and quite hardy here. Its chief recommendation is the glaucous hue of its foliage and young growths, but as the tree gets old it is apt to become unsightly. It is very attractive in a young state. *J. phænicea* (*J. bacciformis*, *J. tetragona*), from the Mediterranean region, has been cultivated in this country for upwards of 200 years. It forms a conical or pyramidal tree, covered with conspicuous brownish-red bark. The slender branches are clothed with pale green scale-like leaves. It is a useful lawn tree. *J. rigida*, discovered on the mountains of Japan in 1861, forms a very handsome small tree. It is of rather irregular outline, with drooping branches, the young wood being brown and the narrow, stiff, needle-shaped leaves rich green. The latter assume a brownish hue in winter. Like the last-named, it is a beautiful lawn tree.

J. Sabina (Common Savin) (Fig. 317) has been cultivated in British gardens for upwards of four centuries, and although not so ornamental as some of its congeners, is useful for planting on mounds and rockeries. It forms a dwarf shrub of spreading habit, and grows freely in light soils. *J. S. procumbens* is an

excellent rock-garden Conifer, and very attractive in winter on account of its violet foliage. It is very distinct, of neat growth, and thoroughly hardy. *J. S. prostrata*, from the Rocky Mountains, is of trailing habit, and well suited for covering banks. *J. S. tamariscifolia* is a pleasing variety, of dwarf habit, with bluish-green leaves. It rarely exceeds 1ft. in height, and may be used with excellent results as a permanent edging to beds: planted with dwarf-growing shrubs. *J. S. variegata*

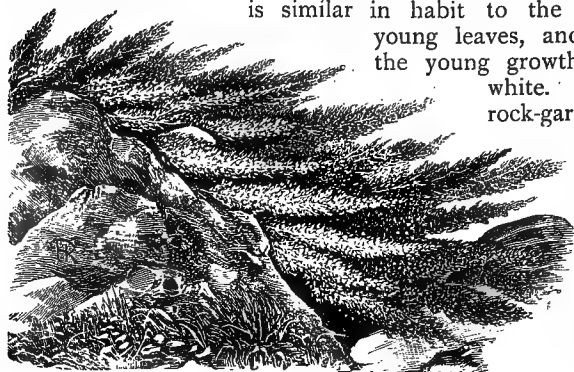


FIG. 317.—*JUNIPERUS SABINA*.

is similar in habit to the type, but the young leaves, and a portion of the young growths, are creamy-white. It is a pretty rock-garden shrub, especially when planted in the shade.

J. sphaerica (*J. Fortunei*), introduced from Northern China by Mr. R. Fortune in 1846, is of upright, elegant habit,

distinct, and attractive. *J. S. glauca* (*J. Sheppardi*) is a glaucous-leaved form of the last named, and very showy in winter. *J. thurifera* (Spanish Juniper) is an old occupant of our gardens, having been introduced from Spain in 1752. It has an erect, slender trunk, and short ascending branches, covered with small grey leaves, and is very conspicuous when laden with its crops of black berries. It is well adapted for small gardens. *J. virginiana* (Red Cedar) is indigenous to North-East America, and was introduced into this country in 1664. It is a charming tree of pyramidal or conical habit, often reaching a height of 40ft. Its short branches and numerous drooping branchlets are furnished with rich green leaves. *J. v. aurea*, though not so free in growth as the type, is very ornamental; its young shoots and leaves are yellow, but it is only when planted in a rather shady spot that its true character is maintained. *J. v. compacta* is very compact, free in growth, and excellent for small gardens. *J. v. glauca* is a charming variety, distinct, and of good growth; the slender branchlets are clothed with small silvery leaves, varying to glaucous-green in winter; a pretty lawn tree. *J. v. Schottii* is of loose, pyramidal habit, with small, scale-like leaves of various shades of green, which towards winter assume a bronzy hue; it is very useful for ornamental planting. *J. v. viridis* is another excellent sort, and very free. It is of

rather loose growth, and the drooping branchlets and small leaves are of a rich green colour.

LARIX (Larches).—*L. europæa* is one of the most charming of trees. Besides being one of the hardiest, it is perhaps the least fastidious of all Conifers, as far as soil is concerned, as it flourishes in poor as well as in rich soil. Its long, straight stem, 80ft. or more in height, and rather short branches, with clusters of narrow light green leaves, form a beautiful picture in early spring against the sky. It is of extremely elegant growth, and with age its branches have a decided drooping tendency, which imparts additional beauty.

L. e. rossica is more compact than the type, vigorous, free in growth, and of graceful habit. *L. e. sibirica* (*L. archangelica*) is a much-branched variety, having stout horizontal branches, and numerous drooping branchlets clothed with rich green leaves.

L. Griffithii bears some resemblance to the Common Larch, but differs from that species in its slenderer habit and longer erect cones. It is a Himalayan species, introduced about fifty years ago, and succeeds best when planted in rich soil and shielded from cold, piercing winds.

The Larch is readily increased from seed, which should, however, be gathered from healthy, vigorous trees, as seed taken from sickly ones generally produces weakly trees, which are apt to suffer from the terrible Larch disease, once so common, but

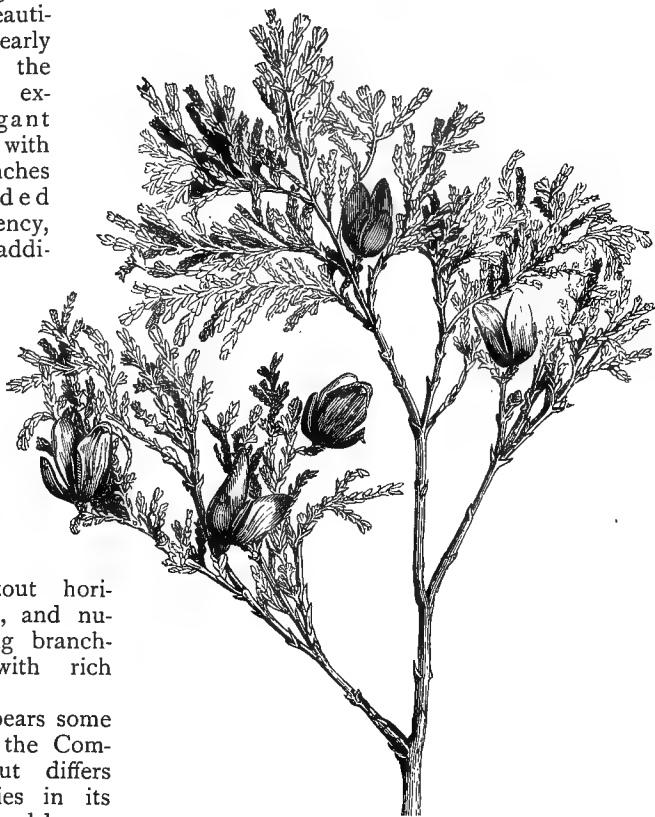


FIG. 318.—LIBOCEDRUS CHILENSIS.

happily less so now. The seed may be sown in well pulverised soil, and when a few inches high the seedlings should be pricked off into nursery rows. As the Larch commences to grow very early in the spring, autumn planting is preferable.

LIBOCEDRUS CHILENSIS (*Thuja chilensis*) (Fig. 318) deserves a sheltered corner, as it is a very ornamental and distinct tree. It was introduced about fifty years ago from South Chili, where it forms a much-branched tree, 50ft. high, and of close, compact, pyramidal outline, its branches being clothed with glaucous green leaves. A rich, moist, well-drained soil and sunny spot suits this rare Conifer best.

L. decurrens (Incense Cedar) is the hardiest and most vigorous of the genus. It forms a tree about 100ft. high, with a straight trunk and short branches of close habit, and it is suitable for planting in gardens of limited extent. *L. d. compacta* is a much-branched variety of neat growth. *L. d. glauca* is of similar habit to the type, quite hardy, and very beautiful; its leaves are of a bluish-green shade.

PICEA (Spruce Firs).—*P. ajanensis*, from Japan, is a pretty Spruce, of sturdy growth, with horizontal branches, flat branchlets and narrow leaves, which are deep green above and silvery-white on the under-sides. It is quite hardy, very effective, and bears an abundance of small cones. *P. Alcockiana* (*Abies bicolor*, *A. acicularis*), also indigenous to Japan, is an attractive species, introduced about forty years ago. It is of pyramidal habit, and is often confounded with *P. ajanensis*; it is, however, more rapid in growth and later in commencing to grow in spring. Although *P. Engelmanni* has been grown in English gardens since 1864, it is even now by no means plentiful, considering its value as an ornamental tree. It is erect, with spreading branches and long rich green leaves. *P. E. glauca* is a handsome variety, similar in habit to the type, but differing in its bluish-grey leaves; it is very hardy, and a fine lawn tree. The origin of *P. ericoides* seems veiled in obscurity; it is, nevertheless, a distinct and pretty Fir. It is of pyramidal outline, and forms a densely-branched small tree, with slender branches and short pale green leaves. It is rather slow in growth, but pleasing in appearance, and deserves wider recognition; useful for small gardens.

P. excelsa (Norway Spruce) is a well-known tree seldom planted for ornamental purposes, but it makes an excellent shelter to tender shrubs. It flourishes in all soils, but delights in a moist one, as its growth is then much more rapid and the tree more shapely than when planted in dry ground. There are numerous varieties of the Norway Spruce, differing in habit, vigour, leaf colour, &c. The following is a selection of the most meritorious: *P. e. aurea*, a golden-leaved, showy variety, needs

a warm soil and a sunny situation to bring out its true leaf-colouring. *P. e. cincinnata* is a vigorous variety having horizontal branches, drooping branchlets, and rich green leaves. It is free in growth, distinct, and uncommon. *P. e. Clanbrassiliana*, popularly known as Lord Clanbrassil's Spruce, originated on his lordship's estate near Belfast towards the close of last century. It is of dwarf, compact habit, and on account of its slow growth deserves a place in the rock garden. *P. e. compacta* is, as its name implies, compact in habit; it is also very attractive and quite distinct. *P. e. diffusa* belongs to the dwarf-growing group, and is well adapted for rockeries. *P. e. dumosa* is a neat, much-branched, pyramidal, low tree, rather slow in growth, and worthy of recognition. *P. e. finedonensis* is a pyramidal, much-branched, elegant tree, having fan-shaped branches clothed with greenish-yellow leaves, varying to brown; distinct and handsome. *P. e. Gregoryana* is a dwarf, sturdy-growing Spruce, having spreading branches clothed with short, stiff, rich green leaves; it is of conical habit, and well adapted for the rock garden. *P. e. pygmaea*, like the last-named, forms a conical bush; it is the dwarfiest of Spruces, and useful for the rockery. *P. e. pyramidalis*, an ornamental tree, is decidedly more important than the type. It is vigorous, with branches of rather upright growth, and deserves wider culture.

P. nigra Doumetti, although not so vigorous as the North American Black Spruce, forms a handsome specimen, with numerous short branches and small leaves, and is of compact, bushy habit. *P. Omorika* (Servian Spruce) is distinct, free in growth, and of pyramidal outline. It has an erect trunk and short, spreading, fan-shaped branches, clothed with rich green leaves. Its short cones are attractive, and borne freely; a pretty and uncommon lawn tree. *P. orientalis* (*Abies Wittmanniana*) is a very ornamental Conifer, introduced into this country about sixty years ago. In a moist, rich, well-drained soil its growth is fairly fast, but in dry ground it is rather slow. It is distinctly pyramidal in outline, with fan-shaped branches, and in spring its young leaves are soft yellow, varying to deep green as the season advances. It succeeds in exposed situations, and may be recommended as a good lawn tree. *P. polita* (*Abies Torano*), the Tiger-tail Spruce, was introduced from Japan about forty years ago. It is a distinct and handsome Spruce for the park and lawn, as it is perfectly hardy and of good growth. It is of conical, sturdy habit, the horizontal branches being clothed with stiff, rich green, sharply-pointed leaves. When the tree has reached a certain size the branchlets droop gracefully. It is scarcely ever injured by spring frosts, as it is late in commencing to push forth new growths. The pendulous cones are about 4in. long, and are borne at the ends of the branches. *P. pungens* (*P. Parryana*) is of vigorous growth, having an erect stout trunk and rather flat, short branches,

clothed with stiff green leaves. *P. p. glauca* (Blue Spruce) (Fig. 319) is strikingly beautiful, with glaucous leaves; in habit, it is identical with the type. *P. sitchensis* (*Picea Menziesii*, *Abies Menziesii*, *A. sitchensis*), a North American species, becomes a large tree of good form when planted in damp soil and an open situation. Its trunk is erect, and the branches are horizontal, with drooping branchlets and narrow pale green leaves, glaucous on the under-sides.

PINUS.—The genus *Pinus* comprises about seventy species, most of which are natives of the Northern Hemisphere. Some are lovely trees for decorative planting, and those here mentioned are a few of the best.

P. Ayacahuite, an uncommon Pine, is a native of Mexico, and bears a slight resemblance to *P. Strobus*. Although hardy in the British Isles, it should have shelter from cold winds. It grows freely, and forms a much-branched tree, with narrow glaucous leaves. It is a handsome lawn tree. *P. Balfouriana* (Fox-tail Pine) is of sturdy growth, compact, and bushy. Being slow in growth and of medium height, it is valuable for planting in positions where the more vigorous sorts would be inadmissible. Its short glaucous leaves, arranged all round the shoots, are distinct and pleasing. *P. Bungeana* (Lace-Bark Pine) is an elegant, medium-sized tree, with

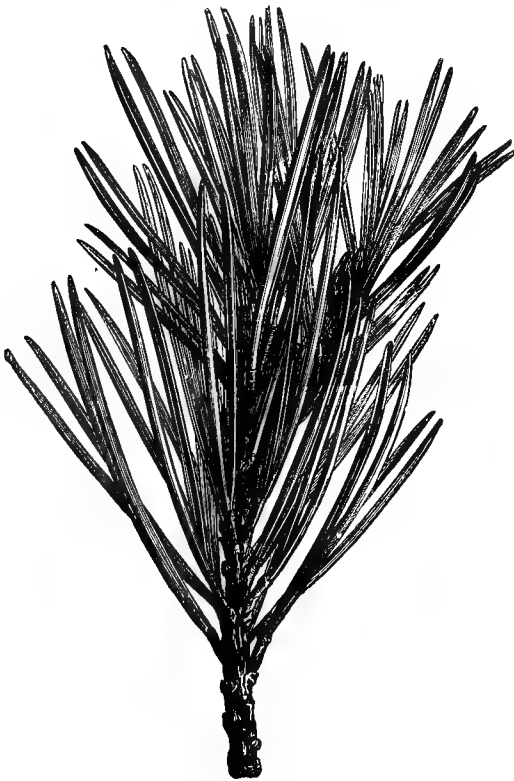


FIG. 320.—PINUS CONTORTA.

long and rather slender branches and narrow, stiff, bright green leaves. It is indigenous to North China, and very handsome in the landscape. *P. Cembra* (Swiss Stone Pine) is of compact growth and very attractive. It is of pyramidal



FIG. 319.—*PICEA PUNGENS GLAUCA*.

habit, and in a young state rather slow in growth, but when properly established it grows fairly rapidly. *P. contorta* (*P. Bolanderi*, *P. Boursieri*) (Fig. 320) is a medium-sized handsome tree from California, with a straight, stout trunk, short branches, and deep green leaves. It thrives well in damp soils, and owing to the short spread of its branches it can be recommended for gardens of restricted areas. *P. Coulteri* (*P. macrocarpa*) succeeds admirably on poor soils, and is amongst the most ornamental of Pines. It is a Californian species, distinct, and free in growth, with long, strong, horizontal branches and long, narrow, glaucous leaves. A radius of about 30ft. should be allowed for this tree to reveal its true character.

P. excelsa (Bhotan Pine) (Fig. 321), an elegant Himalayan species, is quite hardy, and has an erect trunk with long, spreading branches, feathered to the ground. Its pendulous leaves are long and bluish-green in colour. It requires plenty of head-room, and succeeds best in light soil. Shelter from east wind is important. *P. halepensis* (*P. abchastica*, *P. maritima*, *P. Pithyusa*), the Jerusalem Pine, prefers shelter from piercing winds. It is a medium-sized tree of pyramidal outline, with slender branches and long pale green leaves. For planting in the warmer counties, especially in mari-

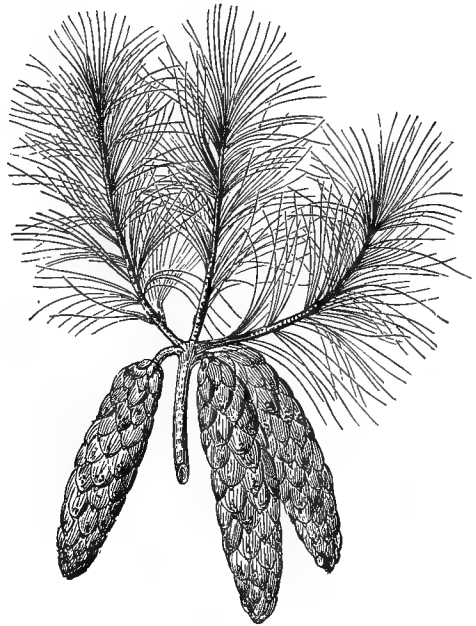


FIG. 321.—PINUS EXCELSA.

time districts, this species is well adapted. *P. insignis* (*P. radiata*), the Monterey Pine, is a particularly handsome Californian species, fairly hardy, and free in growth, having numerous stout branches, closely packed with glossy green leaves. It is a splendid lawn tree, and like the last-named should be shielded from cold winds. It is spring tender, for which reason it should be planted in a cold soil, and in a situation not favourable to early growth. A capital Pine for the sea coast. *P. Jeffreyi*, also a Californian species, forms a tall, handsome tree, with a rather spreading head, bearing

some resemblance to *P. ponderosa*. Its leaves are about gin. long, and are of a charming glaucous tint. *P. Lambertiana* (Sugar Pine) is a gigantic species, quite hardy, and a splendid park tree. It is rather rare, but succeeds admirably in sandy soil. In North America this Pine is a noble feature in the landscape. *P. Laricio* (Corsican Pine) is indigenous to the South of Europe, and extends to the West and North of Asia. It is of rapid growth, with a tall, erect trunk. It thrives in all soils and exposed situations, and is valuable for ornamental planting. *P. L. austriaca* arrests attention by reason of its bold and picturesque effect; although one of the commonest sorts, it is

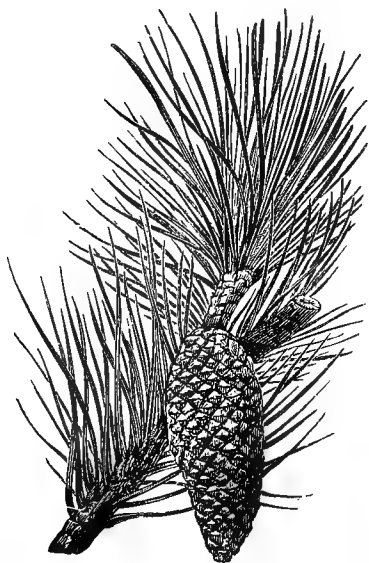


FIG. 322.—PINUS PINASTER.

one of the hardiest and best for serving as a breakwind to tender trees and shrubs, and grows freely in soft soils; it is a good seaside Pine. *P. L. Pallasiana* (*P. caramanica*) is, as an ornamental tree, even finer than the type. It is a rapid grower, with a straight trunk, horizontal branches, and deep shining green leaves. *P. L. pygmaea* is much slower in growth than the type, and differs also in its dwarf, compact, pyramidal habit. *P. monticola* is suitable for both the park and the garden. It grows upwards of 70ft. high, with an erect trunk and short branches, clothed with rich green leaves. It prefers a damp soil. *P. muricata* (*P. Edgariana*) is a medium-sized massive tree, with spreading branches and dark green foliage. It is very distinct, and of easy culture, thriving

better in dry, sandy soils than the majority of Pines.

P. Pinaster (Cluster Pine) (Fig. 322) is indigenous to the Mediterranean shores, and when planted in sandy soil forms a splendid specimen. It is a noble tree for shelter, and one of the best for the sea coast. *P. Pinea* (Stone or Parasol Pine) (Fig. 323) is rather slow in growth, forming a picturesque round-headed tree. It has been cultivated in this country for upwards of three centuries, but is rather tender, and has not been extensively planted. Although of little use as a timber tree, it is well adapted for ornamental planting in the warmer counties. It succeeds best in sandy soil, and should be shielded from piercing winds. *P. Strobus* (Weymouth Pine), a native of North

America, grows vigorously in cool moist soil. It is distinct and very handsome. Its leaves are pale green with silvery lines beneath. *P. sylvestris* (Scotch Fir) is a handsome, very hardy Fir, too well known to need more than passing reference. It thrives on all soils, is of rapid growth, and very cheap. *P. s. aurea* (Golden Scotch Fir) is very attractive, especially in winter; it is a slow-growing variety, and although its leaves are usually of a pale green shade in summer, they assume a rich yellow in winter, at which season it is unquestionably the brightest of golden-coloured Conifers. An open situation should be afforded it, and a dry rather than a moist soil suits it best. *P. s. fastigiata* (Fig. 324) is conspicuous for its Lombardy Poplar-like habit, and is worthy of recognition. *P. s. globosa* is a small, very compact, much-branched tree, with glaucous leaves, distinct, and very slow in growth. *P. Thunbergi* is a Japanese species, and rather rare in this country. It is a vigorous grower, with short, stout branches, and stiff deep green leaves; it prefers a sheltered situation. *P. T. variegata* differs from the type in the lower portion of its leaves being marked with yellow, a constant colour which imparts a distinct appearance to the tree.



FIG. 323.—PINUS PINEA.

PODOCARPUS.—This is a large genus, scattered over Australia, China, Japan, Africa, &c. The majority of the species are, however, not sufficiently hardy to withstand the open air in this country. They succeed best in a moist, loamy soil, but water should not become stagnant at the roots. A position screened from east winds should, if possible, be selected. Those species here mentioned are the hardiest and most serviceable for the garden.

P. alpina, a Tasmanian shrub of humble growth, is very rare in this country, even in good collections of Conifers. Its

hardiness is beyond question, and by reason of its dwarf habit it should be planted in front of taller-growing shrubs or, better still, in the rock garden, where its

trailing growths, often 3ft. in length, and clothed with small, linear, deep green leaves, having a glaucous hue beneath, present quite a cheerful appearance, even in winter. When the main growth is supported by a stake it rises to a height of several feet.

P. chilina, introduced from the Andes of Chili in 1853, forms a loose, much-branched, free-growing, small tree. Its long branches are clothed with narrow shining green leaves, glaucous below. A useful species for planting on the outskirts of the lawn, as it is quite distinct, ornamental, and thoroughly hardy.

PRUMNOPITYS ELEGANS.—Although this distinct-looking Conifer has been cultivated here for about forty years it seems to have been planted sparingly. It was discovered on the Andes of Valdivia, Southern Chili, at an elevation of 5000ft., where it grows to a height of 40ft., but in England it is not much more than a large bush or small tree of dense pyramidal habit. A well-drained, loamy soil, to which has been added a quantity of good leaf-mould, and a sheltered position, suits it admirably, and in such a situation it makes a magnificent specimen.

PSEUDOLARIX KÆMPFERI (*Larix Kæmpferi*) (Fig. 325), the Golden Larch, was discovered by Mr. Fortune in North China, in 1848. Besides being distinct and thoroughly hardy, it is of great value for the pleasure-ground. It is of rather slow growth and pyramidal habit. Its horizontal,



FIG. 324.—PINUS SYLVESTRIS FASTIGIATA.

spreading, fan-shaped branches are clothed in spring and early summer with soft yellow leaves, which towards autumn assume

a beautiful shade of yellow, deepening to bronzy-brown before they fall. This species is also attractive in winter on account of the brownish-coloured bark of the young shoots, which at that season are seen to excellent advantage.

The Golden Larch cannot be depended upon to reproduce itself from seed. The usual method of propagating it is by grafting in early February on stocks of the Common Larch (*L. europæa*). Select young, well-ripened scions, about the thickness of a lead-pencil. After they have been secured to the stock, place them in a moderately warm case, and when a union has taken place, remove to more airy quarters.

PSEUDOTSUGA DOUGLASII (*Abies Douglasii*, *Picea Douglasii*, *Tsuga Douglasii*).—

Few Conifers are better known or more extensively planted than the Douglas Fir, introduced to this country from North America, in 1827. It is a splendid tree for the park and landscape, but shelter from east winds is advisable. It is of rapid growth, and forms a pyramidal tree, varying in height according to soil and position. The branches are horizontal, and the small branchlets are supplied with rich green leaves. Its pendulous and attractive cones (about 3 in. long) are borne freely on medium-sized trees. *P. D. brevifolia* bears some resemblance to the Silver Firs, and is worthy of extended culture; it is of pyramidal habit, and of slow growth, with polished green leaves. *P. D. glauca* is a pretty variety, of close, compact habit, and with beautiful glaucous leaves; it grows freely, keeps its colour well, and is thoroughly hardy. *P. D. pumila*

(Colorado variety) is a distinct variety of neat, compact growth. Where low-growing Conifers are required, this one should find a home. *P. D. Stairii*, which originated at Castle Kennedy,

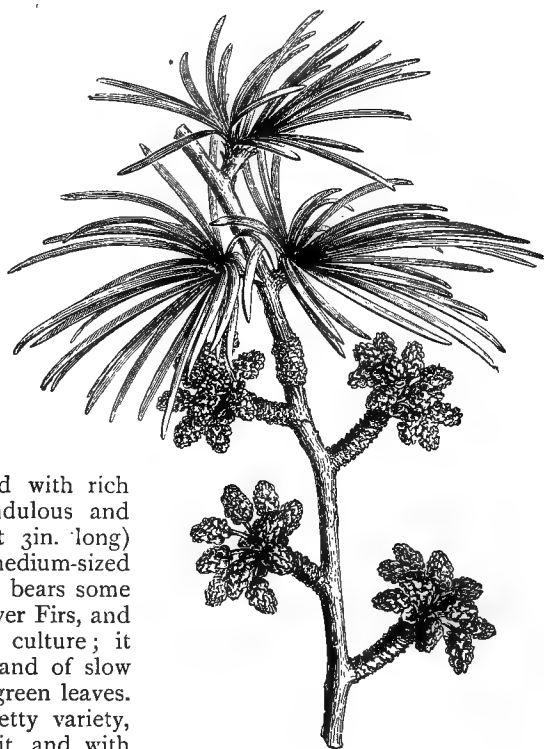


FIG. 325.—PSEUDOLARIX
KÄMPFERI.

the Scottish seat of Earl Stairs, is a showy, free-growing variety, but less vigorous than the type. In spring the leaves are nearly white, and as summer advances they gradually change to a pale green hue; a distinct and beautiful lawn tree. *P. D. taxifolia* is a handsome variety, with rather short upright branches, the branchlets being clothed with rich green leaves; it is a sturdy grower, and is suitable for positions where the lofty-growing type would be inadmissible.

RETINOSPORAS.—See Cupressus.

SCIADOPITYS VERTICILLATA (Umbrella or Parasol Pine).—This is one of the handsomest and most distinct of Japanese Conifers (Fig. 326). The first plant received in this country came from Japan, in 1853, but it was so weakly that it soon died. About eight years later a quantity of seeds were sent to Messrs. Veitch, of Chelsea, and these germinated and grew into beautiful plants. In its natural habitat it grows to a height of 80ft., but in this country few specimens are as yet above 20ft. high. It is thoroughly hardy, but dislikes cold winds, especially when growth is tender. This species is somewhat slow in growth, and delights in peaty soil, with which is incorporated a quantity of leaf-mould. An eastern exposure should be avoided, but the greatest drawback to its successful culture is a cold, wet, badly-drained soil, as anything like stagnation at the roots is fatal to it. As it does not transplant well, great care should be taken in the preparation. A good ball of earth should be attached to the roots, and the latter protected from drying winds by placing mats or similar material round the ball. After planting is completed, water should be given to settle the soil about the roots, and an occasional damping overhead will induce healthy growth. A yearly top-dressing of leaf-mould will increase the vigour of the plants. *S. verticillata* is well adapted for planting as single specimens on the lawn, and is serviceable for all kinds of decorative work. It forms a bold, symmetrical specimen, with horizontal, spreading branches, and long, narrow, leathery leaves of the deepest green, produced in whorls of from thirty to forty at the tips of the growths, and bearing some resemblance to an open umbrella; hence the popular name.

SEQUOIA (*Wellingtonia*) GIGANTEA.—This, the tallest tree suitable for outdoor culture in these isles, has become well known, and bears the appropriate name of Mammoth Tree, on account of the great size which it attains. The Californian *Wellingtonia* forests are amongst the most imposing in the world. There *S. gigantea* towers to a height of upwards of 360ft. It is a handsome tree for the park, and delights in a good deep loam, thoroughly well drained, and in a situation open yet shielded from piercing winds and spring frosts. *S. gigantea* never makes satisfactory progress



FIG. 326.—*SCIADOPITYS VERTICILLATA*.

when planted near the drip of trees, or on cold, wet soil, and cannot be recommended for planting in towns, as it dislikes a smoky atmosphere. It is of conical outline, with a straight trunk, rather short branches, and small, spirally-arranged, scale-like, glaucous leaves, and as the young growths are decidedly glaucous, its beauty is much enhanced. The Mammoth tree is best propagated from seeds, as plants raised from cuttings do not make such good leaders as those raised from seeds. *S. g. aurea* is not so vigorous as the type, and as the yellow variegation is not constant, it cannot be recommended for general planting.

S. sempervirens (*Taxodium sempervirens*) (Fig. 327).—This is the Californian Redwood, and as regards size ranks next to *S. gigantea*. Its erect trunk, covered with brownish-red bark, and its rather long, drooping branches, with flat deep green leaves, are both distinct and pleasing. It has the somewhat objectionable habit of growing rather late in the season, consequently the young growths are sometimes unable to withstand early sharp frosts; it is of fairly rapid growth in most soils, and forms a charming tree of pyramidal habit for the park. *S. s. albospica*, though not so free in growth as the type, is distinct; it is of more compact habit, and has glaucous leaves; the young branchlets, as well as a proportion of the leaves, are speckled with creamy-white. *S. s. gracilis* differs from the foregoing in its more elegant and compact habit, the branches being horizontal, with numerous drooping branchlets and rich green leaves; it is very distinct, and a beautiful tree for the lawn.

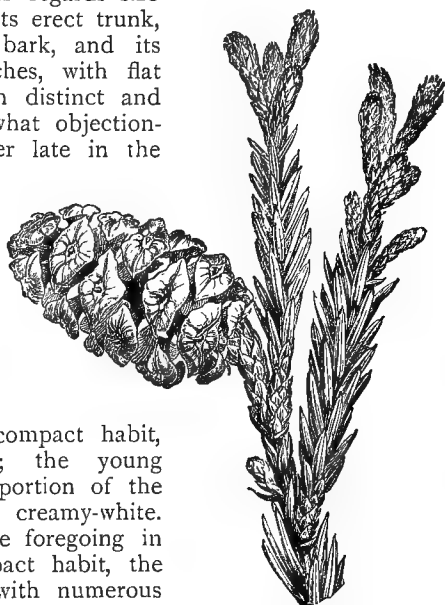


FIG. 327.—SEQUOIA
SEMPERVIRENS
VAR.

TAXODIUM DISTICHUM (*Cupressus disticha*).

—This is a lofty North American tree, and well known as the Deciduous Cypress. It has a straight trunk, and slender, feathery branches, clothed with soft green leaves, which towards autumn assume a dull red shade, and at that season the tree is very picturesque. The highly-coloured bark imparts a distinct appearance, even in winter. The Deciduous Cypress is quite hardy, rather slow in growth, and delights in a cool, moist soil. It is admirably adapted for planting by the margins of lakes and streams, but shelter from cold winds should be afforded.

TAXUS BACCATA (English Yew) (Fig. 328) is familiar to everyone. Thoroughly hardy, and distinct from all other trees, it is too well known to need more than passing reference. Some of its varieties are, however, far from familiar, and attention will be drawn to a few of the most distinct and meritorious. *T. b. adpressa* is of compact growth, with spreading branches and dark green leaves; it is very ornamental and useful for small gardens. *T. b. a. variegata* is a prettily-marked variety of much merit, and worthy of extended culture; the variegation is constant. *T. b. albo-variegata* is of satisfactory growth; the silver-edged leaves are touched with yellow in winter, at which season it is very attractive, and adds colour to the shrubbery.

T. b. argentea is variable in the colour of its foliage, and should always be planted in an open spot to bring out its true leaf colour. *T. b. aurea* is an attractive variety, of compact, pyramidal habit, and is easily grown; it possesses, too, golden-coloured leaves, and the tips of the branchlets are stained with yellow. This is a fine plant to brighten the shrubbery during winter, and is useful also for winter-bedding and window-boxes. *T. b. cheshuntensis* forms a distinct and pleasing variety of erect growth, with short glossy green leaves; it is freer in growth than the Irish



FIG. 328.—TAXUS BACCATA.
(Fruit and Flower in different stages.)

Yew. *T. b. elegantissima* is a showy variety for the garden, of free growth, and neat, compact habit, and its leaves are distinctly edged with cream-white; it keeps its colour well even when planted in partial shade. *T. b. erecta* (*T. b. empetrifolia*) should be represented where the type would be inadmissible on account of its widely-spreading branches; it is compact and upright in growth, free, and quite distinct. *T. b. ericoides* (Heath-like Yew) is erect, neat, and valuable for the rock garden; its stem is covered with brownish-red bark, and the leaves are very small and deep green. *T. b. fastigiata* (Irish Yew) is conspicuous for its upright, close habit of growth;

it is useful for gardens of limited size, and is pleasing when planted by the side of walks. *T. b. f. argentea* is similar in habit to the last-named, but its leaves are striped with creamy-white, which colour deepens with age. *T. b. f. aurea*, also of close habit, has a portion of its leaves and growths marked with golden-yellow. *T. b. fructu-luteo* is an attractive variety on account of its fruit, which is yellow, whereas in the type it is red, thus affording a welcome change. *T. b. glauca* differs from the type in the under-sides of the leaves being of a glaucous hue; it is a vigorous form. *T. b. nana* is a dwarf variety, well adapted for the rock garden; it is of compact and rather spreading dense growth, with glossy green leaves. *T. b. pyramidalis* is a very ornamental variety, differing from the type in being more compact and erect in growth. *T. b. Washingtoni* is a beautiful variegated form, free in growth, and its leaf-colouring is constant. *T. cuspidata* is handsome, vigorous, and spreading, with deep green leaves. It is serviceable for lawns.

THUYA.—In the *Thuya* genus are now included *Thuyopsis dolabrata* and *Biota* of gardens, and they form an important section, suitable alike for small and large gardens. They are natives of North America, China, and Japan, perfectly hardy, easily accommodated, and differ much in habit, size, and leaf-colour.

T. dolabrata (*Thuyopsis dolabrata*) is a distinct Japanese tree, admirably adapted for planting on lawns. It is of pyramidal, bushy habit, and whilst young is of rather slow growth. The flat, scale-like leaves are bright green above and glaucous beneath. This species is well suited for small gardens, also for growing in pots or tubs for placing in corridors, &c. It delights in a moist, well-drained soil and shady position beyond the influence of cold winds. *T. d. variegata* is a pretty variegated form, distinct, and of good growth.

T. gigantea (*T. Lobbi*, *T. Menziesii*), introduced from North America nearly fifty years ago, has been used extensively by the landscape gardener. It is of rapid growth, and very ornamental, with a trunk as straight as an arrow, furnished with numerous short branches down to the ground. In proportion to its height the branches are very short, giving it a compact, close habit, and adapting it to gardens of limited extent. *T. g. compacta* is a very handsome Conifer, and as its varietal name indicates, is of compact growth. *T. g. plicata* (*T. occidentalis plicata*) is similar in habit to the type, but not so vigorous and more bushy. It is of great decorative value, and thrives in poor soils and exposed situations. *T. g. p. lutea* is of excellent habit, free in growth, and by reason of the rich yellow tint of its foliage, is worthy of recognition. It is very attractive in winter.

T. japonica (*T. Standishii*, *Thuyopsis Standishii*), one of the most ornamental of Thuyas, should be represented in gardens

where hardy Conifers are admired. It is vigorous in growth, with horizontal branches, pendulous branchlets, and brownish-yellow leaves which become bronze-tinted in winter. The brown-coloured stem is also conspicuous in winter.

T. occidentalis (American Arbor Vitæ).—Although this cannot be called an ornamental tree of the first water, it is useful for hedges, and its green foliage is tinted with brown in winter; it is of rather irregular growth, and forms a medium-sized tree in moist soils. *T. occ. aurea* is the best of the golden-leaved Thuyas, and is valuable for giving colour to the shrubbery; it makes a beautiful lawn tree, and its golden-coloured foliage is touched with bronze in winter. *T. occ. Dicksoni* is of pyramidal habit, rather sparsely branched, and free in growth; in spring and summer its leaves are rich green, and in winter they are stained with bronzy-yellow. *T. occ. Ellwangeriana* is of all the close-habited Thuyas perhaps the most useful and graceful. It is of dense dwarf habit, with numerous slender branches of upright tendency, feathery branchlets, and scale-like leaves; good for lawns and small gardens. *T. occ. erecta viridis* is bushy, much-branched, neat in growth, and very distinct. *T. occ. globosa compacta* is more vigorous than *Ellwangeriana*, but less graceful; it is, however, compact and ornamental. *T. occ. Hoveii*, though of rather irregular habit, is entitled to the planter's consideration, its numerous branches and flat branchlets being clothed with rich green foliage. *T. occ. Vervaeana* has not been planted extensively, although very attractive, and well adapted for the lawn; it is of elegant growth, and its yellowish leaves are touched with bronzy-yellow in winter. *T. occ. Wareana* (*T. caucasica*) is vigorous, compact, and superior to the type; its short horizontal branches are clothed with deep green leaves, and its sub-variety, *lutea*, a yellow-leaved form, is effective too.

T. orientalis (*Biota orientalis*) (Fig. 329), the well-known Chinese Arbor Vitæ, is a native of Japan, as well as of the northern regions of China, and was introduced into England about 150 years ago. It is a useful and free-growing Conifer, quite hardy, and thrives well in ordinary soil, provided suitable drainage is provided. It forms a dwarf tree, upwards of 20ft. high, of pyramidal dense habit, and, from an ornamental point of view, is much superior to the American Arbor Vitæ, *Thuja occidentalis*. The following are some of the most distinct and handsome varieties: *T. or. argenteo-variegata* is conspicuous for its silver variegation, but, in order to preserve its true character, it should have a sunny spot, as when planted in the shade the variegation is apt to disappear. *T. or. aurea* (*T. aurea*, *T. compacta aurea*) is a charming shrub of dwarf, dense habit, the young growths being wholly yellow, which gradually changes to a greenish tinge with age. *T. or. aureo-variegata* is of Continental origin, and a taller grower than the last-named, with slender branchlets, the



FIG. 329.—*THUYA ORIENTALIS*.

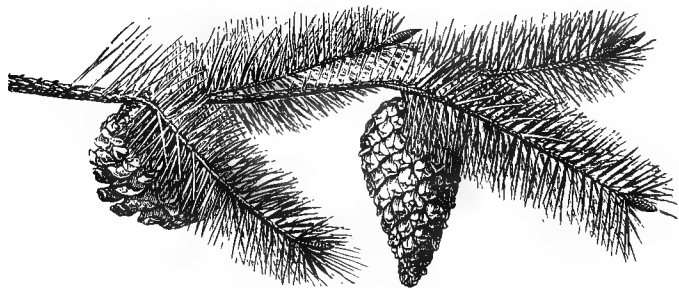
leaves of which are pale yellow. *T. or. compacta* is a distinct and pleasing variety of dwarf habit, and its bright green leaves give it a cheerful appearance even in the depth of winter. *T. or. elegantissima* is another beautiful variety, of erect, compact habit, with yellow foliage. This variety originated in a bed of seedlings at the Tooting nursery of the once famous nurserymen, Messrs. Rollinson. *T. or. ericoides* (*Retinospora ericoides*) is a gem amongst rock-garden Conifers, as it presents an attractive appearance at all seasons of the year; in spring the leaves are tender green, and towards autumn they change to a brownish-violet shade. It forms a conical shrub rarely exceeding 3ft. high, and the short branchlets are crowded with narrow leaves, glaucous on the under-sides; an excellent sort for winter bedding. *T. or. falcata* varies in height from 8ft. to 12ft., is quite distinct, and deserving of extended culture. *T. or. gracilis* is noteworthy on account of its slender, elegant growths, compact habit, and free growth. *T. or. meldensis* (*Retinospora meldensis*), a supposed hybrid between the Virginian Red Cedar and the Chinese Arbor Vitæ, is of loose, pyramidal habit, the slender branches being clothed with short glaucous green leaves, which in autumn assume a brownish-red, and retain that colour until spring. It is not, however, sufficiently ornamental to be recommended for general planting. *T. or. minima* deserves a place in the rock garden. It forms a dense, low bush, and its bronzy foliage is attractive in winter. *T. or. semperaurescens*, of French origin, is unquestionably the most distinct golden-leaved Thuya, and one of the most useful of its class for the garden, forming a neat, globular bush. It is well adapted for winter-bedding, and useful for window-boxes, as well as for pot culture for winter decoration.

TSUGAS (Hemlock Firs).—These form a small group of about six species of Conifers, of much value for decorative planting. North America is the headquarters of the family, and they are all of elegant growth, hardy, and delight in moist soil and an open situation, but the position must be sheltered from east winds. They are splendid lawn trees, and should be more frequently planted.

T. Brunoniana (*Abies Brunoniana*, *A. dumosa*), from the central portion of the Himalayas, cannot, unfortunately, be recommended for general culture in the British Isles, but in the South of England it makes a really handsome specimen. It forms a dense bush or small tree, with elegant drooping branches, and when bearing its small-pointed, glaucous-coloured cones, is an object of great beauty. *T. canadensis* (*Abies canadensis*), a well-known member of the family, is a beautiful decorative tree, thoroughly hardy, and of excellent habit. Its slender branches and drooping branchlets are clothed with light green leaves, glaucous on the under-sides. The attractive cones are

small and borne abundantly. *T. c. albo-spica* is a showy variety with variegated foliage, distinct, free in growth, and of more bushy habit than the type. The leaves are pale green and creamy-white, and in winter are tinged with violet; a gem for the lawn. *T. c. milfordensis* is a compact variety, dwarf, and very attractive. *T. caroliniana* (*Abies caroliniana*) is of bushy, pyramidal habit, free in growth, and distinct from *T. canadensis* by reason of its stouter branches, deep glossy green leaves, and larger cones. In North Carolina it grows to a height of 50ft. *T. Mertensiana* (*Abies Albertiana*) is an elegant, hardy Conifer, of pyramidal habit, more rapid and vigorous in growth than *T. canadensis*. Its long spreading branches and feathery branchlets are clothed with small deep green leaves, and it is very attractive when bearing its numerous small cones. *T. Pattoniana* (*Abies Pattoniana*, *A. Williamsonii*) is very beautiful, and well adapted for planting on lawns. Its trunk is erect, its branches are short and horizontal, and its small branchlets clothed with light green leaves. *T. P. glauca* is a handsome variety, and differs from the type in its more drooping branches and lovely glaucous leaves. This is also a beautiful lawn tree. *T. Sieboldi* (*Abies Tsuga*, *Tsuga diversifolia*), the Japanese Hemlock Fir, is an excellent sort for planting on the fringe of the lawn as well as in small gardens. It is of pyramidal habit and neat growth, its spreading, fan-shaped branches being well clothed with short grass-green leaves, glaucous on their under-surface. Both distinct and pleasing in appearance.

WELLINGTONIA GIGANTEA.—See *Sequoia gigantea*.



PINUS SYLVESTRIS.



12.—*On Ferns.*

BY THE AUTHOR OF THE "BOOK OF CHOICE FERNS."

ALTHOUGH the present work is essentially devoted to the practical part of gardening, it may not be out of place to remind readers that, from the numerous interesting scientific discoveries for which the present century is justly famous, it is certain that Ferns and Lycopods formed the earliest vegetation of our Globe. It has been proved beyond doubt that the formation of coal, during the carboniferous period, was unquestionably due to the existence of Ferns and Lycopods, which, in those days, attained really gigantic dimensions, since well-preserved fossil specimens of these plants, measuring 95ft. in height and 30ft. in circumference, have been found in various collieries here and on the Continent. The Equisetums, or "Horsetails," of the present day found in this country are but diminutive representatives of another genus of flowerless gigantic trees which greatly helped the formation of the combustible materials, bituminous coal and anthracite. Correvon, in his interesting dissertation, "*Les Fougères dans les Âges Géologiques,*" tells us that in coal-mines and in slate-quarries over 900 fossil species of Ferns, divided into more than 160 genera, have already been collected and determined. The species in existence then have all disappeared, and have been replaced by plants more modest in appearance and of smaller dimensions which, although deprived of the gorgeous colours particular to flowering plants, have, so far as grace,

elegance, and diversity of form are concerned, no equal in any other portion of the Vegetable Kingdom.

One of the most striking points in connection with the history and the existence of Ferns all over the Globe, and one which, in artificial cultivation, deserves to be taken in consideration, is the extremely wide range of their geographical distribution. We know of no other order of plants the representatives of which are found in such varied positions and dissimilar aspects, or which show such different habits of growth. From the Tropics, where they exist in profusion, to the Arctic regions, as far north as Greenland, Ferns are found in greater or less quantities, some at an altitude varying from 10,000ft. to 12,000ft., and others at the sea-level, which knowledge actually indicates that in artificial culture while certain kinds are perfectly hardy in this country, others require the protection of the warm house. In their native habitats, certain exotic species affect the most exposed and sunny situations, much in the same way as the Scale Fern (*Ceterach officinarum*), the Maidenhair Spleenwort (*Asplenium Trichomanes*), and the Wall Rue (*Asplenium Ruta-muraria*) do in this country. Others only thrive under the influence of dense shade; while others, again, require constant moisture at the roots, with their heads in full exposure to the action of the light, just as is the case with some of our common British species.

GEOGRAPHICAL DISTRIBUTION.—Another important feature in connection with Ferns in general is the singularly cosmopolitan character possessed by certain kinds which, though generally given and accepted as being of British origin, are also found wild in various, and, in some cases, in very distant parts of the Globe. Thus, for instance, most of our Spleenworts, or Aspleniums, are also found throughout the European Continent, Northern Asia, North and South Africa, in North America, in various parts of India, &c. The same may also be said of our common Maidenhair Fern (*Adiantum Capillus-Veneris*), which is found wild nearly all over the world. Even our own Royal Fern (*Osmunda regalis*) is found growing plentifully on the banks of rivers and streams on the Neilgherries and other high mountains in India, while the common Shield Ferns, *Polystichum angulare*, *Lastrea spinulosa*, and others, are also natives of many parts of India and of North America; and another example of the cosmopolitan character of Ferns is well shown in the delightful violet-scented, small-growing *Lastrea fragrans*, which, although originally introduced into this country from North America, is found to be abundant on some of the Japanese mountains.

It is remarkable also that, to a certain extent, each country appears to produce Ferns forming natural special sections. Thus, for instance, we find that North America supplies us with species mostly of a deciduous character, from the tiny-growing *Pellaea Breweri* to the gigantic *Struthiopteris pennsylvanica*, *Onoclea sensibilis*, *Adiantum pedatum* (Fig. 330), various *Osmunda*, *Dicksonia punctilobula*, and *Woodsia areolata*. It is from Japan that, on the contrary, the greatest part of the hardy and semi-hardy evergreen kinds are native. We note among the most



FIG. 330.—ADIANTUM PEDATUM.

popular species known such general favourites as *Cyrtomium falcatum* and *C. anomophyllum*, *Lastrea atrata*, *L. opaca*, *Polystichum setosum*, and *P. Tsus-Simense*, all of which are not only evergreen, but have a peculiarly glossy appearance and leathery texture—characters which are shared by very few of our native Ferns and by scarcely any other exotic kinds.

Tree-Ferns found in the East and West Indies and South America are, with a few exceptions, conspicuous by their comparatively slender stems, whereas those, or most of those native

of New Zealand, Australia, and Tasmania, have stems of a comparatively thick nature, such as those of the deservedly-popular *Dicksonia antarctica*, of the Silver Tree-Fern, *Cyathea dealbata*, *C. medullaris* (Fig. 331), and a few others.



FIG. 331.—CYATHEA MEDULLARIS.

It is worthy of notice that the power of producing crested, depauperated, and other characters peculiar to forms of original species, either of a deciduous or of an evergreen nature, is much more developed among Ferns growing spontaneously in England than among those found in any other country, as it is a fact that scarcely a single species of Fern native of the British Isles has retained its normal characters throughout: all have become more or less addicted to variations. That power of producing variable forms, either due to the influence of the atmosphere or to other causes, can hardly be ascribed to the effects of cultivation, as most of the crested, undulated, multifid, and other forms of *Lastrea Filix-mas*, *Athyrium Filix-femina*, *Polypodium vulgare*, *Polystichum angulare*, and *Scolopendrium vulgare* have usually been met with in a wild state in some part or other of the United Kingdom. Even the production of the crested forms of exotic species, such as *Adiantums*, *Gymnogrammes*, and *Pteris* may be said to be a monopoly of this country.

VARIETY IN FERNS FROM A DECORATIVE POINT OF VIEW.—Like any other order of plants Ferns have their pigmies as well as their giants, but the differences as regards dimensions are much more marked in them than in most if not in all others. While

some of the gigantic Tree-Ferns attain some 50ft. in height, others seldom exceed a few inches; and, as regards the fronds themselves, although in the case of certain Polypodiums, Trichomanes, and others, these organs are only an inch or even less, in others they reach fully 15ft. in length. Again, some kinds affect a bushy and symmetrical form, whereas others are provided with rhizomes or stems which naturally grow many yards in length, twining round other plants or climbing to the top of tall trees.

Although in the majority of cases their foliage is of a uniform green colour, yet either in the course of development, or when fully matured, their fronds, in some cases entire, and in others more or less finely divided, exhibit a most extensive variety of shades, ranging from the dark colour peculiar to the Hard Fern, *Blechnum Spicant*, or to the Soft Prickly Shield Fern, *Polystichum angulare*, to the soft pea-green tint of our common Oak Fern, *Polypodium Dryopteris*, or the lovely *Adiantum trapeziforme* (Fig. 332). Others, like the common *Polypodium aureum*, a deservedly popular, strong-growing kind, or the small, dwarf-growing *P. glaucophyllum*, retain all through



FIG. 332.—ADIANTUM TRAPEZIFORME.

their existence a most pleasing bluish tint which forcibly reminds one of the foliage of *Eucalyptus globulus*. Others, again, although quite green when mature are, during their development, of most brilliant bronzy or metallic tints. This peculiar character is particularly noticeable among the *Adiantums*, some of which, like *A. Veitchii*, *rubellum*, *tinctum*, *macrophyllum*,

and others, are endowed with most gorgeous hues, turning from a delicate pink to a bright magenta, and finally changing to a glaucous green tint of exquisite softness, before assuming the uniform and permanent green colour which they retain to the end of their existence. The same changes of colours also apply



FIG. 333.—DOODIA ASPERA MULTIFIDA.

to *Blechnum occidentale*, *Doodia media*, and *D. aspera multifida* (Fig. 333), to the striking *Didymochlaena truncatula*, the ever-charming dwarf-growing *Lomaria L'Hermieri*, the handsome, large growing *Davallia polyantha*, and many other species of small or large habit. To those who might object that the variations in colour above referred to only belong to the early part of the vegetation of the plants, it may be answered that, as Ferns of an ever-green nature are growing nearly all the year round, the

objection is not of great consequence, as there is always a variety of colour to be seen and admired wherever a certain quantity of these plants are grown.

CULTIVATION.—For their cultivation, Ferns may be divided into two sections, viz., the hardy kinds, which, in this country succeed best when grown out of doors, and the exotic kinds, which require glass protection. Their habits and modes of growth are so varied, affecting as they do, in their natural state, so many different positions, that their successful treatment depends in a great measure upon the imitation of their natural conditions. For instance, the species having an upright or slowly-creeping stem, usually sending their roots further down than others, and therefore requiring a greater depth of soil, are best adapted for pot culture. The species which are provided with rhizomes, and also with stolons, require to be grown either in pans or on rockwork, or, again, on dead Tree-Fern stems, or in hanging baskets.

As a general rule, with the exception of comparatively few kinds which prefer exposed and airy situations, we find that in their native habitats the majority of Ferns are found forming a sort of undergrowth in woods and forests, clinging to the sides of rocks, or again growing by the sides of brooks or rivers, but usually under trees, which shelter them from the violence of strong winds, and also protect them from the action of the strong rays of the sun. The influence of this protecting agency is such that when the same kinds are found growing accidentally in positions exposed to the direct action of the elements, they hardly appear to be the same plants. It is evident, therefore, that whether Ferns are grown in pots or in the open ground, these natural conditions should, as far as possible, be imitated.

According to the requirements, or to the taste of the grower, most, if not all, Ferns, hardy or exotic, may be grown with equal success either in pots or when planted out; but, whenever convenient, the latter way is by far the more satisfactory, inasmuch as it gives a much greater scope for effect. Moreover, when once put in the places which they are intended to occupy, Ferns require a great deal less attention than when grown in pots.

HARDY FERNERY.—As Mr. J. Birkenhead, in his excellent popular work, "Ferns and Fern Culture," judiciously remarks, "Hardy Ferns are easy to manage—in fact, there are no other plants so easy of culture, and certainly none which present so large a variety of graceful habit and curious forms." It may not be out of place to remark here that there are many places in gardens where flowering plants cannot live, and these are well adapted for the cultivation of Ferns, which convert uninteresting spots into a source of pleasure. Whenever practicable, the hardy fernery should be situated in a naturally moist and cool spot, and, strong light being in most cases objectionable, the neighbourhood of tall, deciduous trees should have preference over all other places, as in this case the plants would be little exposed to the sun, and protected from strong winds. A position with a north aspect is the one most suitable, the plants having then a maximum of light without being spoiled by the sun. The hardy fernery should be constructed of stone, in the form of rockwork, either on the level ground or as a ravine, excavated to a greater or less depth. In whatever form the fernery is arranged, drainage is of the utmost importance, and should be provided for the ready escape of surplus moisture. It should be borne in mind that, in the formation of the outdoor fernery, it is most essential to study the requirements and comfort of the plants in preference to showing the building of the rockwork, and to provide against the disastrous effects of the high winds, which are injurious to all Ferns. Besides the friendly shelter of neighbouring trees, as stated

elsewhere, the tenderest kinds may also be protected by the judicious grouping of the more robust sorts, which, when planted in masses, considerably help in procuring the comfort necessary to the well-being of the smaller and more delicate species.

In planting the hardy fernery, the distribution of the evergreen and of the naturally deciduous species should be carefully considered, and the plants disposed in such a way as to avoid at any time a bare appearance, and allow the whole place to remain covered with foliage during the resting season. The introduction of North American and certain Japanese Ferns, which have proved quite hardy under our climate, has materially added to the great diversity of size and habit as represented by the British species and their numerous varieties. The plantation of the hardy fernery may safely take place at any time from October to March; but if it is tolerably sheltered it is preferable to plant in autumn, as root-action in most hardy Ferns commences long before there are any visible signs of vegetation, and in that case, the plants moved in the autumn will, if kept sufficiently moist during the winter, make a quantity of fresh roots, upon which the new growth is mostly dependent. If, however, the place where the hardy fernery is situated is exposed, it is preferable to plant only in the spring, and just before vegetation commences, say about the end of March, as the plants are then full of vigour, the ascension of sap enabling them to take every advantage of the new soil, the nutritive properties of which are readily assimilated by the roots. Special attention to the nature of the plants employed in the plantation of the hardy fernery is indispensable, and of much greater consequence than the preparation of the compost or material in which the plants are to grow, and which, for general purposes, consists of two parts of fibrous loam, one part of half-decayed leaf-mould, and one part of coarse silver-sand.

In the following list an endeavour has been made to place in their respective positions the British and the hardy exotic Ferns, according to their dimensions, and it is hoped that it will serve as a guide to amateurs intending to plant a collection of Ferns out of doors. With a view to insuring to each plant a position suitable to its requirements, we have marked with an asterisk (*) the kinds requiring more than ordinary moisture at the roots, and with a dagger (†) those kinds which prefer a somewhat exposed and airy situation; all others thrive in naturally shady and moist places, as previously stated.

Dwarf species and varieties growing from 4in. to 12in. high: *Allósorus crispus* and *A. acrostichoides*; the various Spleenworts, such as *Asplenium Adiantum-nigrum*, *ebenum*, *fontanum* (Fig. 334)*, *lanceolatum*, *Ruta-muraria*†, *Trichomanes*†, *viride*; several prettily-crested forms of the Lady Fern, *Athyrium Filix-femina*; *Blechnum Spicant*; *Ceterach officinarum* (Fig. 335)†; *Cystopteris*

fragilis, *Dickieana*, and *montana*†, a few varieties of the Male Fern, *Lastrea Filix-mas*; *Lomaria alpina*; the Oak, Beech, and Limestone Polypodies, *Polypodium Dryopteris* (Fig. 336), *Phegopteris*, and *calcareum*; *Polypodium vulgare*† and varieties; several handsome forms of *Polystichum*, including the Holly Fern, *P. Lonchitis*; numerous forms of the common Hartstongue, *Scolopendrium vulgare**; and *Woodsia glabella*, *ilvensis*, and *obtusa*.



FIG. 334.—ASPENIUM FONTANUM.

Among the medium-sized species and varieties, growing from 12 in. to 24 in. in height we particularly note: *Aspidium cristatum*† and *A. noveboracense*; *Dicksonia punctilobula*; several handsome varieties of the Lady Fern, and also of the Male Fern; *Lastrea intermedia*, *marginale*, *æmula*, *montana*†, *Thelypteris**; the Welsh Polypody, *P. cambricum*; and several pretty forms of *Polystichum angulare*, *Scolopendrium vulgare**, and *Woodwardia virginica**.

The principal and most ornamental species and varieties growing 2 ft. and upwards are: *Athyrium Michauxii* and several varieties of *A. Filix-fœmina*, such as *Howardæ*, *Grantæ*, *Elworthii*, *plumosum*, *setigerum*, *todeoides*, &c.; *Lastrea Goldieana*, and several varieties of *L. Filix-mas*, such as *Bollandiæ*, *Barnesii*, *grandiceps*, *Ingramii*, *lineare*, &c.; also *Lastrea dilatata* and its several crested varieties. The North American *Onoclea sensibilis** and *Osmunda cinnamomea**



FIG. 335.—CETERACH OFFICINARUM.

*interrupta**, *gracilis**, as well as the British *Osmunda regalis* and *regalis cristata**, are among the most distinct of all known Ferns. Very interesting also are *Polystichum munitum*

and the beautiful varieties of *P. angulare*, such as *divisilobum*, *multilobum*, *proliferum Crawfordianum*, *Lomaria chilensis*, *Pteris aquilina*, and *Struthiopteris pennsylvanica**, which grows very luxuriantly, and attains a large size when planted in a damp, shaded, and sheltered position.

From the above lists it will be seen that the outdoor natural fernery is, or should be, quite as interesting as the warm or cool

houses devoted exclusively to tender exotic Ferns, and that it should always form an attractive part of the garden; for if all Ferns are beautiful, some of the hardy kinds are so cheap as to be within the purchasing powers of all, while others are so scarce as to be worthy companions of all that is rich and rare among the gems of the conservatory. When a hardy fernery is once established,



FIG. 336.—POLYPODIUM DRYOPTERIS.

very little attention is required to keep it in good order. The whole work in connection with such a place is limited to occasional waterings during the summer, while during the winter a slight covering of old leaves or other light material placed over the plants will enable the more tender sorts to withstand the rigour of our most severe winters.

UNHEATED FERNERY WITH GLASS PROTECTION.—Besides the outdoor plantation, as already described, a very interesting and most pleasant fernery (in which all the year round there is a certain attraction) may, at very little expense, be erected. It should consist of a span-roofed structure, simply provided with glass protection, but without any means of heating; and it is surprising to note to what extent, through such a simple contrivance, the plants differ from those grown in the open ground. Being protected from the extremes of heat and cold, from excessive wet and from draughts, storms, and other injurious influences, their foliage acquires a more perfect development, and lasts much longer in good condition. Through judicious

selection, a very good collection of Ferns may be gathered together and thrive admirably under these conditions; and, besides the species and varieties already enumerated in the lists of the hardy outdoor fernery, such a place may be planted with most evergreen kinds native of Japan, Australia, and New Zealand; and in it such British species as *Adiantum Capillus-Veneris* and varieties, *Asplenium marinum*, *A. lanceolatum*, and a few others which seldom give satisfaction in the open air may be grown with perfect success. Such a house, devoted exclusively to cool Ferns, may be seen at the establishment of Messrs. J. Veitch and Sons, at Chelsea. It is about 36ft. long by 20ft. wide, and, although of comparatively small dimensions, and built for more than twenty-five years, it is still considered one of the prettiest ferneries now in existence. The rockery, if such term may be employed, is built entirely of brick-burrs, although sandstone, tufa,

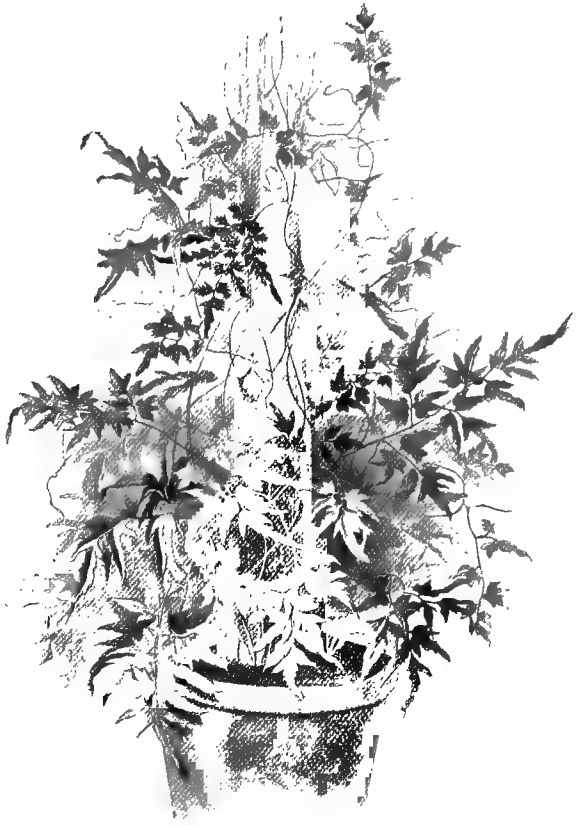


FIG. 337.—LYGODIUM SCANDENS.

or limestone may be used with advantage for the same purpose, and have a lighter appearance; and the comfort of the plants, being considered of primary importance, receives special attention. The Ferns are disposed in a natural way among the rocks, and on the sloping sides, where they enjoy a considerable amount of light, and on some little mounds of

turfy peat, covered with a layer of common green moss, which is kept growing, and in which they luxuriate. The welfare of the inmates is the natural outcome of a genial atmosphere produced by the presence of a comparatively large bulk of soil contained in the house when compared with the quantity of brick-burrs or stone material.

It is interesting to note how, in this house, where the temperature frequently falls several degrees below freezing-point, Ferns from nearly all parts of the Globe thrive together; for, so far as health is concerned, there is nothing to choose between the Australian and New Zealand Tree-Ferns and *Balantium Culcita* and *Woodwardia radicans* of Madeira which, with the various forms of Aspleniums, Cyrtomiums, Lastreas, Pteris, *Todea arborea*, &c., from Australia, form a most interesting group of plants. The Climbing Fern, *Lygodium scandens* (Fig. 337), from Japan, is there in its element and thriving apace. The cultivation of Ferns, under these conditions, is as simple as it possibly could be: once planted, the only attention necessary for the growing season is the watering and the ventilation, while the results are very gratifying.

THE EXOTIC FERNERY.—Whether intended for warm house or simply for ordinary greenhouse Ferns, this structure, especially if it be a span-roofed one, should, in preference, be disposed from north to south, so as to avoid the strong rays of the mid-day sun, while retaining as much light as possible. If it is a lean-to fernery, with a northern or a north-eastern aspect, it will require but very little shading, even during the summer; while at other times of the year none will be needed. It is a well-recognised fact that Ferns not only can do with an abundance of light, but also that it is most beneficial to them.

SHADING.—As a general rule, from the middle of September to the middle of March shading will not be required on a fernery of any aspect; in the early part of March, however, the atmosphere becomes clearer, and the sun gaining strength, a little shading in the middle part of the day soon becomes necessary for houses containing stove Ferns and fully exposed to the sun. The hardier greenhouse kinds will not require shade till later on, and the hardy Ferns not until the beginning of June. In fact the rule is to provide at all times the greatest amount of light, shading only to prevent sunlight from scorching and bleaching the foliage, and to that effect the necessity for shading must be determined by the position of the house and the character of its inmates. The best and most satisfactory way of shading is by means of blinds made of coarse canvas or of other suitable material, which should be of a nature sufficiently open to admit plenty of light, and be fastened on rollers, so that when the rope is released the blind will roll down, and be rolled up again and secured in its place when no longer required, for it is

unwise to weaken the substance of the fronds by subjecting the plants to the influence of permanent artificial shading.

Sometimes, however, the ferneries are so built or so disposed that it is very difficult to shade them by means of blinds ; in such cases permanent shading, with all its drawbacks, must be resorted to, as scorching or bleaching must be avoided by any possible contrivance. Although most Ferns are naturally adverse to strong light, it is now acknowledged that in the construction of a fernery the use of ground or rolled glass should be avoided. Numerous experiments have been tried with the object of dispensing with shading, when ground-glass had been selected as the best means of producing an even and diffuse light, but its use in most cases, if not in all, has had to be discontinued. When permanent shading must be used, white should be selected ; green may produce a heavier shade, but this is beneficial only for a small portion of the time the sun is on the glass, as at other times it keeps out too much light, even when a thin coating only is put on. Cream colour is better than green ; but the best is white, for it allows more light to penetrate on a wet or dull day, and this is a matter of great importance to the health of the plants. Whenever possible, the exotic fernery should be below the level of the ground. The beauty of the Ferns is seen to best advantage when looked down upon ; this disposition also ensures uniformity of temperature and permanency of moisture, both conditions most beneficial, but very difficult to obtain or to maintain in houses built above ground, especially when, as is generally the case, these structures are supplied with shelves and open stages. The exotic fernery may be intended for growing Ferns either in pots or when planted in the natural way. Preference should be given to the latter mode of culture, as a decided advantage in connection with the natural fernery is that, when planted in rockwork, Ferns require a great deal less attention than when grown in pots, and if provided with suitable soil at the outset they will, with the help of an occasional surfacing, flourish for years, and attain a size considerably larger than when grown in pots. Sandstone, tufa, or even limestone, may be used for building the rockery, while either clinkers or pieces of coke dipped in thin cement are sometimes used for that purpose, but they are only poor substitutes for stone, as they lack the porosity so beneficial to the well-being of the plants. Whenever the fernery is of sufficiently large dimensions, the walks should undulate and wind to and fro ; they should be made of stone, with rugged steps here and there, the stone rising on each side to give the whole a more natural appearance.

Light.—Of whatever dimensions the exotic fernery may be, and whatever may be the style adopted for the building of the rockery in it, it should be borne in mind that the principal

object is to secure, as far as practicable, an equal amount of light for all plants, so that the foliage of the Ferns situated in the lower parts should be quite as fresh as that of those planted above, and this luxuriance should extend to the very margins of the walks. Such results can only be obtained by the free admission of light in all parts of the fernery, and at all times of the year; therefore, all undue obstruction should be carefully avoided. It is for this reason that grottoes, as well as the arches and masses of heavy, overhanging rocks, which one is so accustomed to see in ferneries, should be carefully dispensed with, for, although, to a limited degree, they may be tolerated in a large place, the fernery will look better and more natural without them. Certainly the Ferns will grow more satisfactorily, for, however attractive the effect may be, it is invariably spoilt by the sickly appearance of the Ferns planted in nooks deprived of the necessary light. Tufa not only has a pleasant appearance, but it is also, because of its porous nature, the material best adapted for the building of rockeries in an exotic fernery. In building the stone together large pockets intended for any large growing Ferns may be provided, and these should be so arranged that they may be connected with the bulk of the soil on which the body of the rockwork is built, so that in course of time the roots may find their way undisturbed in the subsoil, as the comfort of the plants should on no account be sacrificed to the appearance of the fernery itself, as is frequently the case.

With the exception of the large pockets recommended for gigantic growing plants, it will be found that for the well-being of the inmates as much as for the sake of the general appearance of the place, the Ferns should be planted on the sloping sides and on some mounds made of turfy peat securely held together by means of wooden skewers and covered with a layer of common living moss, which at first must be pegged down firmly, but which in such a position rapidly grows and binds the whole mass together. When planted in this way, which is far more agreeable to the eye, and also more beneficial to the plants than the use of pockets, Ferns have more freedom of action allowed to their roots, which, generally speaking, have a roaming propensity known only to those who grow them. No regular pockets having to be built, a smaller quantity of stone material is required, while a greater bulk of soil generates proportionately a greater amount of natural humidity not obtainable from stone, however porous it may be. This mode of planting also effectually prevents any sourness in the soil through the air having free action all over its surface—a condition unknown to plants grown in pockets generally, however spacious these are.



WELL-GROWN FERNS.

In House in Mr. H. B. May's Nursery, Upper Edmonton.

Soil.—The soil used for planting the exotic fernery should be of a specially rough and open nature, and a mixture of fibrous loam, leaf-mould, and sand in equal proportions will be found to suit the majority of Ferns, whether for the greenhouse or for the warm fernery. Where, however, *Gymnogrammes*, *Gleichenias*, *Cheilanthes*, *Pellæas*, *Platycteriums*, *Nothochlænas*, and a few other kinds are to be planted, it will be best to add one part of peat to the above-named compost. Plants belonging to such



FIG. 338.—STENOCHLÆNA SCANDENS.

genera as *Davallia*, *Nephrolepis*, *Stenochlæna* (*S. scandens*, Fig. 338), and *Polypodium*, whose rhizomes soon take possession of the outer surface of the soil, are recommended as being especially adapted for planting on mounds, which rapidly become covered with foliage, all the more luxuriant in that the plants have more room allowed for the extension of the rhizomes with which they are provided. These organs, in most cases, require to be kept on the surface of the ground, to which they should be fastened with wooden pegs at the time of planting; but, as the plants become established, the necessity for pegs will soon be dispensed with.

Temperature. — According to their native habitats, Ferns require more or less heat; and although it is usually understood that those coming from the Tropics require stove temperature, it is well to point out here that those which are found growing naturally high up the mountains, where the temperature is much lower than near the sea-level, may be cultivated with most success in a warm, and, sometimes, in a cool greenhouse. A much greater number of Ferns than is generally supposed accommodate themselves readily to a comparatively cool treatment, under the influence of which their growth is less rapid, but of greater durability. The minimum night temperature of a cool fernery should be 40deg., which should be increased from 45deg. to 50deg. during the day. A gradual and gentle rise should take place in the spring, until artificial heat is dispensed with for the summer. When, through fluctuation in the weather, the temperature is too low in the summer, it is well to have a little fire-heat at intervals, and when exceptionally hot weather is maintained, the temperature of the cool fernery must be kept down by means of water being freely sprinkled on the floors, on the walls and rockwork, and even by means of extra shading, if it is found to be indispensable.

The temperature of the warm greenhouse fernery will be sufficiently high if kept up at from 45deg. to 50deg. during the night, and from 50deg. to 60deg. in the day, from November to March; it should gradually rise as the days increase in length, so that by the end of May it is 60deg. or 65deg. by night, and about 70deg. during the day. It should be gradually lowered from September, until it reaches its lowest point again in November. When tastefully arranged and planted, nothing can be more interesting and enjoyable than such a fernery, which is most pleasing on account of the medium temperature maintained comfortably all the year round.

In the stove or tropical fernery the temperature need not be so high as is generally the case, and it is far more satisfactory if it can be kept at a moderate degree all the year round; for it has been conclusively proved that far from being necessary to the comfort of the Ferns, a greater amount of artificial heat than they really require is highly injurious to them. Tropical Ferns may be said to have a period of active growth extending from March to October, and during that time it is advisable to take all possible advantage of the natural heat, which, even when somewhat strong, is not hurtful, provided it is counterbalanced by a corresponding amount of moisture in the atmosphere of the house. The damage is generally done by the use of artificial heat, which should not be resorted to so long as the night temperature of the house does not fall below 65deg.; the solar heat may, without inconvenience to the plants, raise it to 75deg. or 80deg. at that time of the year, and be maintained all through

June and July. It should be gradually reduced from August until November, when a minimum temperature of 55deg. at night is all that is required, and it need not be much higher during the day until March again, when the vegetation commences. It is important that no Ferns whatever should be placed in close proximity to the hot-water pipes, which should be so disposed as to be completely hidden from view by the rockwork, and the hot-air shafts should be so managed that the heat generated by the pipes may not come in direct contact with the plants, but diffused in the house by passing through and at the back of the rockwork.

Ventilation.—The ventilation of the exotic fernery, whether as a stove or as a warm greenhouse, is of great importance, and proper means of renewing the air at the required times should be provided for in the building of the structure. Ventilators in the roof of the house are not sufficient, for when they are opened a cold current at once rushes in, and results in the discoloration of the foliage, which is due to the condensation upon the fronds of moisture caused by the cold current. The ventilation should be managed so that a free and constant supply of fresh air may be admitted without creating a regular draught, which is injurious to all plants, but particularly so to Ferns of any and all kinds. To that effect provision should be made, not only for the escape of hot air at the top, but also for the admission of fresh air along the lower part of the house by placing ventilators along the sides. These should be disposed a little below the level of the hot-water pipes, so that the air, which before escaping through the top ventilators, passes over and among the plants, should only do so after having been slightly warmed by a temporary contact with the hot-water pipes. Through this arrangement an upward current, which prevents chilly down-draughts, is produced, and the health of the plants subjected to this treatment is shown by a sturdy growth, and the production of a harder and more enduring foliage than is the case when the fernery is subjected to the influences of a high temperature combined with heavy shading, an abundance of permanent moisture, and a lack of ventilation, which is conducive to the production of weak and elongated foliage only. It is needless to add that the ventilation should be carefully attended to, and only when the temperature is high enough, and the exterior temperature and state of the atmosphere admit of the change of air, in which case the ventilators should be open as early in the morning as possible, and left on as long in the afternoon as it is considered safe. The Ferns which require the greatest amount of ventilation are the *Cheilanthes*, *Nothochlæna*, and *Anemia* (*Anemia tomentosa*, Fig. 339).

FERNS IN POTS—REPOTTING.—All that has been previously recommended in connection with light, soil, temperature, shading,

and ventilation as being beneficial to the welfare of plants grown in the natural fernery, applies with equal force to plants grown in pots; but it must be borne in mind that in this case Ferns require greater and more constant attention than when planted out, as they are much more liable to suffer from the effects of

bad root action through stoppage of the pots, overwatering, or drought when their roots are confined in pots, than when they can freely extend and ramble among

the stones and moss, which render the natural fernery the most attractive part of an amateur's garden. The repotting of Ferns is an operation of great importance, and the principal points to be observed in performing it are that they should not on any account be overpotted, and that special care should be taken to prevent the roots of the plants being torn away or broken off. Over-potting is undoubtedly a frequent cause of loss of Ferns, and should always be avoided. Although a hard-and-fast rule as to the dimensions of the pots to be used cannot possibly be laid down,



FIG. 339.—ANEMIA TOMENTOSA.

it is well to remember that by far the best plan is to repot several times, as required, giving a slightly larger pot each time, than to put plants into much larger pots with the object of saving labour, or the trouble of repotting in a month or two. Through successive repottings the plants derive from each additional supply of new soil the full amount of the nutritive properties

it possesses, while over-potting frequently causes sickness. Healthy well rooted plants may safely be repotted as follows: from 3in. pots to 4½in. pots, from 4½in. pots to 6in. pots, from 6in. pots to 8in. pots, from 8in. pots to 10in. pots, from 10in. pots to 13in. pots, and so on. Ferns require repotting less frequently the larger they become, and the larger the pots are in which they growing; they also should be repotted more or less frequently, according to their nature and to their power of growth. It is well known among practical men that these plants make their hardiest and most luxuriant growth when the inside surface of their pots is already covered with a network of their roots.

When proper attention is given to Ferns after repotting, this operation may safely be performed at almost any time of the year; but, speaking generally, it is preferable to commence in the warm house about the beginning of February, and in the cool house about the beginning of March. In every case it is most advisable to have the plants repotted as they start into new growth. This operation may be continued through spring and summer, but it is best to cease about the middle of September, as little growth is made after that time, and the addition of new soil, even if not injurious to the plants, is of very little use, as its nutritive properties are washed out before the spring by the repeated waterings the plants require in the meantime. It is not advisable to put into larger pots plants with roots matted together into a hard mass until they have been carefully loosened as much as it can be done with safety. When the roots have filled the bottom of the pots, and have become thickly matted among the crocks, it is best to repot without disturbing them, leaving the crocks in, for it is certain that, if for the sake of removing the crocks the roots are torn away, the plants will be deprived of the best part of their feeders, and will suffer accordingly. Large plants should be examined and repotted if they require it, but there is no necessity for repotting them every year; indeed, in many cases it is advisable not to do so, although small plants benefit by being repotted several times during the year, because in the growing season, under favourable conditions, they make fresh roots very rapidly.

On account of the extremely sensitive nature of their roots, Ferns should preferably be potted in old pots; these, when used, should be clean and dry, so as to prevent, whenever the plants are to be repotted, the breaking of their roots, which is bound to happen if the plants have been previously potted in wet or dirty pots, to the sides of which the roots will be found to strongly adhere. Whenever new pots are to be used, it is advisable to have these put in water, in which they should remain until they are thoroughly soaked, and then be well dried

before using; it is well known that pots fresh from the kiln absorb a great quantity of water, and when their pores are not previously filled, it very frequently happens that the first two or three waterings, instead of being beneficial to the plants, only serve to soak the pots, while the balls of soil which the latter contain become so dry that it is often most difficult afterwards to get them into a moist condition. Great care must always be



FIG. 340.—CHEILANTHES FARINOSA.

taken that the plants when repotted are sufficiently moist at the roots, which organs are exceedingly sensitive to even a temporary absence of moisture. When a Fern has suffered from want of water at the roots, the effect is shown by the shrivelling of the fronds, the older ones being usually affected before the young growths. This is a peculiarity well worthy of special notice; for while in the case of most other plants, either of a herbaceous or of a woody texture, the temporary flagging of the foliage is efficiently remedied by an ordinary watering, or, at the most, by a thorough soaking of the roots, such treatment has no apparent effect on the roots of most Ferns, and very few indeed are the species whose fronds, having once flagged, regain their elasticity by the application of water at the roots or over the foliage; the *Nothochlæna* and the *Cheilanthes* (*Cheilanthes farinosa*, Fig. 340) being the Ferns which show the least the effects of drought at the roots.

In growing Ferns in pots it will be found greatly beneficial to the plants that these should stand on a solid, cool, moist bottom,

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and the ordinary stage or shelf can hardly correspond to the requirements of the plants. The most suitable material on which to place Ferns in general is a solid bed of ashes or one of sand covered with a layer of coal-cinders, which have the property of remaining fresh and sweet for an indefinite time. Wherever practicable, the houses in which Ferns are intended to be grown in pots should be comparatively low structures, sunk 15in. or 18in. below the surface of the ground, and provided with solid beds, bricked on their vertical outer surface. The walks should be made either of coarse gravel, or of the natural earth if of a sandy nature, simply covered with a thickness of 2in. or 3in. of coal-cinders, these being the most porous, and at the same time the best moisture-retaining materials that can be used in a house in which constant humidity is of the utmost importance.

FANCY WAYS OF GROWING FERNS. — PANS. — Besides pot culture, pure and simple, there are several other equally practical ways of growing Ferns, some of which have been devised by the cultivator to render the plants more attractive by presenting them under their most favourable aspect, while others have been suggested to him by the nature of the plants under his care.

Among the ways intended to encourage the culture of the plants, and add to their comfort, we may note the hanging-basket and the shallow pan, both of which offer to certain species advantages which they could not obtain if grown in the time-honoured conventional flower-pot. The shallow pan is especially useful for the culture of most Ferns provided with running rhizomes. These organs, in a few instances, prefer being kept underground, but, in most cases, they delight in running over the surface of the soil to which they should from time to time be carefully fastened down by means of small wooden pegs, which are useful until the rhizomes have produced sufficient roots to keep themselves in position, when the pegs may be entirely dispensed with. As the plants grow, and the rhizomes extend, they are apt to come over the sides of the pans; for the welfare of the plants this must be prevented, and it is easily done by carefully turning them inside the pans and pegging them securely on to the soil. Under these conditions, the rhizomes producing fresh roots all along their length add strength to the plant, whereas, when they extend over the sides of the pan and out of the damp soil or moss, they seldom produce any roots, and have to be supported by the plant instead of helping it, and the results are anything but satisfactory. When used, the pans, like the pots, must be clean and dry. Drainage is an essential point; the holes should be covered with large crocks, which should be covered with either moss or rough peat; this, again, should be covered with a layer of very rough compost, higher in the middle than at the sides;

then the pan should be filled to a sufficient depth with finer material until there is enough to plant the Ferns. The principal thing is to have the work firmly done, and, when the rhizomes are well pegged down and watered, very little attention besides watering will be needed for some time. A greater surface in a

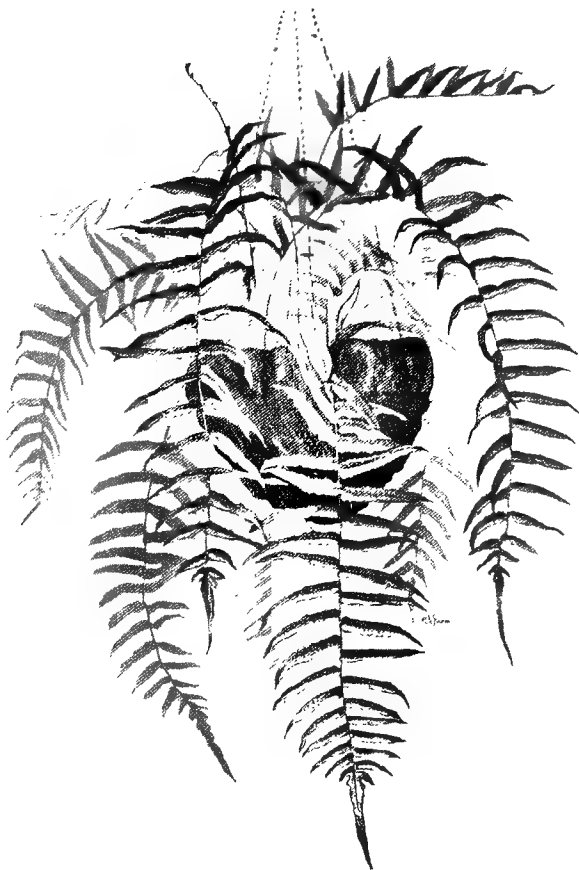


FIG. 341.—POLYPODIUM SUB-AURICULATUM.

pan of same dimensions may easily be obtained by raising the compost in the centre of the pan and forming a cone resting on rough pieces of peat, all made secure by being skewered together. This method is particularly suitable to certain Ferns, such as Davallias, and, with a little extra care, these mounds can easily be prevented from becoming dry.

HANGING-BASKETS.—One of the most popular fancy ways of growing Ferns is in suspended baskets. These may be of various shapes and made of different materials, either galvanised or painted wire, wood, or bamboo cane, or even terra-cotta, such as are generally used for growing orchids. Individual taste must decide the kind to be used, as the baskets have very little influence on the growth of the Ferns; but it is generally acknowledged that the plain galvanised ones, with stiff suspending wires, as shown in Fig. 341, representing *Polypodium sub-auriculatum*, are the most useful. Baskets should be made up every spring, for, unless they are of a particularly large size, the great amount of water given to them during the previous season has rendered the soil so very poor that there is very little, if any, nourishment left in it for the Ferns the following year. These baskets should be lined with living moss, which, being firmly pressed against the wires, is sufficient to retain the soil, in which the Ferns should be planted a little below the surface of the wire so as to leave sufficient room for the water to penetrate the whole ball. In planting a hanging-basket the Ferns in the centre should be lower than those on the sides, to allow the water to run through the soil; when planted too high, the difficulties in keeping the baskets in good order are greatly increased, whereas when filled as directed, ordinary waterings, with occasional dippings, will be found quite sufficient to keep the plants in good condition at the roots. One also sometimes sees baskets manufactured of cork bark, which are very ornamental



FIG. 342.—PLATYCERIUM WILLINCKII.

and rustic. These should be treated as stated above, but of course they do not require any lining of moss. The general appearance of hanging-baskets of any description is greatly increased by the introduction of a few foliage plants of drooping habit

being planted near the edge and allowed to hang down in a careless manner. *Ficus repens*, the beautiful new *F. radicans variegata*, green and variegated Tradescantia, and *Saxifraga sarmentosa*, are among the best adapted for that purpose.

FERNS ON CORK.—Many are the ways in which Virgin cork may be used, and often with the greatest advantage; but perhaps the prettiest arrangement made with that material consists in the making of artificial trees of various dimensions, by firmly binding or tying pieces of cork bark together, allowing little

spaces here and there to be left open, so that the hollow parts may be filled with a compost suitable to the Ferns used. Many Ferns will grow under such conditions, but it is particularly Davallias, Nephrolepis, and Platyceriums—as may be seen by Fig. 342, of *P. Willinckii*—which luxuriate under this treatment.



FIG. 343.—METHOD OF UTILISING STEM OF DEAD TREE-FERN.

DEAD TREE-FERNS.—It frequently happens that in an importation of Tree-Fern stems, some reach their destination in bad condition, and even completely dead. When such is the case these stems may easily be utilised with advantage; a good-sized plant may be inserted in the top, and the sides may be planted with seedlings, which eventually take possession of the entire surface.

Many species of Ferns succeed well under these conditions, but the best adapted for the purpose are those which, in their natural state, are found growing in a similar way, such as Nephrolepis, Davallias, Polypodiums, trailing Acrostichums, and Oleandras. The watering of these ornamented Tree-Fern stems (Fig. 343), to be effective, must be done from the top; and during the growing season the waterings must be copious and frequent, being gradually discontinued as the winter season comes.

POROUS BOTTLES.—A terra-cotta bottle, made of a specially porous material, and usually known as the “Madeira Fern bottle,” having been procured, it is covered with a layer of clay about an inch thick, which is fastened to it and held in position by means of copper wire worked across in different directions. Quite tiny seedlings of *Adiantum Capillus-Veneris* are then planted in the clay, the bottle is filled with water, which soon percolates through to the clay, and hung up. There is no need of ever giving water direct to the plants—the bottle only requires to be occasionally replenished; by that means a most pleasing ball of green foliage is produced, lasting in perfection so long as the bottle is not allowed to get dry.

THE FERN OR WARDIAN CASE.—The Fern case, which proves a constant source of pleasure and instruction, is the one fancy way of growing Ferns which deserves the greatest amount of attention. No other way of growing Ferns, or indeed any other plants in a room, has greater attraction than a miniature fernery planted with judiciously selected Ferns. The charms of such culture are specially appreciated by persons of sedentary habits, spending all or the greater part of their time in town, where the pleasure of seeing plants growing in a natural state is an unknown advantage.

The mode of planting the case should rest with the owner; but whether it is devoted to the culture of ordinary sorts, or to that of the rarer and choicer class of plants known as “Filmy Ferns,” the little glass structure is generally much admired, and most deservedly so. The Fern case should be well drained, the bottom part of it being separated from the soil by a false bottom made of perforated zinc, and the space thus remaining between the two being used for the reception of the water resulting from the watering of the plants. The perforated zinc should be covered with a thickness of zin. of crocks, upon which a layer of sphagnum or one of fibrous peat, to prevent the drainage from becoming choked, should be placed. The bottom part of the case should then be filled to a depth of about 6in. with a mixture of soil suitable to the kinds intended to be planted in it. When ordinary Ferns are intended to be grown, a mixture of two parts of either peat or leaf-mould, one part of fibrous loam, and one part of silver-sand will be found the most satisfactory compost for the majority of kinds used in planting in either Fern- or window-cases. Should the case be intended for the culture of *Trichomanes radicans*, or Killarney Fern, especially, it will be found best to use, in equal proportions, peat and porous sandstone, to which material the hairy rhizomes cling with great tenacity, while the fleshy roots run freely among the pieces, from which they derive all the nourishment they require. A compost of two parts of peat, one part of silver-sand, and one part of partly-

decomposed sphagnum is that which satisfies Todeas, Hymenophyllums, and Trichomanes, and, indeed, all kinds of "Filmies" with crowns or slender, shining rhizomes which delight in running into loose and decayed vegetable matter. It is best for the soil to be a little higher in the centre than at the sides. A miniature rockery may also with advantage be worked in the case, and there is no necessity for cementing together the pieces of stone or of tufa used in its construction. Provided that these be firmly embedded in the soil, they need only be stood up, and will easily be held in position by the soil itself, and by the Ferns planted between them. The case should be placed as near the window as possible, and in preference near a window facing north, as it is most essential that while the Ferns should be protected from the hot sun they should receive all the light possible.

Watering the Fern-case is an operation which requires a certain amount of tact, as a great deal of irreparable mischief is often the result of a too liberal use of the watering-pot. After being planted, the Ferns should be watered gently until the soil is uniformly damp, and the case being closed, no more water will be required until the surface of the soil gets dry, when a gentle watering over the ground only, as before, should be given to the extent required; but in any case it is most advisable to keep the foliage of the plant dry, unless the case is planted entirely with Filmy Ferns, which may safely be watered overhead, and should be kept in a moist condition. When grown in a room, the latter require but little ventilation, as it is well known that, if exposed for any length of time to the influence of the dry air of the dwelling-room, their delicate fronds soon shrivel up and are eventually destroyed. A case filled with ordinary kinds of Ferns requires a greater amount of ventilation, and, when thoroughly established in it, the plants derive much benefit from the change of air, which should be frequently given to prevent the glass from becoming dim and slimy through the condensation of moisture remaining too long upon it.

PROPAGATION.—The various ways by which Ferns are generally propagated are: (1) by means of the spores; (2) by the division of the crowns; (3) by the bulbils, or adventive buds, with which certain species are provided either at the base of their fronds, or at their extremity, like *Woodwardia radicans* and certain Adiantums and Aspleniums; along their rachis or midrib, like certain Polystichums; or again all over the surface of their fronds, as in certain Aspleniums, Scolopendriums, and *Woodwardia orientalis*.

Spores.—The most interesting, as also the most rapid mode of increasing Ferns on a large scale, is, undoubtedly, by means of the spores, as it is in flowering plants by means of their seeds.

Points of great importance are the gathering of the spores in good condition, at the proper time, and the way and time of sowing them. They should be gathered when the spore-cases change colour and turn brown; these, with a few exceptions, are disposed at the back of the fronds, sometimes along the edge of their leaflets, or pinnules, but sometimes also arranged in clusters or lines at the back of their leafy portions; or, again, either disposed in large patches or irregularly dotted all over their under-surface, this according to the species which they represent or to which they belong.

Time of Gathering.—There can be no fixed time named for the gathering, as the ripening of the spores takes place at all times of the year. To ascertain the proper time for collecting the spores it is necessary to watch the development of the spore-cases, which at the outset are colourless, becoming pale green, and with age either dark green or brown. When it is noticed that the spore-cases begin to lift, it is time to gather them; the spore-bearing fronds, or the portions on which the spore-cases are disposed, should then be cut off, put in paper, and placed in a warm, dry place, where they should be allowed to remain for two or three days, when it will be found that the paper is covered with the spores. These resemble very fine dust, and according to the species to which they belong, are either pale or bright yellow, pale or dark green, or black.

Time of Sowing.—Although Fern spores may be sown at any time of the year, March-April is considered the best time for sowing, as in that case, if properly treated, the greatest part of the seedlings raised have sufficient time to form crowns strong enough to stand the following winter. It may be safely stated that the sooner the spores are sown after their ripening, the more readily they germinate, although those which generally ripen during the autumn and winter may be kept in a dry place and preserved until the spring, when it is found more advantageous to sow them than during the winter, for in this latter instance there is a risk of the young plants being destroyed, especially if there should be very heavy fogs, which invariably have a most disastrous effect upon them. When, for some reason or other, Fern spores must be kept a long time without being sown, it is best to put them in bottles tightly corked or in boxes hermetically sealed; under these conditions many of them will retain their germinating powers for several years. As an illustration of the vitality with which certain Fern spores are endowed, it may be stated here that some spores of the beautifully-coloured *Pteris tricolor*, which for seven years had been preserved in the way indicated above, were sown in the spring of 1876, and that, from that sowing, a splendid crop of young plants were raised, and

these, in the course of one season, produced perfectly healthy and robust specimens.

Materials on which to Sow.—Many ingenious and also more or less intricate ways of sowing Fern spores have been recommended, but it has been proved beyond doubt that, provided the materials used are perfectly free from fungus, the simpler the operation is performed the more likely is it to be successful. It is also well known to practical growers that the spores of certain species germinate more readily on one substance than on another; consequently, when dealing with either a choice or a rare species, it is advisable to vary the compost and sow on several materials which may be either peat, loam, a mixture of both, or pieces of brick and sandstone broken small. From experiments undertaken with a view to ascertaining to what extent the nature of the material employed has influence upon the germination of the spores, it has been invariably observed that the spores falling on the substance for which they have a predilection have been found to produce most numerous seedlings on either peat, loam, or broken bricks, as the case may be.

Mode of Sowing.—The most important point to be observed in sowing spores of exotic Ferns is to insure a uniformly moist atmosphere, combined with a temperature of from 70deg. to 75deg., although many of them will germinate in a much lower temperature, but they will also be much longer in developing. Spores of British and other hardy Ferns may be sown in an ordinary greenhouse or in a cold frame, in which case the pots or pans in which they are sown should be placed in some damp, shady, but not dark, corner, and stood on either a tile or a slate, so as to prevent worms from getting into them from below. There is, however, a great and decided advantage in submitting them to the same treatment as the exotic kinds, as they germinate more rapidly and take less time in producing young characteristic plants when sown in heat, although this is not indispensable.

It is immaterial whether the spores are sown in pots, in pans, or in boxes; this must be left to the discretion of the operator, who will use that which he finds answers his purpose best; but unless very great quantities for one special kind are required, it will be found that either 4½ in. or 5 in. pots are of quite sufficient size, for if properly sown and carefully handled afterwards, each one of these pots can accommodate thousands of seedlings. After giving either pots or pans a good drainage, which should be covered with a layer of either fibrous peat or sphagnum, it is best to fill them half way with a compost similar to that used for general potting, or with pure loam, leaving sufficient space to allow for a layer, at least 1 in. thick, of the composts recommended above, which should previously be either

burned or scalded to destroy all germs of vegetable life and all insects that may be found in them. When ready for sowing, the pots or pans should not be quite full; the top layer should not reach the outside surface of the pot by about $\frac{1}{2}$ in., as it is necessary that they should be covered with a piece of glass, which should remain on them until the young seedlings are up, and the space thus reserved is required for their development. The pots or pans should then be stood nearly to the rim in water, in which they should remain long enough to get thoroughly soaked, after which they should be allowed to drain for a few minutes, when sowing may take place.

On account of their extreme minuteness, the spores, when sown, must not be covered with soil; they should be simply scattered thinly over the surface of the compost contained in the pots or pans, which should immediately be covered with a piece of glass. This has for its object the total exclusion of other spores which may be in suspense about the place, and it also greatly helps to keep a close, moist atmosphere about the spores which, on that account, germinate and grow more freely than they would do if left uncovered. It is also necessary, while sowing, to hold the paper which contains the spores very close to the surface of the pots or pans, and care should be taken that the operation is performed in a perfectly still atmosphere, as, being of an exceedingly light nature, they are very liable, under the influence of the slightest draught, to fly in all directions. When the sowing has taken place, it is advisable to stand the pots or pans, covered with glass, in shallow saucers containing water, which will rise to the compost and keep it in a uniform state of moisture; they should then be disposed in places varying in temperature with the species sown.

Watering of Spores.—The watering of the pots or pans in which the spores have been sown is an operation requiring great attention, as it is at a certain given time, and through the agency of moisture, that their fecundation takes place. Should the water in the saucers prove insufficient to keep the soil moist, the pots must be watered by partial immersion, that is by allowing the lower part to stand in water until sufficient moisture has been absorbed to soak the mass of soil.

The length of time which elapses between the sowing of the spores and their germination is very variable, some showing signs of life in the course of a few days, while others are sometimes several months before doing so. It has been observed that even those taken from one frond sometimes vary in the length of time they take to germinate, some of them developing weeks before others, although sown at the same time, subjected to the same treatment, and even when sown in the same pan. The germination of the spores is clearly indicated by a faint colouring of green on the surface

of the soil, which colouring increases until the pots or pans are completely covered with a growth which, in general appearance, greatly resembles the common Liverwort. It is from this strange growth that the young Ferns ultimately develop, according to the different species, in a space of time varying from two to six months from the time of sowing. It is during a certain state of apparent dormancy, lasting sometimes several weeks, that the fecundation takes place, and it is also during that particular time that, to encourage fertilisation, a uniform rate of moisture is most important.

“*Pricking*” *Off.*—The spores having germinated freely, and grown to form a dense mass of Lichen- or Liverwort-like appearance, it is necessary, or even indispensable, that they should be “pricked off.” This delicate operation consists in separating this singular growth into small patches, and depositing them in other pots filled with a material or compost similar to the one in which they have been sown; its object is to give the young seedlings the required room to develop themselves, for if allowed to crowd and overgrow each other in the seed-pan, they are very liable to damp off. After having been pricked off, these seedlings should for a few days be treated as they were previously. They should be gradually inured to the action of the air by tilting on one side the glass cover, which may, in a short time, be removed altogether. They may now be watered overhead and placed where they will receive plenty of light, and where they will require to be kept damp. In some cases this operation may have to be repeated several times before the fronds make their appearance, or before the young plants are strong enough to be potted singly, and treated as recommended in the section on “Ferns in Pots.”

Garden Hybrids.—The interest attaching to Ferns propagated from spores is greatly increased by the chance thus afforded of finding something new, which result cannot be achieved if the plants are propagated in any other way. The number of garden hybrids, or supposed hybrids, already in existence, and obtained in that way, is steadily increasing every year, and it may be safely stated that in the majority of cases these productions are not merely freaks of nature, but, as may be seen by the accompanying illustration of *Adiantum Birkenheadii* (Fig. 344), real acquisitions, possessing great decorative qualities, such, for instance, as the beautiful *Polypodium Mayii*, exhibited at the Temple Show in May, 1899, and in which the pleasing frilled character of the edges of the fronds, combined with their lovely bluish colour, makes it one of the prettiest Ferns known. The most distinct and most beautiful of all Polypodiums, *P. Schneideri*, with its large, very plumose fronds, is another illustration of what may be found among

THE FERNERY, NASH COURT, FAIRFAXHAM.



plants propagated from spores; and these, besides endless forms of *Pteris*, *Adiantums*, *Gymnogrammes*, &c., go far to prove that something unexpected may turn up and handsomely repay all trouble and attention which that mode of propagation entails on the part of the operator.

This mode of reproduction is also frequently resorted to for covering naturally damp bare stone or brick walls, on which the spores of certain species germinate promptly, and the plants grow apace for a long time without any other nourishment than moisture, and what little vegetable mould is naturally produced by the decaying of their lower fronds.

The fact that the market grower seldom employs other means than spores for the raising of his Ferns is a proof of the excellency of the process, although his mode of procedure is of the simplest description. His object being the production of showy sorts of rapid growth, he limits his culture to a few genera, such as *Adiantum*,

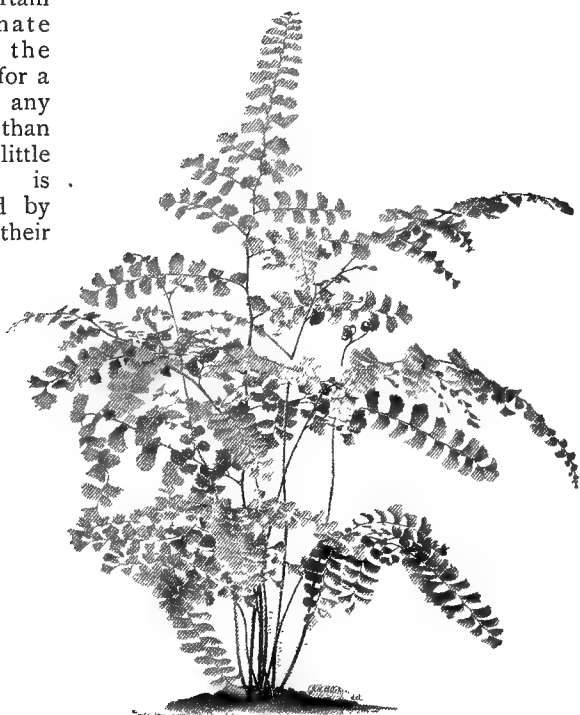


FIG. 344.—*ADIANTUM BIRKENHEADII*.

Aspidium, *Asplenium*, *Lastrea*, *Nephrodium*, *Polypodium*, and *Pteris*, and even of these he only grows the most vigorous. In his case the spores of the different species are sown broadcast on the surface of pots containing plants of slower growth, such as Palms, which, not often requiring fresh potting, give the spores a fair chance of germinating and even of producing young plants without being disturbed. The latter are "pricked off" in either boxes or pans; thence, when they have made five or six fronds, they are potted at once in 2½ in. pots. In that size, hundreds of thousands of Ferns are disposed of annually for the ornamentation of the

dinner-table or of dwelling-rooms, for which purposes more Ferns are grown in this country than any other plants, and all of them are raised from spores.

Propagation by Division of the Crowns.—All Ferns which naturally form clusters of crowns may be propagated by the division of these adventitious crowns; these are produced sometimes from buds situated at the base of the stalk, and at others by a process of fission in the crowns themselves. When Ferns are to be propagated by the division of the crowns, it is necessary to allow sufficient time for their full development into two or more distinct centres of growth, when it will be found that each of these is provided with its own set of roots, and is really a perfect plant. The crowns should be just separated with a knife, and then carefully pulled apart, retaining to each one all the roots possible. The plan of cutting through the crowns and ball of roots is not to be recommended, as it severs many roots from the crowns to which they belong, and this materially reduces the chances of the plants surviving the operation. It is far better to take a little more pains, and in separating the crowns to carefully retain the roots as intact as possible. To that effect it is advisable to either gently shake, or even wash away the soil, so that when the crowns have been separated, the roots may be easily disentangled, and the plants potted at once. They should then be kept close and shaded for a few days to prevent undue evaporation and loss of vigour, and kept there until the plants are strong enough to stand outside the case.

If this mode of propagation is applied to British Ferns after the operation has been performed, they should be kept in a cold frame, as artificial heat is not in any way beneficial to them, and little or no water should be given to them until the first fronds make their appearance. It is particularly applicable, amongst our native kinds, to the numerous and beautiful forms of *Athyrium Filix-femina*, *Lastrea Filix-mas*, and *Scolopendrium*s. It is undoubtedly the safest mode of increasing most of the crested, tasselled, congested, or depauperated forms of these species, the faithful reproduction from spores of the endless varieties being at least doubtful. It is also deemed advisable sometimes to resort to that operation as a means of regulating the growth of the plants, which are of less graceful appearance when, through the multiplicity of crowns, a crowd of foliage, developing in all directions, is produced. The most favourable time for the operation is through February and March, as the plants, being then either entirely at rest, or just beginning to grow, they do not suffer as they would when in full growth, and the new subjects have plenty of time to thoroughly establish themselves during the ensuing season.

Propagation from Rhizomes.—Ferns which are provided with rhizomes creeping above ground may be easily propagated by the division of these organs, as every piece of creeping rootstock bearing a couple of fronds and a few roots, usually produces a plant when firmly pegged to the ground with the roots well covered. It is useless to cut off for this purpose the rhizomes which, having extended over the sides of the pots, are destitute of roots. If such are required for propagation, they must either be bent back, or else have a pot containing soil placed under them; they should then be firmly pegged to the soil and left until they have produced roots, when they may safely be separated from the parent plant by first cutting through the rhizome, and then carefully taking them up with all the roots attached.

The best material in which these newly-divided plants may be placed is one of very porous nature, in which a sufficient quantity of permanent moisture can easily be maintained without the compost becoming sour. The compost which gives the most satisfactory results is a mixture in equal proportions of chopped sphagnum, rough fibrous peat, and coarse silver-sand. Many different species, especially among Davallias, Acrostichums, and Polypodiums, are amenable to this mode of propagation; but it should be borne in mind that in every case the rhizome which is to be separated from the mother-plant must be provided with a growing point and a few roots, and when possible also a few fronds, although this is not indispensable.

Ferns propagated in this way are all the better for being placed in a close frame for a time; even if they do not actually require it, they recover much more quickly when so treated, as they do not feel so acutely the effects of the disturbance at the roots. It may not be out of place here to point out that, although Gleichenias are abundantly provided with external rhizomes, they are the most difficult subjects to propagate by division, and that large plants can rarely be cut up successfully. Their rhizomes are of such a wiry and rambling nature that they are generally destitute of roots on their greatest length, and it is only by securing the younger part of the rhizomes with fibrous roots and growing points that there is any chance of success. The old portions of the rhizomes are of no value for propagating purposes, as they very seldom, if ever, break out again; it is therefore necessary to look to young, healthy plants exclusively for propagation.

Propagation from Proliferous Growths.—When we have to deal with Ferns of a viviparous or proliferous nature, either British or exotic, the best mode of propagation is obvious, for even when these plants can be reproduced from spores, the time gained by rooting the adventitious growths, as compared with the time taken by the complete development of seedlings, is sufficient

to give the former process the preference. The Ferns partaking of these characters may be divided thus: (1) plants viviparous over the whole or the greater part of the surface of the leafy portion of

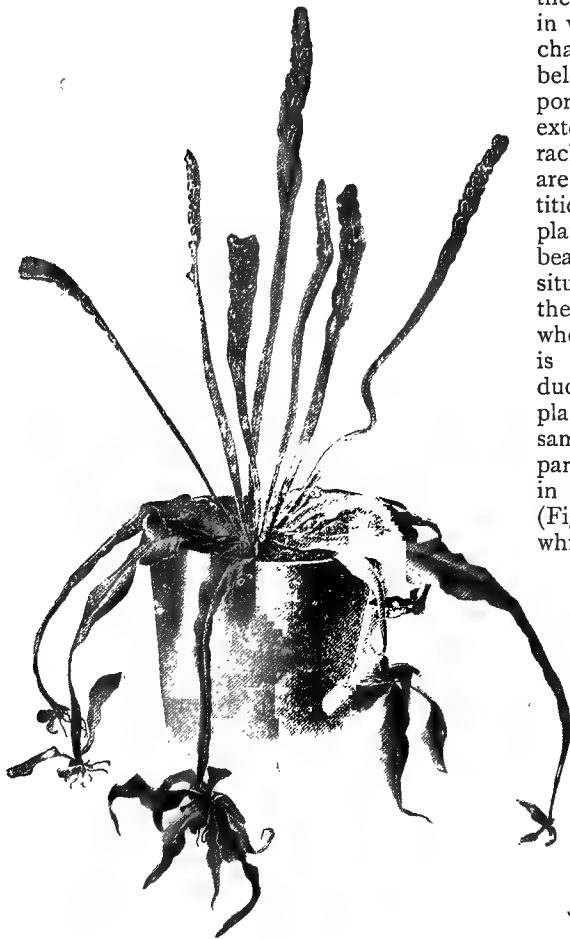


FIG. 345.—FADYENA PROLIFERA.

their fronds; (2) plants in which the proliferous character instead of belonging to the leafy portion of the fronds, extends only to its rachis or stalks which are covered with adventitious growths; (3) plants whose fronds bear one solitary bulbil, situated at or near to their extremity, and whose tailed appendage is formed by the production of a young plant partaking of the same characters as the parents, as is the case in *Fadyena prolifera* (Fig. 345); (4) plants which have the base of their stalks provided with either stolons or scales of a proliferous nature, each of these bearing one or more latent buds, which, under favourable circumstances, never fail to reproduce the parent. The propagation of these Ferns is of the simplest description, and consists

in pegging the fronds or their parts which bear the proliferous growths so that these come in direct contact with the soil, when they will produce roots and soon be able to support themselves. In the species where the buds are disposed on the stalks, or at the base of the fronds, it is most important that these should be encouraged into growth before the stalks begin to decay, for,

if not separated in good time from the mother-plant, these latent growths are almost sure to become abortive.

In dealing with species which have the latent buds disposed on the scales at the base of their fronds, the operation consists in assisting, or rather in artificially stimulating their development, for, when left to themselves, they usually remain dormant, and eventually become abortive. This applies particularly to *Angiopteris* and *Marattias*, whose fronds are surrounded at their base by fleshy scales, each provided with two buds, which seldom, if ever, develop if left on the plants, but which, carefully taken off and placed in a compost of an open nature, and subjected to the influences of heat and moisture, produce young plants. This also applies to certain of our British species, especially *Lastreas*, *Scolopendriums*, and *Polystichums*, for it has been observed that the basal portion of the old fronds contain such latent buds, which, when detached with the portion of the fronds bearing them, usually develop young plants in the same manner.

Propagation from Tubers and Bulbils.—Certain species, such as *Cystopteris bulbifera*, are provided with bulbils on their fronds, or, like several *Nephrolepis*, with distinct tubers on their stolons. These, when taken off and potted, soon form young plants. Others, such as certain *Adiantums* and *Platycteriums*, form small bulbils on their roots. These should be allowed to develop one or two fronds, when they may safely be taken off and treated as seedlings, and produce young plants in every respect similar to the parent plants.

Selection of Kinds for Special Purposes.

With a view to helping in the plantation or in the cultivation of outdoor, cool, and warm ferneries, and also of supplying the necessary information for making the same as attractive as possible, it has been thought advisable to give several separate lists of the Ferns best adapted to special requirements, as follows, and to (where the degree of hardiness or tenderness is not indicated in the heading) mark with an asterisk (*) those kinds which thrive best under warm treatment. Those species and varieties which succeed under ordinary greenhouse treatment, and which are the most numerous, have no special mark, whereas those marked † are perfectly hardy.

Tree Ferns.

Alsophila australis.
contaminans.*
Cooperii.
excelsa.
Rebecca.
villosa.*

Brainea insignis.*
Cyathea arborea.*
dealbata.
Dregei.*
insignis.*
medullaris (Fig. 331).

Dicksonia antarctica.
Barometz.
chrysotricha.
fibrosa.
regalis.*
Schiedei.*

Dicksonia squarrosa.
Hemitelia Smithii.
Lomaria cycadoides.
discolor.
gibba.

*Those marked * require stove temperature.*

Gigantic Non-arborescent Ferns.

Acrostichum aureum.*
cervinum.
scandens.*

Angiopteris evecta.*
Aspidium capense.
Asplenium longissimum.*



FIG. 346.—POLYPODIUM AUREUM.

Adiantum cardiochlænum.*
tenerum.*
trapeziforme (Fig. 332).*

Asplenium Nidus.*
Blechnum brasiliense.
Davallia divaricata.*

- Davallia hirta cristata.*
 platyphylla.
 Dicksonia adiantoides.
 Culcita.
 davallioides Youngii.
 Didymochlæna truncatula.*
 Marattia alata.*
 Cooperii.*
 elegans.
 Nephrolepis davallioides and varieties.*
- Nephrolepis rufescens tripinnatifida.*
 Polypodium aureum (Fig. 346).
 Heracleum.*
 sub-auriculatum (Fig. 341).*
 verrucosum.*
 Pteris Drinkwaterii.
 moluccana.*
 tremula and varieties.
 Todea arborea.
 Woodwardia orientalis and radicans.

*Those marked * require stove temperature.*

Small-growing Ferns.

- Acrostichum peltatum.*
 Actiniopteris radiata.*
 Adiantum fissum.
 Legrandii.
 Luddemannianum.
 mundulum.
 Pacottii.
 reniforme.
 †Asplenium Ceterach (Fig.
 347).
 elegantulum.
 flabellifolium.
 †fontanum (Fig. 334).
 monanthemum.
 †Ruta-muraria.
 †Trichomanes.
 viviparum.*
 Davallia alpina.*
 parvula.*
 Fadyena prolifera.*
 †Lomaria Spicant and
 varieties.
 Nephrodium fragrans.
 sanctum.
 Pellæa Brewerii.
 Bridgesii.
 gracilis.
 Polypodium lycopodioides.

- Polypodium piloselloides.
 rupestre.
 vaccinifolium.



FIG. 347.—ASPENIUM CETERACH.

- †Woodsia glabella.
 †hyperborea.
 †oregana.
 †scopulina.

*Those marked * require stove temperature ; those marked † are perfectly hardy.*

Ferns with Coloured or Tinted Fronds.

- Adiantum cardiochlæna.*
 colpodes.
 cyclosorum.*
 hispidulum.
 lunulatum.*
 macrophyllum and varieties.*
 peruvianum.*
 rhodophyllum.*
 rubellum.*
 tetraphyllum gracile.*
 tinctum.
 Veitchianum.*
 Blechnum longifolium gracile.
- Blechnum occidentale.
 Brainea insignis.*
 Davallia polyantha.*
 retusa.*
 tenuifolia Veitchiana.*
 Didymochlæna truncatula.*
 †Lastrea corusca.
 †erythrosora.
 †opaca.
 †prolifera.
 Lomaria attenuata.
 L'Herminieri.*
 Osmunda palustris.

Pellæa, nearly all of a glaucous colour.
 Polypodium appendiculatum.
 aureum.
 glaucophyllum.

Polypodium sporadocarpum.
 Pteris aspericaulis.
 tricolor.*
 Woodwardia orientalis.

Those marked * require stove temperature; those marked † are perfectly hardy.

Variegated Ferns.

Adiantum cuneatum variegatum.
 macrophyllum striatum.*
 Anemia phyllitidis tessellata.
 †Athyrium Goringianum pictum.
 Dictyogramme japonica variegata.
 Lastrea aristata variegata.
 †Polypodium vulgare variegatum.
 †Pteris aquilina variegata.
 cretica albo-variegata.
 cretica Mayii.

Pteris nemoralis variegata.
 palmata nobilis.*
 quadriaurita argyreia.
 q. tricolor.*
 reginæ.
 r. cristata.
 Victoriæ.
 V. cristata.
 †Scolopendrium vulgare variegatum.

Those marked * require stove temperature; those marked † are perfectly hardy.

Crested Ferns.

Adiantum cuneatum grandiceps.
 cuneatum Luddemannianum.
 c. versailleense.
 excisum multifidum.
 †Aspidium angulare, numerous forms.

†Asplenium marinum ramosum. †
 †Trichomanes, several forms.
 †Athyrium Filix-fœmina, numerous forms.
 Davallia elegans polydactyla.*
 hirta cristata.*
 Mariesii cristata.
 Doodia aspera multifida (Fig. 333).*
 Gymnogramme grandiceps.*
 Parsonsii.*
 Wettenhalliana.*

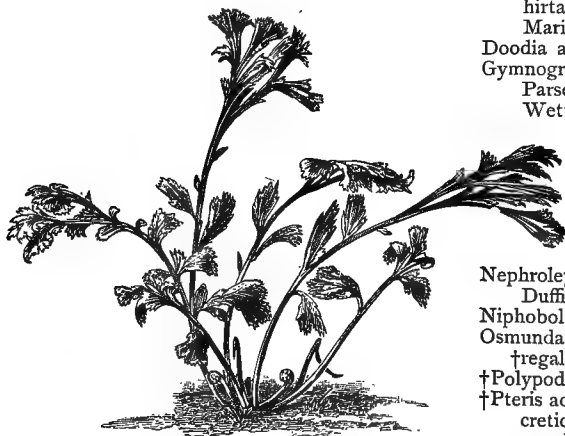


FIG. 348.—ASPENIUM ADIANTUM-NIGRUM GRANDICEPS.

†Asplenium Adiantum-nigrum grandiceps (Fig. 348).

Those marked * require stove temperature; those marked † are perfectly hardy.

Gold and Silver Ferns.

Adiantum scabrum.
 sulphureum.

Adiantum Williamsii.
 Alsophila pruinata.

†Lastrea Filix-mas, numerous forms.
 patens cristatum.
 Richardsii multifida.
 †spinulosa polydactyla.
 †Lomaria Spicant, several forms.

Nephrolepis davallioides furcans.*
 Duffii.*
 Nipholobus lingua corymbifera.
 Osmunda japonica corymbifera.
 †regalis cristata.
 †Polypodium vulgare, several forms.
 †Pteris aquilina grandiceps.
 cretica, several forms.
 serrulata, several forms.
 tremula grandiceps.
 t. Smithiana.
 †Scolopendrium vulgare, numerous forms.
 Woodwardia radicans cristata.

- | | |
|----------------------------------|--------------------------|
| Cheilanthes argentea. | Gymnogramme trifoliata.* |
| Borsigiana.* | Nothochlæna Eckloniana. |
| Clevelandii. | flavens. |
| Eatoni. | hypoleuca. |
| farinosa (Fig. 340). | lanuginosa. |
| tomentosa. | Newberryi. |
| Cyathea dealbata. | nivea. |
| Gymnogramme calomelanos, several | sinuata. |
| silver forms.* | sulphurea. |
| chrysophylla, several golden | trichomanoides.* |
| forms.* | Onychium auratum.* |
| triangularis. | |

*Those marked * require stove temperature.*

Filmy or Transparent Ferns.

- | | |
|---------------------------|--------------------------|
| Hymenophyllum æruginosum. | Trichomanes trichoideum. |
| asplenioides. | venosum. |
| caudiculatum. | |
| chiloense. | |
| ciliatum. | |
| crispum. | |
| cruentum. | |
| demissum. | |
| dilatatum. | |
| Forsterianum. | |
| hirsutum. | |
| javanicum. | |
| pectinatum. | |
| pulcherrimum. | |
| scabrum. | |
| †tunbridgense. | |
| †Wilsoni. | |
| Todea Fraseri. | |
| grandipinnula. | |
| intermedia. | |
| pellucida. | |
| superba. | |
| Trichomanes alatum. | |
| exsectum. | |
| humile. | |
| parvulum. | |
| pyxidiferum. | |
| †radicans and varieties. | |
| reniforme. | |
| tenerum. | |



FIG. 349.—GYMNOGRAMME SCHIZOPHYLLA.

Those marked † are perfectly hardy.

Ferns of Drooping Habit.

- | | |
|------------------------|---------------------------|
| Adiantum amabile.* | Asplenium obtusilobum.* |
| caudatum.* | Sandersoni.* |
| concinnum (Fig. 352).* | Davallia chærophylla. |
| incisum.* | dissecta. |
| lunulatum.* | fijiensis and varieties.* |
| l. dolabriforme.* | hemiptera.* |
| Asplenium caudatum.* | retusa.* |
| fiabellifolium. | tenuifolia Veitchiana.* |
| flaccidum. | Gymnogramme gloriosa.* |
| longissimum.* | schizophylla (Fig. 349).* |

Nephrolepis acuta.
 Bausei.
 cordifolia.
 davallioides.*
 d. furcans.*
 Duffii.*
 exaltata.
 pluma.

Polypodium appendiculatum.*

Polypodium lachnopus.
 Paradisæ.
 sub-auriculatum (Fig. 341).
 sub-petiolatum.
 verrucosum.*
 Pteris moluccana.*
 Woodwardia orientalis.
 radicans.
 r. cristata.

*Those marked * require stove temperature.*

Ferns of Climbing Habit.

Lygodium dichotomum.*
 japonicum.
 palmatum.
 pinnatifidum.*

Lygodium scandens (Fig. 337).
 venustum.*
 volubile.*

*Those marked * require stove temperature.*

Ferns of Trailing Habit.

Acrostichum acuminatum.*
 cervinum.*
 osmundaceum (Fig. 350).*
 peltatum (Rhipidopteris).*
 scandens (Stenochlæna) (Fig.
 338).*

Davallia divaricata.*
 elegans.*
 Griffithiana.*
 hirsuta.
 immersa.
 marginalis.

Davallia Mariesii.
 Mooreana.*
 novæ-zelandiæ..
 pentaphylla.*
 pyxidata.



FIG. 350.—ACROSTICHUM OSMUNDACEUM.

Davallia aculeata.*
 affinis.
 chærophylla.

Polypodium glaucophyllum.*
 †hexagonopterum.
 lachnopus.

Davallia repens.
 solida.
 Tyermanni.
 Dicksonia adiantoides.
 cicutaria.
 Davallioides Youngii.*
 Gleichenias, all known
 sorts.
 Hymenophyllum, all
 known sorts.
 Nephrolepis, all known
 sorts.
 Oleandra articulata.*
 nodosa.*
 Wallichii.
 Polypodium aureum.
 Billardieri.
 †Dryopteris (Fig. 336).

- Polypodium lingua.
 l. corymbifera.
 Paradisæ.*
 †Phegopteris.
 piloselloides.
 pustulatum.
 repens.*
 Schneideri.*
 sporadocarpum.*
 sub-auriculatum (Fig. 341).*
 sub-petiolatum.*
- Polypodium Swartzii.*
 vaccinifolium.*
 verrucosum.*
 †vulgare and varieties.
- Polystichum capense.
 Pteris moluccana.*
 scaberula.
- Trichomanes, most of the known
 sorts.
- Woodwardia angustifolia.

Those marked * require stove temperature; those marked † are perfectly hardy.

Curious Ferns.

- Actiniopteris radiata.*
 r. australis.*
 Adiantum reniforme.
 r. azarifolium.*
 Anemia, all known
 sorts.*
 Angiopteris evecta.
 Asplenium australasi-
 cum.*
 Hemionitis.
 Nidus.*
 †Botrychium lunaria.
 Ceratopteris thalictro-
 ides.*
 Fadyena prolifera (Fig.
 345).*
 Gymnogramme java-
 nica.*
 Muellerii.
 trifoliata.*
 Helminthostachys zey-
 lanica.*
 Hemionitis cordata.*
 palmata.*
 Hymenodium crini-
 tum.*
 Lindsaya reniformis.*
 Llavea cordifolia.
 Lygodium, all known
 sorts.
 Marattias, all known
 sorts.*
 Pellæa geraniifolia (Fig.
 351).
 Platycerium, all known
 sorts.*
 Polypodium fossum.*
 Xiphias.
 Pteris ludens.*
 palmata.
 sagittifolia.
 Rhipidopteris peltata.*
 p. gracillima.*

Schizæa, all known sorts.*
 Tænitis, all known sorts.*



FIG. 351.—PELLÆA GERANIFOLIA.

Trichomanes reniforme.
 Vittaria, all known sorts.*

Those marked * require stove temperature; those marked † are perfectly hardy.

Viviparous and Proliferous Ferns.

Adiantum caudatum.*
ciliatum.*
dolabriforme.*
lunulatum.*

Asplenium laxum pumilum.
longissimum.*
monanthemum.
obtusilobum.

Asplenium reclina-
tum.*
Sandersoni.*
tenellum.
viviparum.*
v. nobile.*

Ceratopteris thalic-
troides.*

Cystopteris bulbifera.
Fadyena prolifera
 (Fig. 345).

Gymnogramme schi-
zophylla.*

Hemionitis cordata.*
palmata.*

Hypolepis Bergiana.
Lastrea cicutæfolia.

prolifera.
Nephrolepis, nearly
 all known
 sorts.

Phegopteris divergens.
Platyterium alcornice
 (Fig. 353).

Stemmaria.*
Willinckii (Fig.
 342).*

Polypodium prolifera.
refractum.

†*Polystichum angulare*
prolifera,
 and varieties.
viviparum.

Pteris palmata.

Scolopendrium (*Camp-*
tosorus) *rhi-*
zophyllum.

†*Scolopendrium vulgare densum*.

†*v. proliferum*.

†*v. Wardii*.

Trichomanes pinnatum.*

Woodwardia orientalis.

radicans.

1. *Burgesiana*.

1. *crispa*.

1. *cristata*.



FIG. 352.—*ADIANTUM CONCINNUM*.

Asplenium alatum.*
attenuatum.
Belangerii.*
bulbiferum.
caudatum.*
Colensoi.
compressum.
dimorphum.
flabellifolium.
flaccidum.

*Those marked * require stove temperature; those marked † are perfectly hardy.*

Ferns for Hanging Baskets in Warm Fernery.

Adiantum amabile.
caudatum.
concinnum (Fig. 352).
cuneatum grandiceps.

Adiantum dolabriforme.
Farleyense.
fragrantissimum.
gracillimum.

Adiantum peruvianum.
Williamsii.
Asplenium caudatum.
longissimum.
Blechnum glandulosum.
Davallia dissecta.
elegans.
fijiensis and varieties.
Griffithiana.
Mooreana.

Davallia pentaphylla.
tenuifolia Veitchiana.
Gymnogrammes, gold and silver.
schizophylla gloriosa.
Microlepia hirta cristata.
Nephrolepis davallioides furcans.
exaltata.
pectinata.
Platynerium alcorni (Fig. 353).
Polypodium sub-auriculatum (Fig. 341).



FIG. 353.—PLATYNERIUM ALCORNI.

Ferns for Growing on Cork Blocks in Cool Fernery.

Adiantum Capillus-Veneris and
 varieties.
colpodes elegans.
Asplenium flabellifolium.
Davallia bullata.
Mariesii
M. cristata.
Hypolepis distans.
Pellaea rotundifolia.

Pellaea ternifolia.
Platynerium alcorni (Fig. 353).
Polypodium incanum.
lycopodioides.
pustulatum.
salicifolium.
tenellum.
triangulare laxum.

Ferns for Hanging Baskets in Cool Fernery.

Adiantum assimile.
venustum.
Asplenium flaccidum.
Davallia bullata.
Lawsoniana.
Mariesii.
M. cristata.
novæ-zelandiæ.
Hypolepis distans.
tenuis.
Leucostegia immersa.
Nephrolepis philippinensis.

Nephrolepis pluma.
tuberosa.
Pellæa ternifolia.
Phegopteris effusa.
Platycerium alaicorne (Fig. 353).
Polypodium pustulatum.
Polystichum lepidocaulon.
Pteris scaberula.
serrulata and varieties.
Woodwardia orientalis.
radicans.
r. cristata.

Ferns for Growing on Cork Blocks in Warm Fernery.

Adiantum ciliatum.
dolabriforme.
lunulatum.
setulosum.
Asplenium nobilis.
Davallia decora, all species with
rhizomes.
Nephrolepis cordata compacta.
pectinata.
philippinensis.

Oleandra nodosa.
Pellæa flexuosa.
Phlebodium venosum.
Phymatodes vulgaris cristata.
Platycerium grande.
Hilli.
Stemmaria.
Willinckii (Fig. 342).
Stenochlæna scandens (Fig. 338).

Ferns for Planting on Walls in the Warm Fernery.

Adiantum æmulum.
amabile.
caudatum.

Adiantum ciliatum.
cuneatum and varieties (Fig. 354).
fragrantissimum.



FIG. 354.—*ADIANTUM CUNEATUM*
LUDEMANNIANUM.

Adiantum peruvianum.
pubescens.
tenerum.
Asplenium alatum.
flaccidum.
planicaule.
Blechnum glandulosum.
Davallia decora.
dissecta.
elegans.
hemiptera.
fijiensis and varieties.
Mooreana.
pentaphylla.
Tyermanni.
Leucostegia immersa.
Nephrolepis, all sorts.
Osmunda palustris.
Platyloma ternifolia.
Polypodium appendiculatum.
Billardieri.
Catherinæ.
glaucophyllum.
sub-auriculatum (Fig. 341).
Polystichum mucronatum.
Stenochlæna scandens (Fig. 338).

Ferns for Planting on Walls in the Cool Fernery.

- | | |
|--|---------------------------------------|
| <i>Adiantum æthiopicum.</i> | <i>Davallia bullata.</i> |
| <i>assimile.</i> | <i>Mariesii.</i> |
| <i>Capillus-Veneris</i> and varieties. | <i>novæ-zelandiæ.</i> |
| <i>colpodes.</i> | <i>Diplazium Thwaitesii.</i> |
| <i>cuneatum</i> and varieties. | <i>Doodia caudata.</i> |
| <i>Cunninghamii.</i> | <i>Hypolepis distans.</i> |
| <i>denorum.</i> | <i>repens.</i> |
| <i>formosum.</i> | <i>Leucostegia immersa.</i> |
| <i>fulvum.</i> | <i>Nephrolepis tuberosa.</i> |
| <i>pubescens.</i> | <i>Niphobolus lingua.</i> |
| <i>venustum.</i> | <i>Onychium japonicum.</i> |
| <i>Williamsii.</i> | <i>Polystichum triangulare laxum.</i> |
| <i>Asplenium biforme.</i> | <i>Pteris adiantifolia.</i> |
| <i>elegantulum.</i> | <i>longifolia.</i> |
| <i>flaccidum.</i> | <i>scaberula.</i> |
| <i>Blechnum occidentale.</i> | <i>serrulata</i> and varieties. |



FIG. 355.—AGLAOMORPHA (POLYPODIUM) MEYENIANA.

Stove Ferns for Exhibition.

- | | |
|-------------------------------|-----------------------------|
| <i>Adiantum cardiochlæna.</i> | <i>Adiantum Farleyense.</i> |
| <i>Collisii.</i> | <i>fragrantissimum.</i> |

Adiantum Lathomii.
peruvianum.
trapeziforme (Fig. 332).
Aglaomorpha Meyeniana (Fig. 355).
Anemias, of sorts.
Asplenium Nidus.
Davallia fijiensis and varieties.
Mooreana.
polyantha.
tenuifolia Veitchii.
Gymnogramme chrysophylla Alstoniæ.

Gymnogramme peruviana argyrophylla.
schizophylla gloriosa.
Nephrolepis davallioides.
d. furcans.
rufescens tripinnatifida.
Microlepia hirta cristata.
Platycerium grande.
Polypodium Schneiderii.
sub-auriculatum (Fig. 341).
Pteris ludens.

Greenhouse Ferns for Exhibition.

Adiantum cuneatum.
c. grandiceps.

Adiantum gracillimum.
Veitchii.



FIG. 356.—GLEICHENIA MENDELLII.

Adiantum Williamsii.
Asplenium laxum
pumilum.
Brainea insignis.
Davallia bullata.
Tyermannii.
Gleichenia dicarpa
longipinnata.
flabellata.
Mendellii (Fig.
 356).
rupestris.
semivestita.
speluncae.
Lomaria gibba.
g. platyptera.
Microlepia platy-
phylla.
Phegopteris effusus.
Polypodium aureum.
Pteris Drinkwaterii.
longifolia Mariesii.
scaberula.
Woodwardia orient-
talis.
radicans and va-
 rieties.

British Ferns (dwarf) for Exhibition.

Adiantum Capillus-Veneris grande.
C.-V. imbricatum.
Asplenium fontanum (Fig. 334).
septentrionale.
Trichomanes confuens.
T. cristatum.
T. incisum.
Athyrium Filix-foemina crispum.
F.-f. Edwardsii.
F.-f. Vernoniæ cristatum.
Blechnum Spicant cristatum.
S. Maunderii.
S. plumosum.

Blechnum Spicant trinervo coronans.
Cystopteris montana.
Lastrea Filix-mas fluctuosa.
montana ramo-coronans.
Polypodium vulgare cristatum.
v. elegantissimum.
v. Fowlerii.
Polystichum Lonchitis.
Scolopendrium vulgare Coolingii.
v. cristulatum.
v. ramo-marginatum.
v. scalariforme.

British Ferns (tall) for Exhibition.

- | | |
|-------------------------------------|----------------------------------|
| Athyrium Filix-femina corymbiferum. | Polypodium vulgare pulcherrimum. |
| F.-f. Craiggii. | Polystichum angulare cristatum. |
| F.-f. Fielqiæ. | a. divisilobum decorum. |
| F.-f. plumosum. | a. plumosum. |
| F.-f. todioides. | a. proliferum. |
| F.-f. Victoriæ. | a. p. Henleyæ. |
| Lastrea Filix-mas Bollandiæ. | a. rotundatum. |
| F.-m. cristata. | Scolopendrium vulgare crispum. |
| F.-m. fimbriata. | v. endivæfolium. |
| F.-m. grandiceps. | v. grandiceps. |
| F.-m. ramosissima. | v. ramo-cristatum majus. |
| Osmunda regalis cristata. | v. Stableræ. |
| Polypodium vulgare cambricum. | |

Hardy Exotic Ferns for Exhibition.

- | | |
|------------------------------|--------------------------------|
| Adiantum pedatum (Fig. 330). | Onoclea sensibilis. |
| Aspidium Goldieanum. | Osmunda cinnamomea (Fig. 358). |
| Dicksonia punctilobula. | gracilis. |
| Lastrea corusca. | interrupta. |
| erythrosora. | Polystichum munitum. |
| Lomaria chilensis. | Struthiopteris pennsylvanica. |

Hardy Ferns Suitable for Dwelling Rooms.

- | | |
|-------------------------------|-----------------------------------|
| Asplenium bifforme. | Nephrolepis tuberosa. |
| bulbiferum. | Osmunda palustris. |
| Colensoi. | Polypodium aureum. |
| foeniculaceum. | Platyterium alaicorne (Fig. 353). |
| laxum pumilum. | Polystichum capense. |
| Nidus. | setosum. |
| Cyrtomium anomophyllum. | Pteris adiantifolia. |
| falcatum. | cretica and varieties. |
| Fortunei. | longifolia. |
| Davallia canariensis. | Mayii. |
| • Lastrea aristata variegata. | Ouvrardii. |
| atrata. | serrulata and varieties. |
| Filix-mas cristata. | Todea arborea. |
| lucida. | tremula. |
| Nephrolepis exaltata. | Wimsettii. |

Hardy Ferns Suitable for Ordinary Fern-Cases.

- | | | |
|-----------------------------|-----|--------------------------------------|
| Adiantum Capillus - Veneris | and | Davallia novæ-zelandiæ. |
| varieties. | | tenuifolia stricta. |
| affine. | | Doodia caudata. |
| hispidulum. | | Lomaria alpina. |
| reniforme. | | Niphobolus lingua. |
| setulosum. | | Onychium japonicum. |
| Asplenium alatum. | | Polypodium Billardieri. |
| Fernandezianum. | | Scoulerii. |
| fragrans. | | venosum. |
| Hemionitis. | | Polystichum setosum. |
| inequale. | | Pteris cretica and varieties. |
| monanthemum. | | internata. |
| zeylanicum. | | serrulata and varieties. |
| Davallia bullata. | | Scolopendrium vulgare and varieties. |
| canariensis. | | |

For Outdoor Ferneries.

Ferns growing from 4in. to 12in. in height.

Allosorus acrostichoides.
 crispus.
 Aspidium nevadense.
 Asplenium adiantum nigrum.
 ebumum.
 Ruta-muraria.
 Trichomanes, and varieties.
 viride.
 Athyrium Filix-fœmina crispum.
 F.-f. Edwardsii.

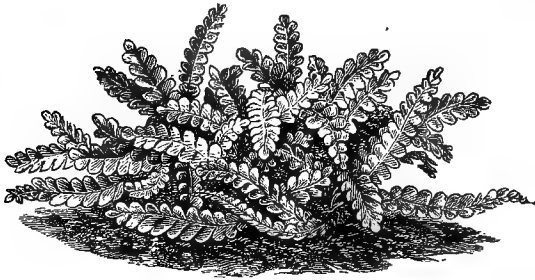


FIG. 357.—LOMARIA ALPINA:

Athyrium Filix-fœmina Findlayanum.
 F.-f. Frizellæ.
 F.-f. minimum.
 F.-f. Vernoniæ.

Aspidium cristatum.
 noveboracense.
 rigidum argutum.
 Asplenium Thelypteroides.
 Athyrium Filix-fœmina, about fifteen
 varieties.
 Dennstædtia punctilobula.
 Lastrea æmula.
 dilatata cristato gracile.
 d. lepidota.
 Filix-mas fluctuosa.
 F.-m. Crouchii.
 intermedia.
 marginale.
 montana.
 Thelypteris.
 Polypodium alpestre.
 a. flexile.

Ferns growing 2ft. high and upwards.

Aspidium Clintonianum.
 spinulosum Boothii.
 Athyrium Filix-fœmina, about eighteen
 varieties.
 Michauxii.

Blechnum Spicant, and varieties.
 Ceterach officinarum (Fig. 335).
 Cystopteris bulbiferum.
 fragilis and other sorts.
 Lastrea Filix-mas crispa.
 rigida.
 Lomaria alpina (Fig. 357).
 crenulata.
 Phegopteris hexagonoptera.
 Polypodium Dryopteris (Fig. 336).
 Polypodium Phegopteris.
 Robertianum.
 vulgare cornubiense.
 v. elegantissimum.
 Polystichum angulare Bayliæ.
 a. parvissimum.
 Lonchitis.
 Scolopendrium vulgare Coo-
 lingii.
 v. cristulatum.
 v. densum.
 v. digitatum.
 v. endivæfolium.
 v. fissum.
 v. grandiceps.
 v. marginatum tenue.
 v. ramo-cristatum.
 Scolopendrium vulgare scalariforme.
 Woodsia ilvensis.
 obtusa.
 Woodwardia angustifolia.

Polypodium vulgare auritum.
 v. cambricum.
 v. crenatum.
 v. semilacerum.
 Polystichum acrostichoides.
 aculeatum.
 angulare acutilobum.
 a. cristatum.
 a. grandidens.
 a. imbricatum.
 a. proliferum.
 a. rotundatum.
 a. Wollastonii.
 Scolopendrium vulgare capitatum.
 v. crispum.
 v. multifidum.
 Woodwardia virginica.

Lastrea dilatata and varieties.
 erythrosora.
 Filix-mas, about eighteen varieties.
 Goldieana.
 Lomaria chilensis.

Onoclea sensibilis.
 Osmunda cinnamomea (Fig. 358).
 gracilis.
 interrupta.
 regalis.
 r. cristata.

Polystichum angulare, about twelve varieties.
Polystichum munitum.
Pteris aquilina
 a. cristata.
Struthiopteris germanica.
pennsylvanica.

Ferns for Cutting.

Adiantum æmulum.
 amabile.^{*}
 Capillus-Veneris.
 cuneatum.
 decorum.
 Farleyense.^{*}
 fragrantissimum.^{*}
 gracillimum.
 Pacotii.
 scutum.^{*}
 †*Asplenium Adiantum-nigrum*.
 alatum.
Davallia bullata.
 decora.

Davallia dissecta.^{*}
 d. elegans.^{*}
 fijiensis.^{*}
 Griffithiana.^{*}
 tenuifolia.
 t. Veitchiana.^{*}
 Tyermannii.
Leucostegia immersa.
Onychium japonicum.
Osmunda palustris.
Pteris cretica and varieties.
 serrulata and varieties.
 †*Polystichum angulare* and varieties.

*Those marked * require stove temperature ; those marked † are perfectly hardy.*

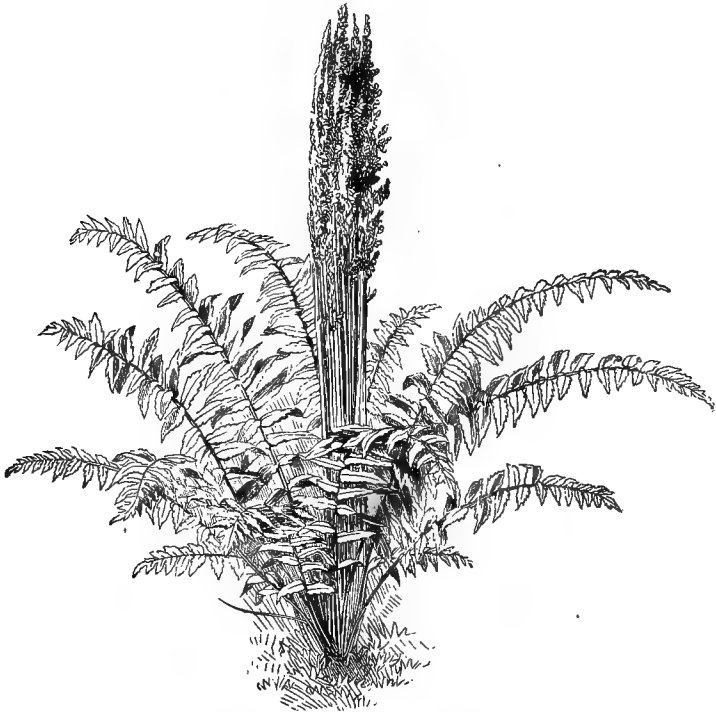


FIG. 358.—OSMUNDA CINNAMOMEA.



13.—*On Orchids.*

BY HENRY JAMES CHAPMAN.

THERE is no branch of gardening that has made more rapid progress during the last half century than the cultivation of Orchids. With the facilitated steamship passage afforded by the present day, these gems of the forest may be translated in as many days as it used to take months; and, by the means at disposal, after they arrive in this country, they are brought practically to the doors of our glasshouses for an outlay of less shillings than it would have cost pounds a few years ago. This increased facility, combined with better-arranged houses and the enlightenment of the grower, especially in the art of hybridisation, has led to the present popularity of the most interesting class of plants that Nature has presented to man. The principal drawbacks to the further and more general cultivation of Orchids are the utterly erroneous ideas that the initial expense is so great, that after the plants have been procured they require very special conditions under which to grow, and that a man with a special practical knowledge of their culture is indispensable. It is easy to refute the first of these objections by simply stating the fact that a selection of plants of the very finest species may be procured from any respectable nurseryman or at the weekly auction sales for the same sum that would purchase a collection

of Carnations, Geraniums, or any other class of stove or greenhouse plants. As to the special houses in which to grow them, there is no question that where the usual kinds of stove and greenhouse plants are cultivated, the possessor of the houses has the means at hand for the successful culture of Orchids. With regard to the gardener, any man with common sense has the required ability if he is a successful cultivator of stove and greenhouse plants; there is no fear but that his sense of observation, with energy, will be sufficient to surmount all difficulties. There is a decided line to be drawn between having a useful and an interesting selection of Orchids, and, on the other hand, becoming the possessor of a vast collection, and making them a speciality. In the latter case, the skill of a thoroughly trained and experienced man is, of course, absolutely essential.

In the cultural notes which follow the aim of the writer has been to set forth the conditions under which he has obtained the best results, in order to assist those who may need a little guidance; but it must be borne in mind that there are no hard-and-fast lines in the cultivation of Orchids, any more than is the case with other plants. In many instances (some of which are cited further on) even a change of position in the same house has produced remarkable effects. This is pointed out in order to give encouragement, so that growers may endeavour to ascertain for themselves suitable conditions of culture, where those here advised may not have proved satisfactory.

For convenience of reference this chapter has been divided into four sections: (1) Warm or Stove Orchids, (2) Intermediate House Orchids (warm and cool), (3) Cool Orchids, and (4) Hardy Orchids.

In conclusion, the progress that has been achieved since 1853, through the art and perseverance of the hybridist, will be noticed; while an extended list of desirable kinds will be found in the "Appendix."

Warm or Stove Orchids.

The following require a temperature of 70deg. to 75deg. Fahr. in summer, and 65deg. Fahr. in winter.

ARACHNANTHE. — This genus was originally introduced as *Vandas*. In *A. Cathartii* and *A. Lowii* we have two of the most remarkable Orchids that have ever been brought into

European gardens. They are usually considered difficult subjects to manage, but where they can be induced to grow satisfactorily they are most attractive, and thoroughly repay for the trouble incurred. When in blossom *A. Cathcartii* has flowers upwards of 3in. in diameter, the sepals and petals pale yellow, crossed with numerous wavy reddish-brown bands; the front lobe of the lip is pale yellow, and the side lobes are white streaked with red. The most satisfactory conditions under which I have found this species to grow are when attached to teak-wood cylinders, using a compost of sphagnum intermixed with clean broken crocks, giving the plants a position in the house where there are constant moisture and condensation about them throughout the year. *A. Lowii* is one of the most remarkable Orchids in cultivation. It was discovered in Sarawak by Sir H. Low, by whom it was introduced to this country. The habit of growth resembles a gigantic Vanda, the leaves being from 24in. to 30in. long. I have seen racemes of flowers on this species upwards of 14ft. in length, with the flowers at short intervals from its base to apex. The three lower flowers differ both in colour and in shape from the others, and form a striking contrast; the sepals and petals are shorter, broader, and more fleshy than the ordinary ones, bright tawny yellow with some brown dots sprinkled over the surface. The ordinary flowers are 3in. in diameter; the sepals and petals are undulated, rich chocolate-brown mottled with yellow; the lip is yellow, lined and spotted with purple. The temperature and treatment should be the same as that recommended for Vandas.

VANDAS.—There are no more graceful plants to be seen in any genera of Orchids than the common varieties of Vandas. A house full of these plants is always an attraction, even when not in flower; and as they flower at different seasons of the year, where there are sufficient numbers grown it would be difficult to enter the house without finding something in blossom. They are among the most tractable species to cultivate, and should be grown to a far greater extent than they are at present. Vandas require a temperature of from 68deg. to 70deg. Fahr. fire-heat in summer, with a rise of from 10deg. to 15deg. with sun-heat; in winter a temperature of from 60deg. to 65deg. Fahr. is sufficient. During the growing season (March to October) they require an abundance of moisture both at the roots and in the atmosphere. In bright weather, and when the outside conditions permit, free ventilation at the bottom is required. The top ventilators must be used with judgment for all warm houses, or the desired humidity of the atmosphere may not be retained. It is far better to bring the roof-blinds into use earlier than to have to resort to the use of the top ventilators. During the other months of the year, with the lower degree of temperature, very little moisture is required; in fact, only

sufficient should be given to keep the plants from shrivelling and in a plump condition. This season of rest is when most of the Eastern sections of Orchids require the greatest care. I may be permitted to point out here that when alluding to plants *resting* (speaking of Orchids in general) I do not mean that they are to be cast on one side or placed on a shelf and to be subjected to the barbarous practice of being kept without water for an indefinite period. My experience has led me to believe that for resting purposes there is nothing like a low, dry temperature, which can be well maintained without injury to



FIG. 359.—VANDA SANDERIANA.

the plants; better growths can be procured, and far more satisfactory results obtained as regards flowering under the latter conditions.

The best season for potting or top-dressing Vandas is at the end of February or the beginning of March. It is not desirable to repot plants of this section oftener than is really necessary. Only those that have become leggy and unsightly through loss of their basal foliage need shifting; under such circumstances the plants should be cut down, so that the basal leaves may be brought within a desirable distance from the rim of the pot.

Of course, this operation must be governed by the amount of roots the plant has below the lowest leaves. In repotting a clean pot should always be used. A layer of large crocks should be placed at the bottom, the plants then placed in position, and as many roots as possible got in. A stick sufficiently long and strong enough to sustain the plant should then be fixed. After this has been done, the whole of the space between the roots should be filled with clean broken crocks to within an inch or so of the top, filling the remainder with chopped sphagnum moss, slightly raised in the centre, and making it moderately firm with a stick in preference to using the fingers, which latter practice has a tendency to turn the moss sour. Other plants that are well furnished with foliage to the base should not be turned out of the pots; they should have all the sour material removed, and replaced with good living sphagnum moss and clean broken crocks, the whole being made moderately firm about the roots. After potting the plants should be thoroughly watered, using a moderately fine-rosed water-can. The water used is an essential consideration if it is desired to keep the moss in a green and growing condition in any class of Orchids. If



FIG. 360.—VANDA TERES.

possible rain-water only should be employed. Hard water soon has disastrous effects on the moss.

The best varieties of Vandas to grow are those of the *V. tricolor* section, of which there are varied forms, and all are interesting. *V. Denisoniana* is creamy-white, and a desirable kind; *V. cœrulea*, with its azure-blue flowers, is one of the finest in

the genus; *V. Batemannii* (*Stauroopsis lissochiloides*) is a gigantic species, with flowers brown- and yellow-barred in front and rose-pink at the back; *V. Amesiana* and *V. Kimballiana*, with terete foliage, are both splendid kinds. Fig. 359 represents *V. Sanderiana*, the king of the genus, with huge flat flowers of brilliant hues—rose and yellow, heavily veined with rich purple. There are many other desirable kinds, but the above-mentioned are the most prominent. There are two others, viz., *V. teres* (Fig. 360) and



FIG. 361.—VANDA HOOKERIANA.

V. Hookeriana (Fig. 361), with cylindrical foliage, which to flower satisfactorily require a strong light, and should be grown at the end of a house, where they may be exposed to the full rays of the sun. They may be planted out thickly in a box, and trained up close to the roof-glass, the potting compost consisting of sphagnum and broken crocks. These species require constant syringing during the growing season, with a humid atmosphere; but during the resting season little moisture is needed.

AERIDES are closely allied to the Vandas, and require similar treatment in most instances, the exception being *A. japonicum*, which does best in a cool house, and *A. crassifolium* (one of the most beautiful of the genus, having deep rose-tinted flowers), which succeeds better when grown in a lighter position than is suitable to the bulk of the genus. This is a group of plants that at the present time have become scarce and valuable. For some unknown reason they have not been grown to the extent they deserve, consequently many trade establishments, finding there has been no sale for them, have replaced them by more saleable articles, with the result that many kinds are now difficult

subjects to procure; but as they are gradually becoming more popular again, I trust importers may be induced to increase the stock of many of the choicest species.

The finest *Aërides* ever introduced is *A. Lawrenceæ* (Fig. 362). I well remember the first plant of this flowering, and what a sensation it caused. When it was offered for sale at Stevens' Auction Rooms it realised 210 guineas. The purchaser was Sir Thomas Lawrence, and the species was dedicated to Lady Lawrence.

The gigantic flowers are pure white with broad tips of bright rose-pink. *A. Sanderianum* was imported with *A. Lawrenceæ*, and is a variety of that species, the only distinction being that the white ground is replaced by a creamy-yellow in *A. Sanderianum*. *A. crispum* is a lovely species, deserving of a place in every collection. *A. falcatum* and its several forms are desirable. *A. Fieldingii* (the Fox Brush) is one of the most popular of its section. *A. odoratum*, one of the oldest known Orchids in cultivation, and many others are well worthy of mention, but for these the reader is referred to the "Appendix."

ANGRÆCUM.—This is a most interesting genus of plants, of peculiar structure, their tail-like protrusions giving them an appearance that cannot fail to attract. Undoubtedly the finest species is *A. sesquipedale* (Fig. 363), a plant in which the

late Charles Darwin took a special interest. It has waxy-white flowers upwards of 6in. in diameter, with a tail of the same colour often upwards of 1ft. in length; it is easy of culture, and



FIG. 362.—*AËRIDES LAWRENCEÆ*.

should be represented in every collection. *A. eburneum* is the most gigantic of the genus, and possesses a robust constitution. The above two species, owing to their proportions, are best accommodated in pots, requiring similar treatment to that recommended for Vandas. All the other members of the genus in cultivation are practically of miniature habit, and suitable for basket culture, suspended from the roof. The most



FIG. 363.—ANGRÆCUM SESQUIPEDALE.

attractive sorts are *A. Ellisii* (Fig. 364), *A. citratum*, *A. fastuosum*, *A. Leonis* (*A. Humblotii*), *A. modestum*, and the terete-leaved *A. Scottianum*. The potting compost should be the same as that recommended for Vandas.

SACCOLABIUM is another genus that requires similar treatment to that recommended for Vandas. One of the best of the species is *S. Blumei* (*Rhynchostylis retusa*). It is of free habit,

and very attractive. The flowers are white, spotted with pink, and are produced on racemes 12 in. or more in length. *S. (Rhynchostylis) caeleste* is one of the most beautiful of the section, its flowers—light blue, suffused with a darker shade—being very attractive. Unfortunately it is of delicate constitution, does



FIG. 364.—ANGRÆCUM ELLISII.

not submit readily to culture, and requires considerable care. A suspended position close to the roof-glass suits it best. *S. bellinum* is a pretty, dwarf-growing species, having frosty-white and green flowers, spotted with purple. *S. ampullaceum*, a pretty species with rose-coloured flowers; *S. curvifolium*, a very attractive species, with rich scarlet flowers; *S. giganteum*, as its name implies, the

largest of the section; and *S. Harrisonianum* (now regarded as a variety of *S. violaceum*), with pure white flowers, are all worthy of consideration. The whole section is suitable for basket culture.

PHALÆNOPSIS.—These are far more frequently met with in perfection in stoves growing with other plants, where there is no pretension to cultivating Orchids, than in places where there are valuable collections. In fact, in very few indeed of our prominent collections do we find the plants in a satisfactory condition. From an incident that happened in the collection of which I have charge I have come to the conclusion that the principal difficulty as regards their culture is to find a position suitable to their requirements. If this can be done there is no need for manuring, special appliances, or cultural skill to attain desirable results. This may be gathered from the following facts: Five years ago the plants of Phalænopsis under my care were in such a dilapidated state that I suggested to my employer to either dispose of them or allow me to remove them to another house, for they had lost leaves as fast as they made them, while others were cut asunder where they had been attacked by the dreaded "spot," so fatal to this genus. It was decided to try them in another house, to which they were all immediately removed, with the exception of two plants which had no leaves on, but still showed some life in the crowns. These were hung on one of the crossbars of the roof, more to be out of sight than for any other reason, as very little hope was entertained of their recovery. The bulk of the plants removed did not seem to make much progress in their new quarters, but to my surprise one day, when looking through the plants in the old house, I discovered that both those left hanging had started into active growth, one having broken afresh with two growths. These went on so satisfactorily that ultimately it was decided to bring the whole of the plants back again, and to suspend them from the roof, they having previously been arranged on the staging, not more, in many cases, than a few inches below where they at present hang. The result has been that they have gone on satisfactorily ever since, and are now one of the chief features of the collection. No special treatment in any way is adopted with them; they are dipped in a pail of water when they require moisture at the roots. A temperature is maintained with fire-heat in summer from 70deg. to 75deg. Fahr., and in winter to 65deg. The potting, or top-dressing, as may be required, is done in May, as the plants then begin to show signs of activity, using for the purpose good living sphagnum moss. The plants are not rebasketed oftener than is really necessary, it being sufficient, providing the basket is sound, to remove all decayed material and replace it with new, pressing the same firm with a pointed stick. After they have been so treated they are thoroughly soaked with soft rain-water, and

are not again watered until the potting compost has become dry. The plants by this time show signs of making new leaves, and only require to be kept moist at the roots, until with shortening days the temperature in the houses is reduced. The flower-spikes by that time have made their appearance, and consequently the watering is carefully attended to until these have been removed, after which only sufficient moisture is given to prevent the plants from shrivelling until the potting season returns.

The showiest sorts are: *P. Aphrodite* (*amabilis*, Lindl.) (Fig. 365, c), one of the best, with white flowers, except a little purple

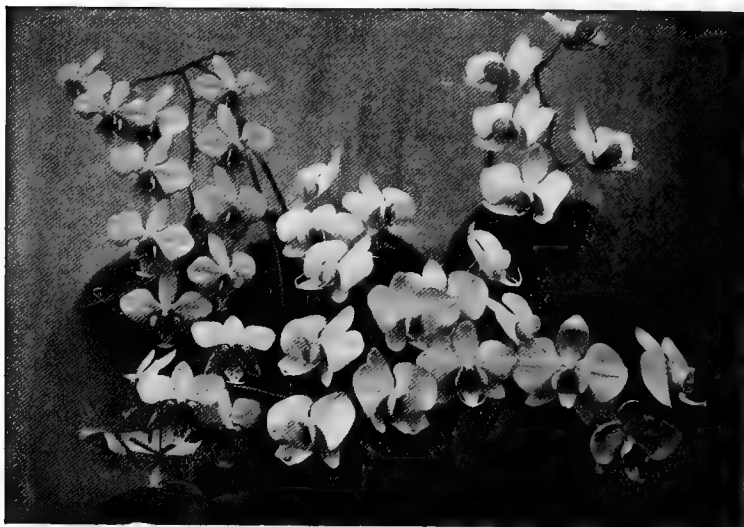


FIG. 365.—(A) PHALÆNOPSIS SCHILLERIANA, (B) PHALÆNOPSIS STUARTIANA, (C) PHALÆNOPSIS APHRODITE.

on the base of the lower sepals and a little yellow on the lip. *P. grandiflora*, as its name implies, is a noble plant, deserving of every attention; its white flowers are produced during the summer months. *P. Schilleriana* (Fig. 365, A) is one of the most useful, producing its rose-tinted flowers in the dead of winter. There are several others of this section, such as *P. Stuartiana* (Fig. 365, B), *P. leucorhoda casta* (Fig. 366), and the numerous *Veitchiana* hybrids in the way of *P. intermedia*. In the dwarf-growing section *P. violacea*, *P. Luddemanniana*, *P. speciosa*, and others are interesting and useful.

BOLLEA, PESCATOREA, and WARSCIEWICZELLA.—These are somewhat difficult subjects to deal with, but when a place suitable

to their requirements is found, the difficulties are readily surmounted. I grow them satisfactorily in a shady, damp corner of the Phalænopsis-house. The plants are placed in baskets, raised from the stage by means of inverted pots, the potting compost consisting of good fibrous peat and sphagnum moss



FIG. 366.—*PHALÆNOPSIS LEUCORHODA* CASTA.

(two parts of the latter to one part of the former). They require an abundance of water during the growing period, and on no account must the plants be allowed to suffer from lack of moisture at the roots at any season of the year. *Pescatorea Lehmanni* is a handsome species. The sepals and petals are white, with numerous parallel lines of rich purple. The lip is

mauve-purple, with numerous coarse purplish hairs in the centre. There are many others in this section worth growing, but space does not permit of their being dealt with here.

ANÆCTOCHILUS and **GOODYERA**.—These also are usually difficult subjects to deal with. As they are grown principally for their foliage, and require special appliances, they do not recommend themselves to general cultivation. The plants require a frame or case covered with glass affixed to the staging, and the atmosphere within kept almost at saturation point of humidity throughout the year. The potting compost should consist of good fibrous peat and living sphagnum in equal proportions, to which should be added a free sprinkling of broken crocks. *A. Lowii* is one of the best of the Anæctochili, but there are several other interesting species.

BULBOPHYLLUM is rather a genus of special interest to botanists as curiosities, than to the average Orchid-fancier. The plants are quaint and wonderful. Their usual dwarf habits and preference for light positions make them suitable subjects for basket culture, so that they may be suspended from the roof in a compost of fibrous peat and sphagnum. They require a humid atmosphere and strong heat when growing, but are benefited by cooler quarters during the season of rest.

CALANTHES.—The deciduous section of this beautiful winter-flowering genus are perhaps more generally grown than any other species of Orchids, and they adapt themselves readily to cultivation in almost every garden where stove accommodation exists. The plants should be repotted directly they show signs of activity by starting from the base of the last-made growths. The pots as to size must be governed by the strength of the plant; they should be filled one-third of their depth with clean, broken crocks, the potting compost consisting of rich fibrous loam and peat in equal proportions, to which may be added a liberal supply of dried cow-manure and a free sprinkling of rough sand. Calanthes are best grown on a shelf close to the roof-glass. They require very little water at the roots until the growths have got away and the roots have taken hold of the material. They should then be more liberally treated and have every encouragement, and should not be allowed to become dry until the flower-spikes have been removed, after which they may be rested until the potting season returns, only sufficient water being given to keep the bulbs in a plump condition. Calanthes may be had in various colours, undoubtedly the finest of all being the lovely hybrid raised in the collection of Baron Schroeder, after whom it is named. The evergreen section is not so popular as the deciduous class, but is very interesting. The plants require similar treatment to that recommended for Phaius.

DENDROBIUMS.—At the present time there are no species of Orchids so much in demand as the Dendrobiums, amongst the most beautiful and, in most cases, easily cultivated of the *Orchideæ*. There are at the present time nearly one hundred species, and an equal number of garden hybrids are in cultivation. Considering the wide area from which the species

are derived, it is not surprising that there is a great difference in their habit of growth. Some have small wiry bulbs, while others have growths of gigantic proportions. *D. superbiens*, native of tropical Australia, represents one of the sections which of late years have come into prominence by the re-introduction of *D. Phalænopsis* (Fig. 367), one of the most wonderful and beautiful species known. The flowers are



FIG. 367.—DENDROBIUM PHALÆNOPSIS.

produced in racemes, and the colour is found in all shades from paper-white to rich purple and crimson, thus giving it preference over all the species of the genus. One of the grandest sights ever witnessed was that in the collection of Baron Schroeder, where upwards of 500 spikes of flowers were to be seen some time ago. To grow this section satisfactorily it is advisable to afford strong light and a hot, humid atmosphere during the growing season, with a cooler and drier atmosphere during the period of

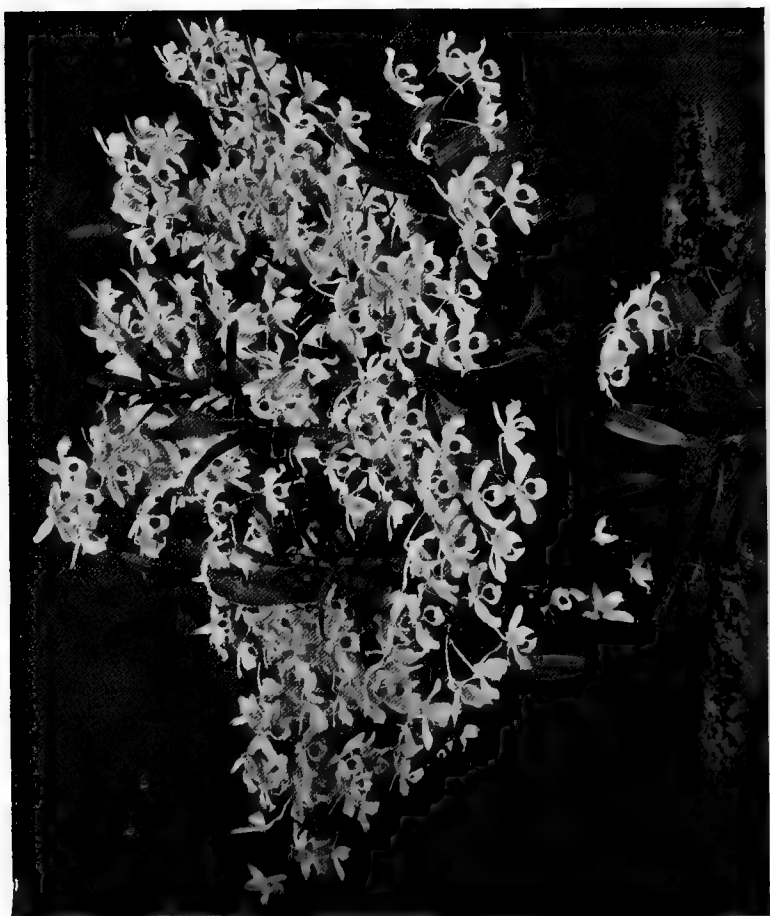


FIG. 368.—DENDROBIUM NOBILE.

rest. The plants are best grown in pans suspended from the roof.

The other two sections of Dendrobiums, viz., the deciduous and the evergreen, may be grown by anyone in possession of a stove or vinery. Some of the most remarkable cultural examples of *D. nobile* (Fig. 368) I have seen were in a market-garden, growing with and under similar conditions to the vines. There is no reason whatever why many others of the Eastern section should not succeed under the same conditions. As plants of

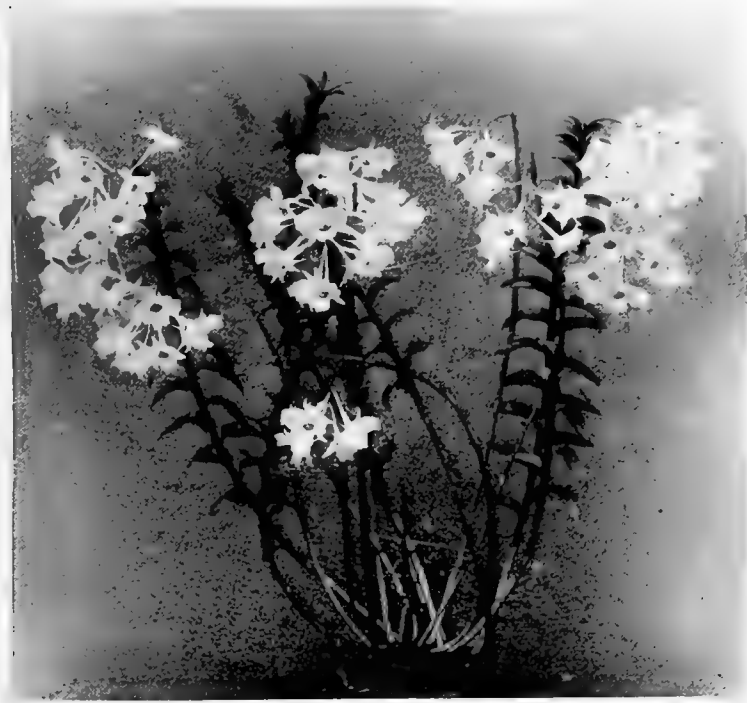


FIG. 369.—DENDROBIUM DEAREI.

both sections can now be procured in variety by the outlay of a few shillings, they should be far more generally grown. *D. infundibulum* is a lovely white and yellow-flowered sort that succeeds best when grown with the *Odontoglossums*.

Those in possession of a house that can be specially set apart for Dendrobium culture enjoy considerable advantages. The temperature must be maintained at stove-heat from the time when the plants commence to push their flower-buds into prominence till the new growths are matured. The atmosphere

must also be kept in a humid condition during the season of activity by constantly syringing the plants overhead in bright weather, and by continually damping the floors and staging. As they require strong light to properly mature their growths, only sufficient shading is necessary to prevent scorching of the foliage. I have always found it best to remove the plants from their quarters, as soon as the growths are sufficiently matured, to drier and cooler positions. This prevents premature growth, enables the plants to ripen their growths properly, and so prepares them for the flowering season.

The best season for repotting is directly after the flowers have been removed. The receptacles should be only just large enough to properly hold the plants, so that as little compost as possible may be used (only sufficient to properly secure the plants is needed), the compost consisting of one part of fibrous peat and two parts of sphagnum. Plenty of drainage and a few broken crocks are desirable to keep the compost in a sweet and porous condition. After potting the plants should be thoroughly wetted, which will be sufficient to sustain them for some time. Too much moisture at the roots must be avoided until the new growths get well away and the young roots appear,

when they require more liberal treatment.

The number of desirable species and hybrids are so great that I would advise those desirous of forming a collection to visit some of the large nurseries during the months of February, March, April, and May. They will then be able to select such forms as



FIG. 370.—*DENDROBIUM FORMOSUM GIGANTEUM*.

may suit their taste. Fig. 369 represents *D. Dearei*, which may faithfully be termed a perpetual grower, and must therefore be treated accordingly. The flowers are pure white, except the base of the lip, which is pale green. This species lasts several months

in perfection after expanding its flowers. The lovely *D. formosum giganteum* (Fig. 370) is one of the most beautiful and useful Orchids in cultivation, and its exquisite large white and yellow flowers being produced in the late summer and autumn months



FIG. 371.—DENDROBIUM THYRSIFLORUM.

(when flowers of all description are scarce) adds further to its value. It requires highly humid and hot conditions during the period of growth, with the full benefit of the sun's rays. A fig or forcing-house suits it admirably. It should be suspended near the roof-glass.

The evergreen section, to which *D. thyrsiflorum* (Fig. 371) belongs, is a lovely one, and may be grown under similar conditions to those suggested for the deciduous section, with the exception that a little more warmth must be afforded during the resting period, or the foliage is liable to become spotted. There are numerous interesting varieties which flower through the summer months, and these are worthy of every consideration.

RENANTHERA.—Owing to its shy-flowering qualities, this genus is not grown to any great extent. There are only three species which merit attention: *R. coccinea*, *R. Storiei*, and the dwarf-growing *R. Imschootiana*. These should be grown under similar conditions to those advised for Dendrobium, as they require strong light to flower satisfactorily.

PERISTERIA and PHAIUS.—I have coupled these two genera as they require practically similar treatment. With the exception of *Phaius tuberosus*, all are suitable for ordinary stove culture. The potting compost should consist of good fibrous peat and sphagnum, to which may be added a liberal mixture of turfy

loam and rough sand. The plants are mostly gross feeders, and require a fair amount of pot room. The pots should be drained to one-third their depth. *Phaius tuberculatus* is rather a difficult subject, requiring a position near the glass, the atmospheric conditions of a Phalænopsis house, and a potting compost of peat and living sphagnum moss. Fig. 372 represents *P. Norman*, a hybrid between *P. Sanderianus* and *P. tuberculatus*. *Peristeria elata* (the Dove or Holy Ghost Orchid), when in flower, is always a subject of admiration.



FIG. 372.—PHAIUS NORMAN.

PLATYCLINIS (*Dendrochilum*).

—This is another lovely Orchid, requiring stove culture. There are several species, the best being *P. glumacea*, with racemes of creamy-white flowers. Its perfume is delightful, two or three spikes being sufficient to scent a house. It requires a compost of peat and sphagnum, and a well-drained and shallow receptacle suits it best.

PAPHINIA and PROMENEA.—These are dwarf-growing kinds suitable for hanging purposes. They produce their quaint flowers during the summer months, and these, though small, are very attractive. The potting compost

should consist of good peat and sphagnum. The plants require a moist position in the temperature of the East Indian house.

GRAMMATOPHYLLUM is a somewhat unsatisfactory genus to deal with. It is very unusual to meet with a plant in vigorous condition that has been imported many years. I find *G. (Grammangis) Ellisii* the most satisfactory; grown in a basket suspended from the roof of the East Indian house. The potting compost consists of two parts fibrous peat to one part sphagnum. These are an interesting class of plants, and worthy of consideration, as

most of the forms grow and flower freely for a few years, *G. speciosum* being the exception. This is a species of gigantic proportions. A specimen may be seen at Kew in one corner of the Victoria House tank, where it has been grown for years without flowering.

EPIDENDRUM (DIACRIUM) BICORNUTUM has lovely white flowers, spotted with purple, and is one of the most desirable Orchids when well cultivated. It requires a strong light with a liberal supply of heat and moisture during the growing season, and should have a position in close proximity to the roof-glass.

ONCIDIUM.—There are several species of this genus that require stove treatment. One of the most attractive is the Butterfly Orchid, *O. Papilio*. Oncidiums should be grown in as small a receptacle as possible in a compost of peat and moss. *O. ampliatum*, *O. Kramerianum*, *O. Lanceanum*, and others of this section should be similarly treated.

MILTONIA ROEZLII (Fig. 373) and *M. Phalænopsis* require the warm-house treatment and a compost similar to that recommended



FIG. 373.—MILTONIA ROEZLII.

for Miltonias in the cooler section. A shelf against the back wall of a stove, with a board fixed in front, so that the plants may be plunged to two-thirds the depths of their pots in living sphagnum, suits them admirably. If placed on the stages it will be found advantageous to put a good amount of moss

between the pots. The plants require a liberal amount of light, but they must be sheltered at all times from the direct rays of the sun.

Intermediate House Orchids.

I have thought it best to further split up this section, namely, into the *warm intermediate* (requiring a temperature of 65deg. to 68deg. in summer, and 58deg. to 60deg. in winter), and the *cool intermediate* (60deg. in summer, and 55deg. in winter with fire-heat). As these plants are principally natives of tropical South America, and form several classes of the most beautiful and popular Orchids in cultivation, I will endeavour to note in the following pages the most desirable amongst them.

ACINETA.—This is a quaint genus, the species of which should be grown in baskets, as the flowers are produced on pendulous spikes, which often push their way through the potting compost and make their appearance through the bottom bars of the basket. They require the temperature of the cool intermediate house, and a potting compost similar to that recommended for Stanhopea.

ANGULOA.—This is a most attractive and useful genus of plants suitable for cool intermediate house treatment. Most of them are free growing and possess a robust constitution. They require similar potting compost to that recommended for Lycaste. The most useful varieties are *A. Clowesii*, *A. Ruckerii*, and *A. uniflora*. They require a liberal supply of moisture during the growing season and until the growths are matured, after which only sufficient should be given to maintain the bulbs in a plump condition.

ANSELLIA AFRICANA.—This African species requires the temperature of the warm house. It has long Dendrobium-like growths. The potting compost should consist of two parts fibrous peat and one part of sphagnum moss. A fairly moist atmosphere is required throughout the year.

ARPOPHYLLUM GIGANTEUM is more of botanical interest than otherwise. It requires treatment similar to that recommended for Cattleya.

BARKERIA.—The several species of this genus require full exposure to the sun's rays to induce them to flower satisfactorily. The Mexican house, with *Lælia anceps*, suits them best.

BRASSAVOLA is now classed under Lælia.

BURLINGTONIA.—A dwarf-growing species, suitable for basket culture in the warm intermediate house.

CATASETUM.—A genus of plants always attractive and interesting. There are numerous sorts. They should be grown in baskets

suspended close to the roof-glass. They require the warm intermediate house, with plenty of moisture while growing; but drier and cooler conditions are required for the resting season. The potting compost should consist of two parts of peat and one part of sphagnum.

CATTLEYA.—This is no doubt the most attractive and popular of all the Orchid genera, the various and beautiful tints in the different species being always appreciated. Where a house can be devoted to the culture of Cattleyas and Lælias it is possible to obtain a succession of flowers throughout the year, commencing in January with *C. Trianae*. This is followed by *C. Lawrenceana*,

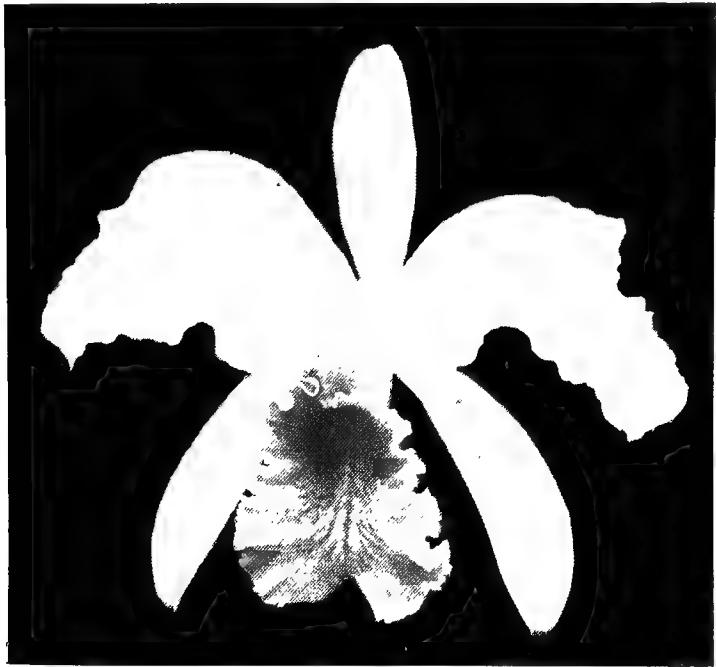


FIG. 374.—CATTLEYA MOSSIÆ REINECKIANA.

C. citrina, *C. Mendelii*, and *C. Mossiæ* (Fig. 374 represents *C. Mossiæ Reineckiana*, one of its white forms); these are succeeded by *C. Warszewiczii (gigas)*, *C. Warneri*, *C. Gaskelliana*, and *C. Loddigesii*, which in turn are followed by such sorts as *C. Schofieldiana*, *C. Dowiana*, *C. bicolor*, and *C. Eldorado*; while the year may be closed with the now cheaply procured *C. labiata autumnalis*. The habitat of this last Cattleya was lost for upwards of forty years, and its re-discovery has brought with it

colour variety which a few years ago one would never have thought of. Some of the white forms are the most beautiful and valuable *Cattleyas* in cultivation. Numerous species not included in the above list would also help to fill up the different seasons of the year, and many of them are equal in beauty to those already named. There are also the hybrids, both natural and artificial. As these have the intermediate characters of the



FIG. 375.—*CYCNOCHES CHLOROCHILON*.

species from which they have been derived, so their blossoms are produced at intermediate times, according to the natural flowering seasons of the parent species. The hybrid *Cattleyas* and *Lælias* now number some 300, they having increased since 1895 something like 80 per cent., and they are likely to continue increasing for many years to come, owing to the fact that hybridisation is gaining favour in almost every collection of Orchids throughout the world.

These *Cattleyas* require warm intermediate house treatment. The potting compost should consist of good fibrous peat and a little sphagnum. The pots should be drained sufficiently high to leave the base of the leading bulbs raised slightly above the edge of the pots. The material must be pressed firmly about the base of the growths so that the plants may be made secure in the pots. The best season for repotting is when the

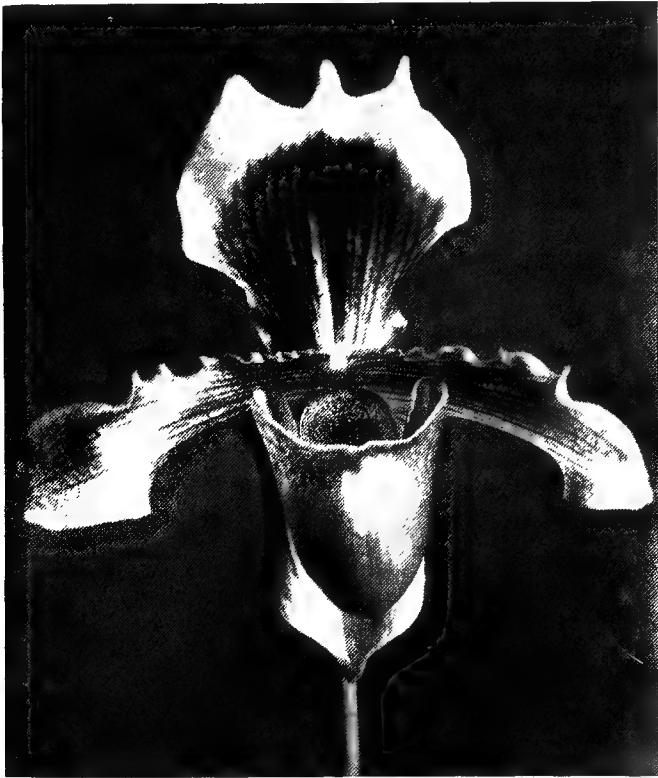


FIG. 376.—*CYPRIPEDIUM INSIGNE SANDERÆ*.

new roots make their appearance from the base of the newly-made growths. If done at this stage, the plants soon get hold of the new material, and so become established in their fresh quarters. Water must be given with discretion, the supply being governed by the particular situation, construction of the house, and atmospheric surroundings both inside and out. These conditions are best ascertained on the spot. Any difficulties in this respect may be quickly overcome by an observant cultivator.

Imported plants may be potted up as soon as received, but it is as well to use only crocks to secure the plants until rooting commences; the top crocks may then be removed and replaced by the material advised above. Sticks sufficiently strong should be affixed, so that the plants may be held in position until they have become established in the potting material. This plan also adds to the neatness and appearance of the plants if carefully done. Very little water is required at the

roots when the plants first arrive—only sufficient should be given to maintain the bulbs in a plump condition—but after rooting has commenced they may be more liberally treated.

As regards procuring Cattleyas, the most satisfactory and interesting way is to buy imported plants. The majority of species grow and flower freely for a few years, often under most unfavourable conditions; so that those inclined will be enabled to ascertain during that period the requirements necessary for their successful culture. There is also a great amount of interest to be derived from watching the plants develop their growths; this increases after maturity, and when the flowers are out of the sheaths, each one being

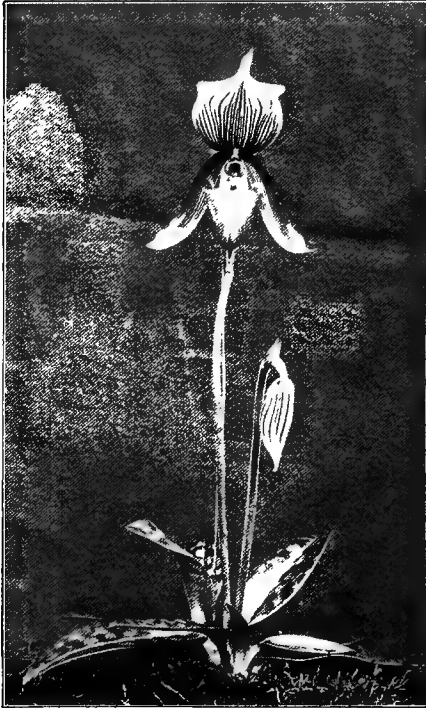


FIG. 377.—*CYPRIPEDIUM CALLOSUM*
SANDERÆ.

anxiously watched in the expectation of forms of sterling merit making their appearance. Such forms are just as likely to turn up with the humble buyer as they are in experienced hands, for no one can tell what a particular plant may turn out until it flowers. It has been my good fortune to procure a white form of *Cattleya labiata*, as imported, for less than 10s., which has already realised considerably over 100 guineas.

CHYSIS is a lovely genus, requiring warm intermediate house treatment, the potting compost consisting of the usual mixture of peat and moss.

CIRRHOPETALUMS.—There are several sorts of this botanically interesting genus which are worthy of consideration by those interested in this class of plants. They may be accommodated in the two sections of the intermediate house temperatures, and are suitable for pan or basket culture suspended from the roof.

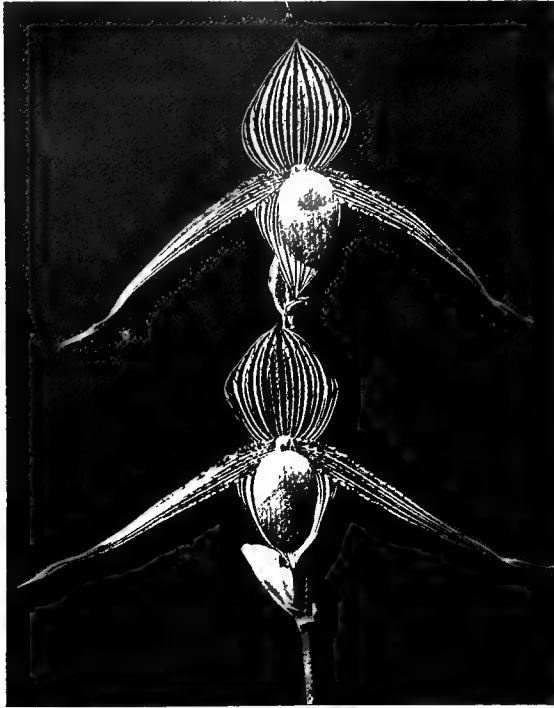


FIG. 378.—CYPRIPEDIUM ROTHSCHILDIANUM.

CŒLOGYNE.—This is a popular genus, the most useful species of which are too well known to need description here. The *C. cristata* forms may be successfully cultivated in the cool intermediate house, and should receive every consideration. The potting compost should be equal parts of peat and sphagnum.

CYCNOCHES (Swan Orchids) are interesting and highly-perfumed species, requiring similar treatment to that recommended for *Catasetums*. Fig. 375 represents *C. chlorochilon*, one of the finest, with yellow flowers.

CYMBIDIUM.—This is one of the most interesting and useful genera of cultivated Orchids, and requires cool intermediate house

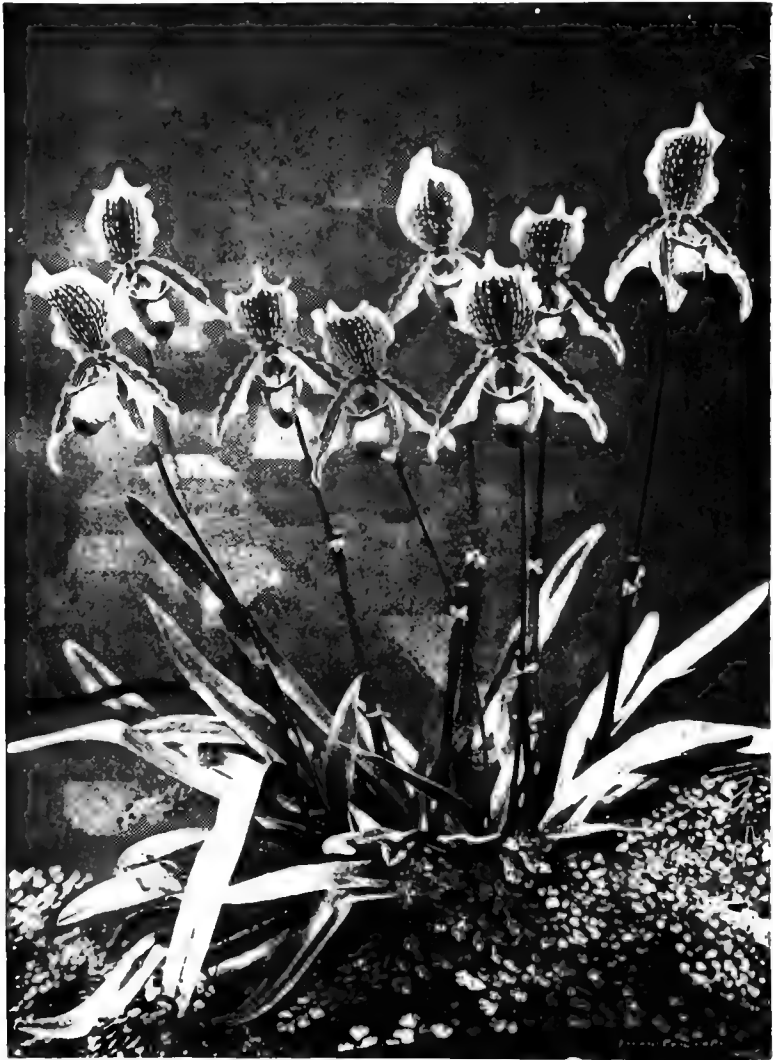


FIG. 379.—CYPRIPEDIUM ARTHURIANUM.

treatment. The potting compost should consist of two parts of good fibrous peat and one part of loam, to which may be added

a free sprinkling of rough sand or finely-broken crocks. As the plants are gross feeders during the growing season, every precaution must be taken to keep the soil in a free and open condition. There are numerous species and hybrids, from the pure white *C. eburneum* to the wonderful *C. Tracyanum* with deep brown-spotted and lined flowers. The racemes of the latter produce upwards of twenty flowers, each blossom measuring more than 6in. in diameter.

C. Tracyanum, with *C. Lowianum*, *C. giganteum*, *C. grandiflorum*, and others of this section last in perfection for weeks, and are most useful even when cut for decorative purposes. The whole section is most tractable under cultivation, and worthy of every consideration.

CYPRIPEDIUMS are divided into two sections: the Eastern, known as *Cypripedium* proper, and the Western, termed *Selenipedium*. Attempts have been made of late to subdivide these into several other genera; but as both the Eastern and Western sections thrive admirably together, the general term *Cypripedium* answers all requirements that are needed here. These plants cannot be too highly recommended. Though not so attrac-



FIG. 380.—CYPRIPEDIUM REGINA.

tive as the *Cattleyas*, they have other qualities which more than atone for their shortcoming in this respect. There are now nearly 1000 distinct species and hybrids in cultivation; these flower at different seasons of the year, and many of them last months in perfection. It is possible with a little consideration to have *Cypripediums* in flower the whole year through. Many of them are highly interesting, and may be procured at reasonable prices;

it is only the scarce kinds that fetch high prices. By the outlay of a few pounds a collection may be procured that will give flowers throughout the year. This fact cannot be too firmly impressed upon the amateur, as the articles that are constantly appearing in the lay Press on the subject of "valuable plants" are so ridiculous and liable to mislead those not acquainted with the value of Orchids.

With but few exceptions the most suitable place for the culture of *Cypripediums* is the cool intermediate house. They are best grown in well-drained pots or pans, using a potting compost of two parts peat and one part sphagnum. They require a liberal amount of moisture throughout the year, both at the roots and in the atmosphere. Space here does not allow of a selection being made: a visit to a good collection will be the



FIG. 381.—*CYPRIPEDIUM CHAPMANII MAGNIFICUM*.

best guide in choosing desirable varieties. Many of the species and varieties are sufficiently hardy to be cultivated successfully in a cool greenhouse. Fig. 376 represents the well-known *C. insigne* *Sanderæ*, one of the most beautiful of the yellow *Cypripediums*;

it does well in the cool house. *C. callosum Sanderæ* is another albino, represented in Fig. 377. Fig. 378 represents *C. Rothschildianum*, undoubtedly the finest species among the so-called New Guinea section of *Cypripediums*. It has

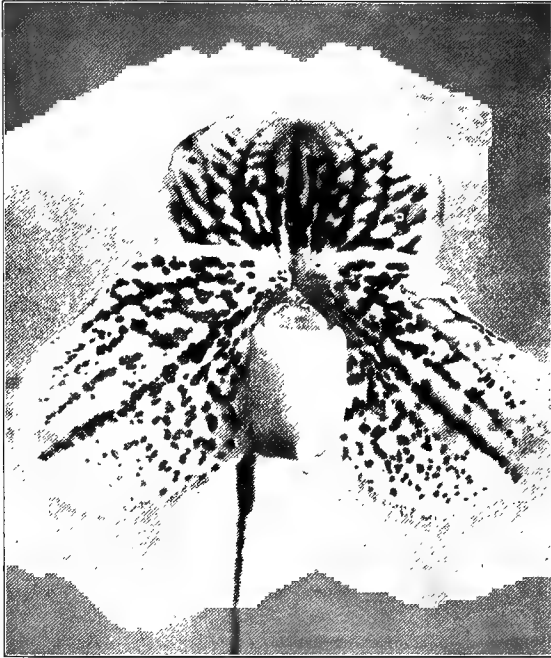


FIG. 382.—*CYPRIPEDIUM GODEFROYÆ LEUCOCHILUM*.

proved a most useful subject for hybridisation purposes. Fig. 379 represents *C. Arthurianum*, and Fig. 380 *C. regina*, which belong to the *C. Fairieanum* section of hybrids, and must remain among the most valuable of hybrid Orchids, as the last-mentioned species has become practically extinct, and baffles all the efforts of collectors to re-discover its habitat. Fig. 381 represents *C. Chapmanii magnificum*, a unique hybrid of the *C. bellatulum* section, and Fig. 382 shows *C. Godefroyæ leucochilum*, one of the finest of the natural hybrids. Fig. 383 represents *C. (Selenipedium) caudatum*, the best species of the Western section. The tail-like pendulous petals often attain upwards of 3oin. in length. For fuller list see "Appendix."

CYRTOPODIUM requires the warm intermediate house during the growing season, with cooler treatment during the season of

rest. The usual compost of peat and moss may be used as potting material.

EPI-CATTELYAS and EPI-LÆLIAS are bigeneric hybrids derived from species of the genera indicated by their names. They should be cultivated with the Cattleyas.

EPIDENDRUMS.—There are many species among this vast



FIG. 383.—CYPRIPEDIUM (SELENIPEDIUM) CAUDATUM.

genus that are suitable for intermediate temperatures; they are, with few exceptions, very easy of culture, while their varied colour-shades recommend them to consideration. They require the usual potting compost, with a liberal supply of moisture during the growing season.

EPIPHRONITIS VEITCHII is a bigeneric hybrid between *Epidendrum radicans* and *Sophronitis grandiflora* that should be included in every collection. It has rich scarlet flowers, and requires cool intermediate house treatment.

LÆLIAS are only distinguished from Cattleyas by the pollen-masses, and, with the exception of *L. anceps* and the *L. autumnalis* section, all may be cultivated under similar conditions, although *L. purpurata* succeeds better when grown a few degrees warmer. *L. Digbyana* (Fig. 384) is one of the most distinct Orchids in cultivation. To be successful with *L. anceps*, a strong light is absolutely necessary; it will stand, with free ventilation, the full power of the sun's rays. The plant requires an abundance of moisture, with strong heat during the growing season, and must



FIG. 384.—LÆLIA DIGBYANA.

not be allowed to suffer from want of water until the flower-spikes have been removed, after which a long rest, with a cool temperature and dry atmosphere, is necessary, during which time little moisture is required at the roots. There are many handsome forms, varying from deep rose-purple to the purest white. They flower through the dead of winter, and are always appreciated. Fig. 385 represents *L. a. Waddonensis*, one of the most beautiful of the white section. Fig. 386 shows a fine plant of *L. a. Sanderiana*, grown in the Highbury collection of the Right Hon. J. Chamberlain.

LÆLIO-CATTELYAS are the hybrids derived from intercrossing species of the two genera indicated by the name, and succeed with

similar treatment to that recommended for Cattleyas. *L.-C. Thorntonii* (Fig. 387) is derived from the intercrossing of *C. Gaskelliana* and *L. Digbyana*. The characteristic fringe around the labellum in the last-named species is inherited to a lesser degree by the offspring. These hybrids are very distinct, and are among the most valuable of the Cattleya family of hybrids.

LYCASTE.—This is a most useful, varied, and beautiful genus of plants, suitable for cool intermediate house culture. They

flower at different seasons and last for some weeks in perfection. The most popular among the many species is *L. Skinneri*. This varies considerably in colour, and may be had with deep rose-purple sepals and petals and

rich crimson-purple lip, varying in shades to the pure white *L. S. alba* (Fig. 388).

This species and its varieties possess robust constitutions. They grow well in the cool house during the hottest months of the year, but require temperature a few degrees warmer during the winter. *L. aromatica*, *L. cruenta*, *L. Deppei*, and the free-flowering *L. plana* are all best grown as advised



FIG. 385.—*LÆLIA ANCEPS WADDONENSIS*.

above. The section to which *L. Cobbeana*, *L. gigantea*, *L. lanipes*, &c., belong, are best suited with the intermediate house treatment throughout the year.

Lycastes require a liberal supply of water and atmospheric moisture during the growing season. They are semi-deciduous, and therefore only need sufficient moisture during the resting season to maintain the bulbs in a plump condition. Potting is best done in the spring, just as the plants commence to grow,

using for the purpose a compost of two parts good fibrous peat and one part fibrous loam and sphagnum, to which may be added a liberal sprinkling of rough sand. The compost should be made moderately firm about the base of the plant. The pots used should be thoroughly cleaned and half-filled with clean broken crocks, thereby carefully avoiding any possibility of stagnation.



FIG. 386.—*LÆLIA ANCEPS SANDERIANA*.

MAXILLARIAS.—These are closely allied to the Lycastes, and require similar treatment.

MILTONIA.—The bulk of the species require the cool intermediate treatment. The most popular is *M. vexillaria* (Fig. 389), which flowers during the summer months. It does well in the cool house during the summer, but requires a few degrees warmer treatment during the winter. Potting should be done just when the spikes are about to make their appearance, as this is the

rooting season. The young roots quickly get away into the material, and few ill effects are observed. The most critical season is immediately after the flower-spikes have been removed, and just when the new growths are starting; if great care is not then taken in the matter of moisture at the roots the plants spot or damp off, and become completely rotten in a few hours. It is best to keep the plants at this season in a practically friable condition at the roots, affording sufficient atmospheric moisture to maintain them nice and plump. Sufficient ventilation must be given to keep the temperature as even as possible.



FIG. 387.—LÆLIO-CATTELEYA THORNTONII.

Shading must also be attended to carefully during the summer months.

Many of the other sections of Miltonias are well worthy of attention. Those belonging to *M. spectabilis* are best grown suspended from the roof.

NANODES (EPIDENDRUM) MEDUSÆ, I find, does best suspended from the roof of a cool intermediate house.

ONCIDIUM.—As previously stated, with the exception of a few species, these lovely plants thrive best in the two sections of intermediate temperature, the majority of them succeeding in the cool section with the Odontoglossums. The lovely *O. Marshal-*

lianum, *O. Forbesii* (Fig. 390), *O. varicosum*, the different species in the way of *O. sphacelatum*, and many others equally worthy of notice, may be grown in shallow pans or baskets suspended from the roof, the potting compost consisting of peat and moss, with plenty of drainage. They require a liberal amount of water throughout the growing season, with the usual rest after the flowers have been removed.



FIG. 388.—LYCASTE SKINNERI ALBA.

ORNITHOCEPHALUS GRANDIFLORUS does best grown similarly to *Oncidiums* in the cool intermediate house.

PLEIONES (Indian Crocuses) are best grown on a shelf in a cool intermediate temperature. The potting compost used for *Cœlogynes* (to which they are allied) suits them well. The best time to repot is immediately after flowering.

SCHOMBURGKIA.—These are shy-flowering plants, needing a position near the roof-glass in the Cattleya-house. They are lovely Orchids, and if they could be induced to flower satisfactorily would be more generally grown.

SOBRALIA.—This genus has Bamboo-like growths, from the apex of which, when fully matured, are produced Cattleya-shaped flowers in various hues. The cool intermediate house suits them



FIG. 389.—MILTONIA VEXILLARIA.

well. The potting compost required is a mixture of peat, fibrous loam, and sphagnum. As the species are practically perpetual growers, they require moisture at the roots, with discretion, throughout the year.

STANHOPEA.—This is one of the oldest genera known to cultivation in this country. The plants are suitable for basket culture, as the flowers usually pierce through the potting compost,

and are produced through the bars at the base. The potting compost should consist of fibrous peat and sphagnum. They require warm intermediate treatment, with a liberal supply of moisture, during the growing season, and a cooler treatment when at rest. Fig. 391 represents *S. tigrina* in flower and bud; this is one of the finest species in cultivation.

THUNIA.—A genus of deciduous Orchids. They commence growing in the early spring, which is the best time to repot them. Each of the old bulbs should have a stick sufficiently strong to secure it firmly in position, and they may be placed as many in each pot as desirable. The pots should be half filled with clean crocks. When the plants have been fixed as desired, the following compost should be brought up to the base of the new growths and pressed moderately firm: Equal portions of fibrous loam and peat, to which may be added a free sprinkling of dry cow-manure. To keep the compost in a porous condition finely-broken crocks or rough sand should



FIG. 390.—ONCIDIUM FORBESII.

be added. The plants should be placed in a light position of the warm intermediate house. Little water will be needed at first, but as soon as the new roots get hold of the compost they will require a liberal supply up to the time when the growths reach maturity, and the flowers are developed, after which the moisture should be reduced, and the plants placed in a cooler and more airy position until the bulbs have properly ripened off, when they may be placed on a dry shelf in the cool division for the resting period.

TRICHOPILIA is an interesting genus of plants. The *T. suavis* section, which are the most popular, are best suited when grown in pans suspended from the roof of the cool intermediate house; they require the usual compost of peat and moss as potting material, with a liberal supply of moisture throughout the year.

ZYGOPETALUM.—A lovely genus of Orchids. One of the species is usually found in places growing admirably with other plants where there is no pretension to cultivate Orchids, and this is often a source of envy to the Orchid specialist. *Zygopetalums*,



FIG. 391.—STANHOPEA TIGRINA.

with but few exceptions, thrive under cool intermediate treatment. The potting material should consist of fibrous peat, a little loam, and chopped sphagnum. The pots used should be drained to two-thirds their depth, as the plants require a liberal supply of moisture during the greater part of the year. *Z. Sedeni* (Fig. 392) is a very rare and desirable hybrid, derived from the intercrossing of *Z. Mackaai* and *Z. maxillare*.

There are many other species and varieties that might have been included amongst the intermediate Orchids, but as space is a consideration I have noted only those which I consider most suitable for the amateur and for a general collection. Others will be found in the "Appendix."

Cool Orchids.

In this division are included many of the most brilliant of the Orchid genera. They require a temperature of from 45deg. to 50deg. Fahr. Lower temperatures than this may be allowed on severe occasions, but with the lowering temperature the atmospheric moisture must receive careful attention, or the results will be disastrous. In mild weather the temperature may usually be maintained without resorting to artificial heat, but in dull weather it is advisable to use a little fire-heat occasionally, which assists in drying the excessive accumulation of moisture likely to gather under such conditions. The temperature should be regulated on these occasions by the use of the lower ventilators. As most of the cool species are worthy of attention, I will endeavour to deal with the most interesting and beautiful amongst them.

CRYPTOPHORANTHUS (Window Orchid).—Of this genera there are two species well worthy of consideration, *C. atropurpureus* and *C. Dayanus*. They should be grown and treated similar to *Masdevallias* of the *M. Chimera* section.

DISA. — There are about one hundred species of *Disa*, all natives of Africa, but very few are in cultivation at the present time. The most satisfactory results with *D. grandiflora* — which is the most beautiful of the genus — have been achieved where plants

have been grown in a house with the Cape Heaths, *i.e.*, where there has been a free circulation of air throughout the greater portion of the year. The tubers require setting in the winter—about January or the beginning of February—when they commence to make their growths, the compost consisting of peat and sphagnum, with a liberal sprinkling of limestone rock or broken crocks to keep the material in a porous and open condition. They should have a liberal supply of moisture throughout the growing season; and the syringe used freely overhead in bright and warm weather will have beneficial results,



FIG. 392.—*ZYGOPETALUM SEDENI*.

A bright light is also necessary to their successful culture. The best species to grow are *D. grandiflora*, *D. racemosa*, and *D. tripetaloides*. To these may be added the garden hybrids, *D. kewensis*, *D. Langleyensis*, *D. Premier*, and *D. Veitchii*. These

latter, being naturalised to our climatic conditions, grow more freely, and often succeed where the species have been a failure.

MASDEVALLIA may be divided into three sections: *M. Harryana*, with its gaudy colours; *M. caudata* (*Shuttleworthii*); and the quaint *M. Chimera*.

The latter two sections should not be allowed to fall below a temperature of 50deg. in winter, or the dreaded "spot," to which Masdevallias are subject, usually makes its appearance. The *Chimera* (Fig. 393) section are best grown in baskets, as they produce their flower-scapes through the potting compost, and the use of the baskets affords them a

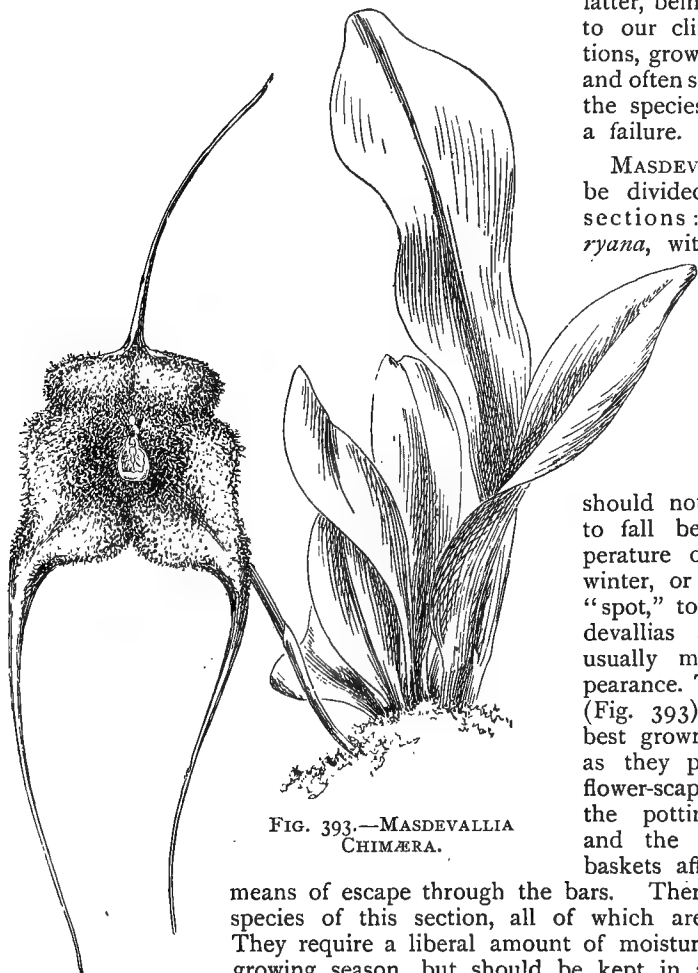


FIG. 393.—MASDEVALLIA
CHIMÆRA.

means of escape through the bars. There are several species of this section, all of which are interesting. They require a liberal amount of moisture during the growing season, but should be kept in a moderately dry condition when in a dormant state. The *M. caudata* (*Shuttleworthii*) (Fig. 394) section, inclusive of such kinds as *M. armenii*, *M. Estradae*, *M. Wagneriana*, and others of miniature growth, do not need a great quantity of potting material about them, and are best accommodated when grown in pans suspended from the roof.

The more robust-growing kinds, or those known as the *M. Harryana* section, also include such sorts as *M. amabilis*, *M. chelsoni*, *M. Davisii*, *M. Veitchiana*, and the thick-leaved kinds, such as *M. peristeria*, *M. macrura*, *M. ephippium*, and others of the *M. leontoglossa* section; all are suitable for pot culture. *M. towarensis* (Fig. 395) is a most desirable form, with pure white flowers, which are produced in the dead of winter, and last a long time in perfection. The pots should be clean, and drained to three-parts of their depth with clean broken crocks, and the potting compost should consist of two parts of peat to one part of sphagnum. The best time to repot Masdevallias is during the latter part of August and the beginning of September. This being the rooting season, they have ample time, under ordinary circumstances, to become re-established before it is necessary to resort to the use of fire-heat. The plants require a large amount of moisture during the greater part of the year, both at the roots and in the atmosphere. During the winter months it is necessary to reduce the root moisture, but sufficient should be maintained in the atmosphere to keep it in such a condition that the plants do not suffer when fire-heat is being used. There cannot be any hard-and-fast lines in this matter; for the construction of the house, the position in which it is situated, and other points have to be taken into consideration; and these particulars are best observed by those familiar with the conditions under which the plants have to be cultivated. Without doubt, Masdevallias are best accommodated where a house can be devoted to their culture, preferably one with a northern aspect, thus avoiding, to a great degree, the excessive heat of the summer months. They require free ventilation whenever the outside conditions permit, and must also be heavily shaded from the direct rays of the sun.



FIG. 394.—MASDEVALLIA
CAUDATA.

ODONTOGLOSSUM.—There are no Orchids more suitable for culture by those in possession of a greenhouse than the many

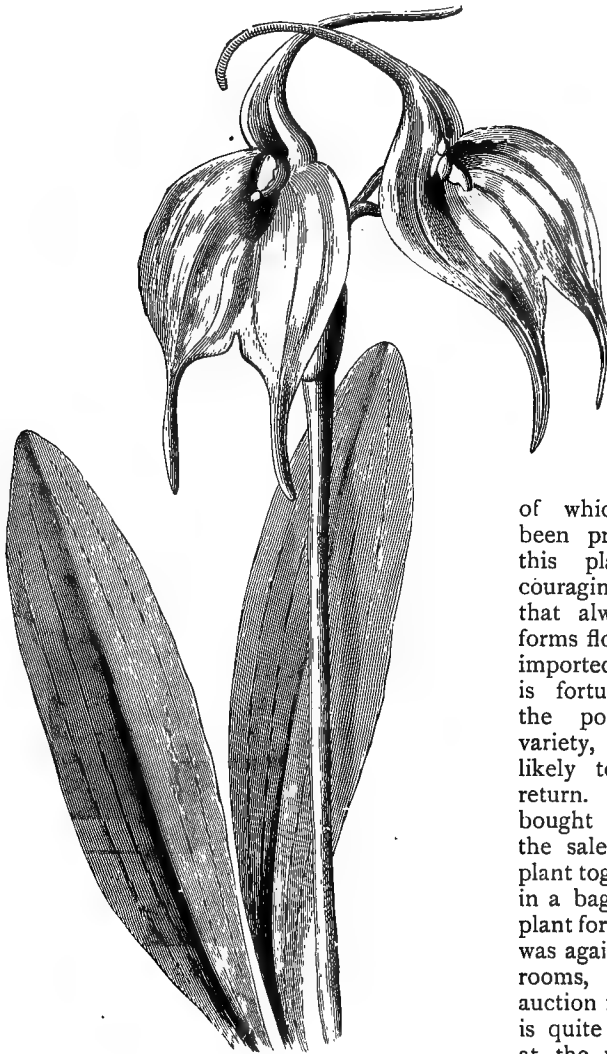


FIG. 395.—MASDEVALIA TOVARENSIS.

varied and beautiful Odontoglossums. Practically all the species can be procured in an imported condition for a few shillings each. I advise buying imported plants because there is always more interest derived by growing and watching the development of unflowered plants than it is possible

to get out of plants of which the variety has been proved. What makes this plan still more encouraging is the chance that always exists of unique forms flowering from amongst imported plants, and, if one is fortunate enough to be the possessor of such a variety, the investment is likely to yield a profitable return. A friend of mine bought for half-a-crown in the sale rooms an imported plant together with four others in a bag. After growing the plant for two years it flowered, was again brought to the sale rooms, and disposed of by auction for 120 guineas! It is quite possible for anyone at the present time to buy a single plant of *Odontoglossum crispum* (*Alexandrae*)

in an imported condition that would realise even a higher figure than that quoted, for no one can foretell what particular variety

is likely to turn up from an importation of this plant. This gives the humble purchaser proportionately equal chances with the expert and with those who buy in quantity. Fig. 396 represents *O. crispum* Frantz Masereel, one of the most beautiful of the spotted forms; Fig. 397 shows *O. Andersonianum* (D. B. Crawshay's variety), considered to be one of the finest of its section; Fig. 398 represents *O. excellans*, a natural hybrid (also artificially raised) between *O. Pescatorei* and *O. triumphans*. *O. excellans* (Rosslyn var.) is undoubtedly the finest that has yet been seen.

Odontoglossums require a temperature of 50deg. at night, with free ventilation whenever the temperature rises above 55deg. and the outside conditions permit. The potting compost should consist of peat and moss in equal proportions, and well-drained pots should be used. The plants require to be kept in a fairly moist condition throughout the year, as they are almost perpetually in a state of activity, and flower at different seasons. Where a house can be devoted to the culture of the different species of *Odontoglossum* it would be difficult to enter it at any season of the year without finding something in flower.

The exquisite beauty of the different species and the durability of the flowers cannot be too highly praised; in fact, the whole genus *Odontoglossum* is worthy of the first place in the consideration of all lovers of Orchids. Among the most suitable kinds for the consideration of the intended cultivator are *O. crispum*, *O. cirrhosum*, *O. Andersonianum*, *O. Edwardii*, *O. gloriosum*, *O. grande*, *O. Hallii*, *O. Harryanum*, *O. Pescatorei* (Fig. 399 shows *O. P. Veitchii*, a unique plant in Baron



FIG. 396.—ODONTOGLOSSUM CRISPUM
FRANTZ MASEREEL.



FIG. 397.—*ODONTOGLOSSUM ANDERSONIANUM*.

Schroeder's collection), *O. Rossii*, and *O. triumphans*. There are other interesting kinds, but the above are the most robust-growing and suitable for beginners.

ONCIDIUM.—Several of these succeed better grown with the Odontoglossums than under warmer conditions, and should be treated in the same manner in every respect. They include such lovely sorts as *O. concolor*, *O. cucullatum*, *O. incurvum*, the lovely forms of the *O. macranthum* section, with their trailing spikes of exquisitely beautiful flowers, *O. ornithorhynchum*, *O. tigrinum*, and several others with lesser attractions. As the above flower



FIG. 398.—ODONTOGLOSSUM EXCELLANS.

at different seasons of the year, they help to keep a succession of blossom in this department.

SOPHRONITIS is one of the most beautiful genera of winter-flowering Orchids. *S. grandiflora* (Fig. 400) possesses the highest qualities of all the species in cultivation, its deep scarlet flowers always compelling admiration. The plants are of dwarf habit, and suitable for pan or basket culture, suspended from the roof. The potting compost used should be the same as that recommended for Cattleyas. *S. grandiflora* does well in a light position of the cool house with the Odontoglossums. The other species of this genus are scarcely worthy of consideration where space is limited. They require similar treatment to *S. grandiflora*.

Hardy Orchids.

Several species of Orchids form interesting subjects for the rock garden. The species and varieties most suitable for this

purpose are *Cypripedium acaule*, *C. Calceolus*, and *C. spectabile*, many species of *Ophrys*, and a number of interesting *Orchis*, of which *O. foliosa* and *O. latifolia* are two of the easiest grown and the most beautiful.

CULTURE.—Hardy Orchids require a position somewhat sheltered from the bright rays of the sun in summer, and from excessive cold and wet in winter. The material best suited for their requirements is a mixture of fibrous loam, peat, and leaf-mould, with a liberal sprinkling of coarse sand. If planted in the rockery particular attention should be given to the matter of drainage to prevent, as far as possible, excessive accumulations of water about the roots. The least stagnation is liable to have disastrous effects on any kind of hardy Orchids.

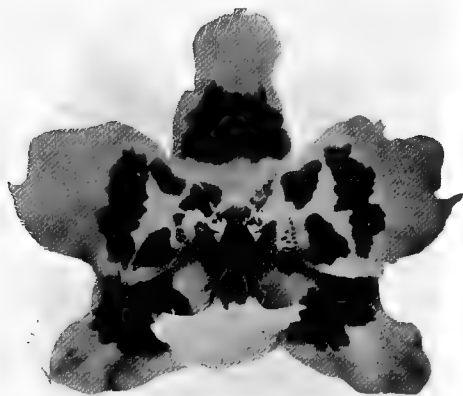


FIG. 399.—ODONTOGLOSSUM PESCATOREI
VEITCHII.

Hybridisation.

This interesting branch in the culture of Orchids is practically only in its infancy, although thirty-seven years have elapsed since the first artificially-raised hybrid flowered in this country. It was obtained by the late Mr. J. Dominy in the Exeter nurseries of Messrs. J. Veitch and Sons, by the intercrossing of *Calanthe Masuca* and *C. furcata*, and was named *C. Dominii*. Mr. Dominy continued raising seedlings at Exeter with

success. When the firm removed to the Royal Exotic Nurseries, in King's Road, Chelsea, a few years later, encouraged by the success he had achieved, and with fresh material constantly coming to hand, Mr. Dominy was enabled to considerably extend his operations, with the result that many of the most beautiful hybrids raised by that pioneer of Orchid hybridisation are still among the choicest and most valuable in up-to-date collections. Mr. Dominy was succeeded in the middle of the sixties by Mr. J. Seden, who has continued crossing and intercrossing both hybrids and species uninterruptedly up to the present, with the result that scarcely a meeting of the Royal Horticultural Society is held without the introduction of some new and startling novelty in hybridisation, by the firm. *Lælio-Cattleya Dominiana* (Fig. 401)

is one of the finest of these bigeneric hybrids. It is derived from the intercrossing of *Laelia purpurata* and *Cattleya Dowiana*.

It was my privilege a short time since to inspect the private hybridising department of Messrs. Veitch's nursery, now situated at Langleigh, Slough, and I was astonished to see the countless number of hybrids in all stages of growth, from the tiny germinations in the seed-pans to those bursting into flower. As pioneers of hybridisation, Messrs. Veitch have naturally had considerable advantages by being able to bring into use the hybrids that have been continually flowering with them. These give "new blood," which it is impossible to obtain under less favourable circumstances.

The fascination of Orchid hybridisation has so extended of late years that there is now scarcely any Orchid collection where seedlings of some of the different kinds are not raised on the premises. Considerable variation occurs as to the period that elapses from fertilisation to the time of ripening of the seed-pods in the different kinds. The greater part of them take from nine to twelve months. There are also different methods of sowing the seed, each advocate claiming the greater advantages.

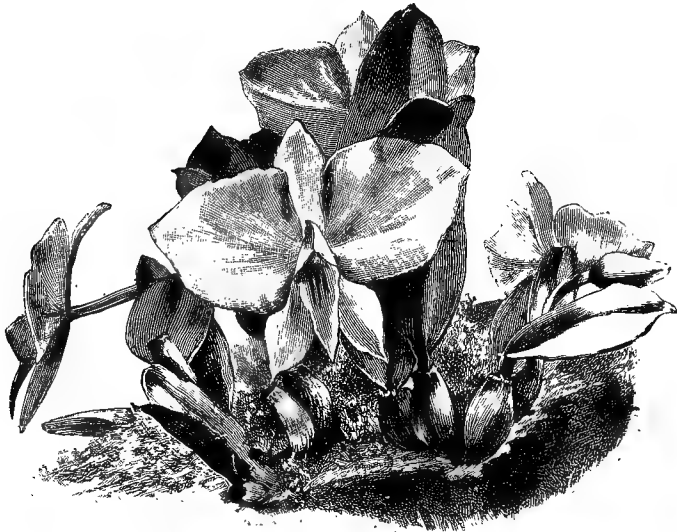


FIG. 400.—*SOPHRONITIS GRANDIFLORA*.

My own experience is that this is only a secondary consideration, providing the seed is good, properly ripened, and carefully attended to afterwards. There is little more difficulty in the raising of Orchids than is experienced with any other class of plant

bearing seeds of the same dimensions. Far more seeds are destroyed by thoughtless watering than by any other cause. They are so minute and dustlike that the least carelessness in watering washes them over the sides of the pots or seed-pans.



FIG. 401.—LÆLIO-CATTELEYA DOMINIANA.

After the seedlings have been removed from their seed-pans, constant care is required to keep them clean and give every inducement by light and atmospheric conditions likely to be suitable to their various requirements. If this is done very little more difficulty will be found in the successful culture of Orchid seedlings than is experienced in the raising of other plants. In proof of this assertion I have only to point out the numbers of persons who, without any instructions, have surmounted, as the late Mr. Dominy did, all difficulties, and are at the present day among our most successful hybridists.

FOES.—Considering the number of Orchids which are annually imported into this country, and the ready means they afford of materially increasing the insect population, it is matter for congratulation that one so seldom hears of the introduction of any species which are very harmful to the plants under notice. The wonder, too, is greater if one comes to think how very favourable the temperature of Orchid-houses is for the development of certain insects needing warmth. Orchids, of course, have their pests like every other plant, but that they have hitherto enjoyed, at any rate when artificially grown, an immunity from

attack by any pests, animal or vegetable, which is seldom vouchsafed to most popular plants, is certain. Of late years, however, several formidable pests have threatened the Orchid-grower, and in some collections much damage has actually been inflicted.

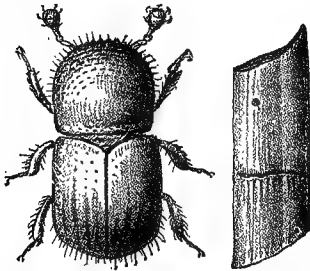


FIG. 402.—DENDROBIUM BEETLE, AND PORTION OF PLANT SHOWING PERFORATIONS. (Much magnified.)

(By permission of the Board of Agriculture.)

The most destructive of insect pests amongst the newcomers is a tropical beetle, scientifically known as *Xyleborus perforans*. The genus is unrepresented in this country, but in the sugar-cane districts this same beetle occasions the planter not a little anxiety. The generic and specific names give sufficient clue to its propensities, which are to tunnel. *Dendrobium Phalenopsis* are the plants usually selected, and these are attacked by means of the pseudo-bulbs. Having gained access, the beetles practically tunnel the stems, causing the plants to have a most unhealthy appearance and not infrequently to die. The beetle (Fig. 402) is about $2\frac{1}{2}$ mm. long, and chestnut-brown. The larva (Fig. 403) is white and footless, and is also capable of much mischief. *Dendrobiums*, therefore, which show signs of decay without a cause being readily assigned for it, should be carefully examined, and if the small perforations are noticed in the growths (Fig. 402), the portions must be cut away; for it is better to risk the check that such is sure to cause than the utter destruction of the plant attacked.

In *Cattleyas* there is a species of fly (*Isosoma orchidearum*) which occasions a lot of damage. This insect deposits its eggs in the eye of the young growth when the plant is in a dormant state. As a consequence, the growth does not advance much above 1in., swells in the centre, and generally exhibits a stunted appearance. If this growth is cut off at the base and split open, there will be disclosed from three to seven yellowish maggot-like creatures. After eating a large hole in the young growth, they become pupæ, and eventually emerge as perfect flies. They should be destroyed as soon as seen. Fumigation with a vaporising insecticide will effectually settle them before they have time to deposit their eggs. The roots, too, not infrequently, are pierced by the insects, and a warty growth results. The grubs should be picked out with a stout needle.



FIG. 403.—GRUB OF DENDROBIUM BEETLE.

Other insect pests which do considerable damage to Orchids are the Cockroaches. These are most difficult to eradicate when thoroughly established, as the colonies are usually in very inaccessible places, and the eggs so well protected as to be out of the reach of insecticides. These not only destroy the vital parts of Orchids, but also entirely disfigure the flowers. For *Cattleya* blossoms in particular Cockroaches betray a marked partiality, and in a single night will destroy what has taken the grower months to achieve. Cockroaches are so readily introduced, either in importations of new plants, or even in the clothing, that the gardener can hardly be too careful, and should their presence be detected he should at once take active measures to deal with the pest. Our plant-houses afford the insects the warmth that is absolutely necessary to their welfare; and no wonder, therefore, is it that once introduced they take a lot of ousting. Phosphorus paste spread upon bread-and-butter is as good a trap as anything, and will kill large numbers. Cockroaches are nocturnal in their habits, and in the daytime are seldom visible.

At one time growers of plants had but one species to contend with—*Periplaneta orientalis*—an insect which holds its midnight revels in our kitchens, causing them to have a most disgusting smell. To-day the number of species found has been considerably augmented, due mainly to the way in which the importation of plants has increased. One of the commonest of these Cockroach newcomers is *P. australasie*, a handsome insect. This has established itself in this country, and promises to become still commoner in the future. Unlike *P. orientalis*, it is winged in both sexes. In colour it is red-brown, with a yellow streak along the costal margin of the fore-wing at the basal half. The pronotum is black, and has a distinct yellow margin, all round. *P. australasie* is altogether larger than the so-called "Black-beetle," and a generally showier insect. Though the specific name suggests Australia as the native country of this pest, yet such does not seem to be the case. Large numbers of the insect have been taken in public gardens giving place to Orchids, &c., and from many private collections it has also been recorded. All Cockroaches are inimical to plant-life, and should be seriously regarded by the gardener who values his precious charges.

Belonging to the *Hemiptera Heteroptera* are the plant-bugs, a group of insects whose ways are not so well understood by the gardener as they should be. Of late one of these creatures has been adding to the troubles of the Orchid-grower by inflicting damage upon *Dendrobium* foliage. The insect responsible for this mischief is known as *Phytocoris militaris*, a near relative of the objectionable-smelling creature found upon Raspberries and the like. It is another of those insects with which an interchange

of commerce has presented us. The bug is nocturnal in its habits. The perfect insect is described in the "Journal of the Board of Agriculture" as bright blood-red with black or blackish-brown markings. Its head is blood-red, and the black eyes are very large and prominent; on the thorax are two broad black stripes extending down the wing-cases. The legs are red and the feet dark brown. The rostrum, or beak, by means of which it extracts the juices from the leaves, causing them to have a blotchy appearance, extends to half the length of the body, though it is not so long as in the nymphal stage of the insect, when the creature has but rudimentary wings, and is yellowish instead of bright red. Spraying with a solution of quassia and soft-soap has been found to give good results.

Of other insect pests affecting Orchids, mention must be made of Thrips and Greenfly. These may be killed by treating them to one of the vaporising insecticides (XL All is very safe and efficient), taking care that such is performed when the plants are not in flower. Mealy-bug is another pest which asserts itself, while Scale insects find Orchids suitable hosts. The former should be brushed off, and the latter sponged, in either case using a soft-soap solution.

There are several other pests, outside the class *Insecta*, which give trouble, but none more destructive than Slugs, Snails, and Woodlice. Both the first-named are particularly troublesome to the cool division of Orchids, and they manifest an especial fondness for *Odontoglossum* and *Masdevallia* spikes. There is a small variety often found with the sphagnum which is very destructive; it emits a garlic-like odour when crushed. The Common Garden Snail (*Helix hortensis*), which is very abundant, is also to be avoided. It exhibits considerable variation as regards the colour of its shell. This pest does not exhibit a fondness for any special section of the Orchid family. Slugs and Snails are best trapped by means of bran, brewers' grains, or Cabbage- or Lettuce-leaves. These traps must, however, be examined nightly, as in the daytime the pests are hidden away. Woodlice find their way into Orchid-houses, and, being night-feeders, they must necessarily be trapped. This is best accomplished by placing sliced Potato or Apple in the vicinity of their haunts, and lifting the traps each morning, when the Woodlice should be destroyed.

Comparatively few fungoid pests seriously affect Orchids, and those which are found if recognised may be readily dealt with. The commonest kind is a Leaf-Rust, which causes the foliage in summer to have unsightly whitish-yellow patches. As soon as the presence of this fungus (which is a species of *Glaosporium*) is detected, resort should be had to spraying with liver of sulphur (sulphide of potassium)—1oz. dissolved in 2gals. of hot water.



14.—*On Pitcher and Insectivorous Plants.*

BY HENRY JAMES CHAPMAN.

MOST charming and interesting are these plants, and as they are also easy of culture they should be far more generally grown than is now the case. *Nepenthes* is perhaps the most difficult genus to deal with, owing to the fact that the plants need more heat during the winter months than is generally at command. But there are the North American Pitcher-plants (*Sarracenia*s, in various species and hybrids), *Darlingtonia californica*, and the New Holland Pitcher-plant (*Cephalotus follicularis*), all of which may be grown in a house where a winter temperature of from 45deg. to 50deg. can be maintained. These delightful subjects are always interesting and appreciated, their various-coloured pitchers and quaint characteristics recommending them to all in the possession of a greenhouse; indeed, even those least interested in horticulture are usually attracted by this wonderful section of plants.

NEPENTHES.—Of these Pitcher-plants there are about forty species and hybrids now in cultivation; the species are mostly natives of the South Sea Islands. They require a summer temperature of not less than 70deg. to 75deg., and with sun-heat at closing time the temperature may often reach as high as 100deg. or more. They like a strong light, but must be protected from

the scorching rays of the sun during the hottest part of the day. With this condition of high temperature naturally the plants require an abundance of moisture at the roots and in the atmosphere at all times. They make their growths and pitchers during the summer months, and are generally seen in perfection about September. After this time, with shorter days, accompanied by cooler nights, the temperature may be reduced to about 65deg. at night, and the atmospheric moisture diminished correspondingly; but the plants must not, under any consideration, be allowed to suffer from want of moisture at the roots at any season. The plants are best accommodated when grown in baskets, which show their graceful habit to perfection, and they can also thus be more easily transferred or suspended, as desired, in any position, for exhibition purposes, &c.

The most distinct and desirable kinds are *Nepenthes bicalcarata*. The plant is of robust habit, with very broad foliage. The pitchers are large, of elegant form, about 5in. long, and upwards of 3in. wide at the broadest part; the colour, when mature, is light reddish-crimson, marked with parallel ridges. They are of remarkably stout texture, have two prominent fimbriated wings in front, and on the inner side of the triangular process at the articulation with the lid, two strong, spiny spurs, which suggested the specific name. A rare species from Borneo.

N. Burkei is a native of the Philippine Islands. It has distinct cylindrical pitchers, 8in. long, narrowed in the middle; the colour is green, spotted with red. They have a distinct, ridged, deep red rim at the top. This species is remarkable as being the most variable one in cultivation. The variety *N. B. excellens* has much larger and somewhat more cylindrical pitchers, which are more richly coloured. The spots on them are larger and more numerous; the lid also is prettily spotted, which, in the type, is almost destitute of spots. Both possess a good constitution, and pitcher freely.

N. cincta is a native of Borneo; the pitchers are fine in texture, 7in. or 8in. long, and the colour is green, flushed with red, and with numerous irregular purple blotches. The plants are of good constitution and pitcher freely. There is a question of the possibility of its being a natural hybrid between *N. Northiana* and *N. albo-marginata*. It certainly has many of the characteristics of these species. *N. Curtisii* is another distinct and desirable species from Borneo, having pitchers of a dull green, thickly mottled with purple, while the lid is prettily marbled with purple on a pale ground. The variety *N. C. superba* is, however, a very striking improvement on the type. Not only are the pitchers of the variety much larger, but their coloration is also much superior. The ground-colour is of a rich sanguineous red, with longitudinal yellow-green streaks and markings. The rim, which has here a much greater development, with the

numerous ribs and tooth-like lobings, is wholly of sanguineous red, while the broad, undulated lid is much freckled with red on a yellow-green ground.

N. Hookeriana is one of the best known kinds, and possesses a good constitution and pitchers freely. The colour is green, spotted with red. It is a native of Sarawak. *N. Kennedyana*, from Northern Australia, is a pretty species, with pitchers 5 in. long, elongated-cylindrical in form, and of a reddish colour. *N. Khasiana* (*N. distillatoria*) has pitchers 6 in. to 7 in. long, green, with purplish markings. It is a native of China. *N. lanata* is a distinct and pretty species, but very rare. The pitchers are about 6 in. long, and greenish-yellow. It is a native of Borneo. *N. madagascariensis* (Fig. 403) is a free-growing, most desirable kind, with small distinct reddish-crimson pitchers. *N. Northiana* (Fig. 404) is one of the finest *Nepenthes* in cultivation. The flask-shaped pitchers are reddish-green, striped and spotted with

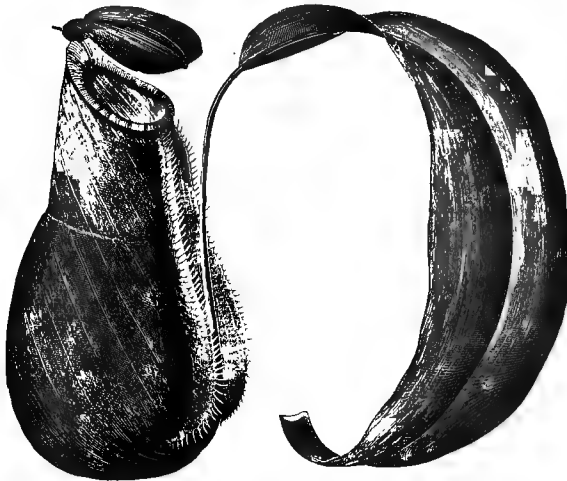


FIG. 403.—*NEPENTHES MADAGASCARIENSIS*.

crimson, while the lid is green, spotted with red; when mature they are 12 in. to 16 in. long, and 3 in. to 5 in. broad. It is a native of Borneo.

N. Phyllamphora (from Borneo) is a distinct species of free habit, producing pitchers 10 in. long, and of the same colour as the leaves. *N. Rafflesiana* is the species oftenest seen under cultivation; its robust constitution, combined

with the freedom with which it produces its elegantly-shaped pitchers, readily accounts for its popularity. The pitchers are 5 in. to 6 in. long, green, spotted with red. *N. Rajah* (from Borneo) is probably the grandest of all the species of *Nepenthes*. The broad, ampullaceous pitcher is 6 in. in diameter and 12 in. long. It has two fimbriated wings in front, is covered with long rusty hairs above, and studded with glands within; the margin is scalloped into bold undulations. The lid is 10 in. long and 8 in. broad. Unfortunately, it is of delicate constitution.

N. sanguinea has blood-red pitchers 5in. to 10in. long. It is a very rare species. *N. Veitchii* is a most distinct species, with cylindrical pitchers 9in. to 12in. long, and 3in. to 4in. in diameter; they are of a light green colour, shaded with brown, and covered with minute woolly hairs. It is a native of Borneo.

There are numerous garden hybrids which have been derived from the intercrossing of the various species. These form

interesting and in many instances striking additions. The following list includes only the best kinds: *N. chelsoni*, derived from the intercrossing of *N. Dominiana* and *N. Hookeriana*, has the intermediate characters of the parents, and is free-growing and most desirable. The pitchers are of good shape and substance, deep green, heavily blotched and spotted with reddish-brown. *N. Courtii* is a remarkably handsome hybrid, with pitchers 5in. long and $2\frac{1}{2}$ in. in diameter, cylindrical, pale greyish-green in colour, heavily spotted with reddish-brown. *N. Dicksoniana* is of recent introduction, and is derived from the intercrossing of *N. Rafflesiana* and *N. Veitchii*, and combines the intermediate characteristics of the parents.

The pitchers are 10in. to 12in. long, sub-cylindrical and slightly compressed, and of a light green colour, densely spotted and speckled with bright red-crimson. The rim is a most striking ornament. The furrows are yellow, the ridges crimson, interrupted at intervals by deep red bands. *N. Mastersiana* is indisputably the finest hybrid yet obtained. It is derived from the intercrossing of *N. sanguinea* and *N. Khasiana*. The pitchers are 8in. to 10in. long, and 2in. to 3in. broad. The colour is a deep blood-red, with some spottings of a darker colour; they are cylindrical, slightly distended below, and contracted above the middle. This is quite distinct from every other *Nepenthes* in



FIG. 404.—NEPENTHES NORTHIANA.

cultivation. It has a vigorous constitution, is compact in habit, and pitchers freely.

N. mixta is a most interesting and desirable hybrid, derived from the intercrossing of *N. Curtisii* and *N. Northiana*. The intermediate characteristics are well defined in the offspring. The pitchers are about 8in. in length, yellowish-green in colour, blotched with red, as in *N. Northiana*. The fine ribs which surround the mouth of the pitcher are of a deep crimson. The lid is oblong and thickly spotted with purple. The plant is of good habit, and pitchers freely. *N. Morgana* is distinct and pretty, and of dwarf, neat habit. The pitchers are flask-shaped, with two narrow wings. In a young state and on weakly plants they are beautifully mottled with bright red and pale green; but in older plants they are almost self-coloured and blood-red. The lid is always pale green, forming a striking contrast to the deep coloration to the other portions of the pitchers. *N. Sedenii* has medium-sized light green pitchers, profusely blotched and freckled with brownish-crimson. The variety *N. S. rubra* has deeper-coloured pitchers.

N. Toveyi is one of the most distinct *Nepenthes* in cultivation. It is of recent introduction, having been derived from the intercrossing of *N. Veitchii* and *N. Curtisii superba*. The pitchers are as large as those of *N. Veitchii*, but more cylindrical; the ground-colour is light green, which is much blotched and spotted with crimson. The wings are heavily fringed, and the broad rim is of a deep reddish-brown. The lid is a marked ornament, being erect, light yellowish-green, spotted and mottled with dark crimson. The plant is of good habit, and pitchers freely. *N. Williamsii*, derived from the intercrossing of *N. Sedenii* and *N. Hookeriana*, bears pitchers intermediate in shape between those of the two parents, 4in. to 5in. long, and of a green colour, densely spotted with blood-red, sometimes becoming suffused with red; it is of good habit, and pitchers freely. *N. Wrigleyana* has medium-sized flask-shaped pitchers, pale green, thickly covered with crimson spottings. When well grown, this is distinct and pretty.

The potting compost should consist of two parts fibrous roots extracted from the best brown peat, and one part of living sphagnum chopped moderately fine, to which should be added a liberal sprinkling of finely-broken crocks or rough sand and a few pieces of charcoal, to keep the whole in as open and porous a condition as possible. Drainage also should be carefully attended to, so as to avoid stagnation, which causes the soil to decay and become sour about the roots. The plants should be thoroughly watered as soon as they have been re-basketed, and every encouragement given to induce free growth.

The stock is increased by cuttings; these should be made of half-ripened wood, cut at the joint in the usual way, and inserted in cocconut fibre in a case where a brisk bottom-heat can be

maintained; or they may be inserted in 'pots of living sphagnum, where they often root more successfully than in heated cases or under bell-glasses. Young plants may also be raised from seed when it can be procured. This may be sown in pans prepared with finely-chopped portions of peat and sphagnum, placing them in a heated case, and keeping in a moist condition. The seeds usually germinate in about a month after sowing. The seedlings may be pricked off as soon as sufficiently large to handle, and grown on in the usual way.

SARRACENIA.—This interesting and pretty section of Pitcher-Plants is worthy of the consideration of all amateur gardeners and those in possession of a greenhouse where a winter temperature of from 45deg. to 50deg. can be maintained. Unlike the Eastern section of Pitcher-Plants, these gems produce in early spring most attractive and highly-perfumed flowers which are always appreciated and useful for cutting purposes, as they last a considerable time in perfection. As soon as the flowering season is over, the plants commence to make their new growths and quickly develop their attractive pitchers.

Considerable variety is observable amongst the species, as the accompanying illustrations indicate. The handiwork of the hybridist also has still further added to the varied characteristics of the plants. A further list of varieties may be seen in the "Appendix."

The potting compost required for *Sarracenias* is good fibrous peat and living sphagnum in about equal proportions; the peat should be of such a character that it does not readily turn sour. A liberal sprinkling of rough sand or clean, finely-broken crocks should also be added to keep the compost in an open condition. The pots must be carefully drained in such a manner as to avoid

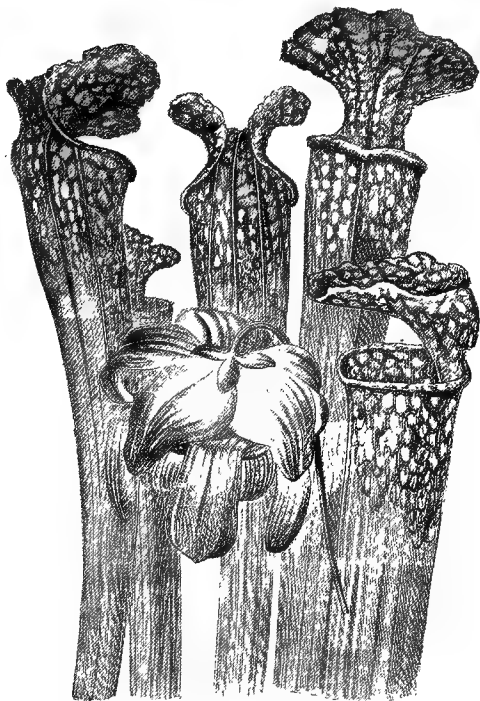


FIG. 405.—*SARRACENIA DRUMMONDI*.

stagnation. The best time to pot the plants is in the early spring, when they are in a dormant condition. Afterwards they should be thoroughly watered and kept in a fairly moist condition until active growth sets in, when they require an abundance of water at the roots, and a somewhat moist atmosphere is beneficial though not absolutely necessary. As autumn approaches, with cooler and duller conditions outside, the moisture should be diminished accordingly, and the compost should be kept in a friable condition throughout the resting period. A fairly light position is beneficial at all seasons, as this enables the pitchers to properly develop, brings out prominently the various natural tints, and thoroughly ripens the growths.

Sarracenias may be increased by dividing the numerous crowns which are produced near the surface. These should be taken off in the early spring at the time of repotting, using the same compost as recommended above.

Among the best species are *S. Drummondii*, which is shown with the flower in Fig. 405; the pitchers are green and purple, mottled with white. *S. D. alba* has more white than the typical form, and the pitchers are generally not so robust. *S. flava* has large open green pitchers, with deep purple veinings. The variety *atrosanguinea* has greenish-white and purple tessellation, as seen in Fig. 406.

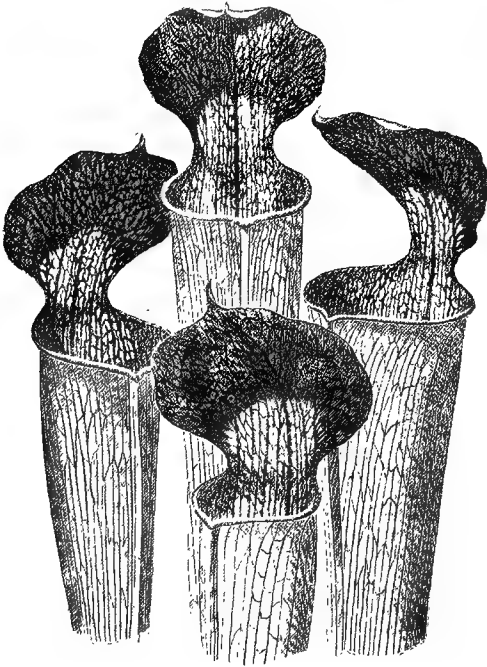


FIG. 406.—SARRACENIA FLAVA
ATROSANGUINEA.

S. purpurea is a hardy subject, and is a most distinct and desirable species. *S. psittacina* is very scarce; but it is distinct and good, and one of the most useful for hybridisation.

Among the hybrids *S. formosa* (shown on the right of Fig. 407) is derived from the intercrossing of *S. variolaris* and *S. psittacina*, and the marked characteristics of the latter species are seen in

the offspring. Other hybrids from the same species which are among the most desirable in cultivation are *S. Courtii* and *S. Wrigleyana*. *S. chelsoni* has large dark purple pitchers. *S. exoniensis* and *S. Stevensii* are two of the largest and best of their section. *S. melanorhoda* (shown on the left of Fig. 407) has deep green pitchers with dark purple veinings. *S. Willisii* has similar characteristics, but different-shaped pitchers. There are many other hybrids worthy of note, but the above-mentioned are the most desirable.

DARLINGTONIA CALIFORNICA (Fig. 408) is closely allied to the *Sarracenias*, and requires similar treatment as regards potting compost. It is hardier than many of the *Sarracenias*, and may easily be cultivated in the rockery with the protection of a light in winter, or in cold frames. Some of the finest specimens I have ever seen were grown under the latter conditions, and were in every way far superior to anything I have seen under greenhouse cultivation. I would therefore advise frame culture, especially in the summer. The plant requires a liberal supply of moisture and a fairly humid atmosphere during the growing season. It should

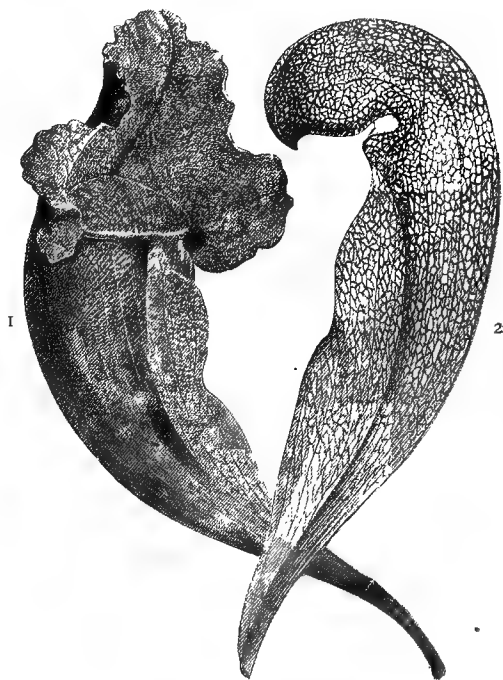


FIG. 407.—(1) *SARRACENIA MELANORHODA*,
(2) *S. FORMOSA*.

be freely syringed overhead in bright weather or when the outside conditions permit, especially when planted in the rockery.

HELIAMPHORA NUTANS is a rare and quaint species from South America, closely allied to, and requiring similar treatment to that recommended for the *Sarracenias*, with the exception that it needs more heat and is best suited when grown in the cool stove or warm greenhouse. It requires a liberal supply of moisture and a humid atmosphere at all times.

CEPHALOTUS FOLLICULARIS is a most desirable, easily cultivated, and always interesting little subject, and it cannot be too highly recommended to the notice of amateurs; in fact, all in possession of a greenhouse where a temperature of 45deg. to 50deg. can be maintained in winter may grow it successfully. In summer and during the growing season it requires a temperature of about 55deg., as then it usually makes its leaves and pitchers. During the warm months there is very little difficulty in maintaining a desirable growing temperature. These plants require a fairly light position to enable them to properly develop the colour of the pitchers, but care must be observed to protect them from the direct rays of the sun during the hottest parts of the day, or they are liable to become scalded. A humid atmosphere is its chief requirement. The best way to ensure this condition is to



FIG. 408.—DARLINGTONIA CALIFORNICA.

employ an ordinary bell-glass to cover the plants. Moisture is thus drawn up from the potting compost and condenses on the glass and around the plants. Under such conditions the plants are easily grown and always form objects of interest and admiration even to those least interested in horticulture.

The potting compost should consist of one part chopped sphagnum and two parts peat and rough sand or finely-broken crocks. The crocks are necessary, as the plants require a liberal amount of water, and it is desirable to keep the compost in as open a condition as possible, so that there may be no stagnation about the roots. The pots (small "sixties" are usually large enough) should be clean and liberally drained. The crown of the plants should be kept slightly above the rim of the pot, and the compost mounded up to it and made moderately firm about the roots.

Early spring and just before active growth commences is the best time to repot the plants; after this operation I find it an advantage to plunge the pot to the rim in another pot sufficiently large to take the bell-glass comfortably inside its rim, filling up the lower space with crocks and making up the surface with chopped living sphagnum, which quickly commences to grow, producing a nice effect, and assisting also in providing the humid conditions necessary for successful culture. After the plant has been plunged, it is desirable to give it a thorough soaking with soft rain-water, and then to cover it with the bell-glass. It will not require more moisture for several days, but

as soon as there are signs of its becoming dry, water should again be supplied. Rain-water is always desirable, as it encourages the moss to grow, while hard water has the opposite effect.

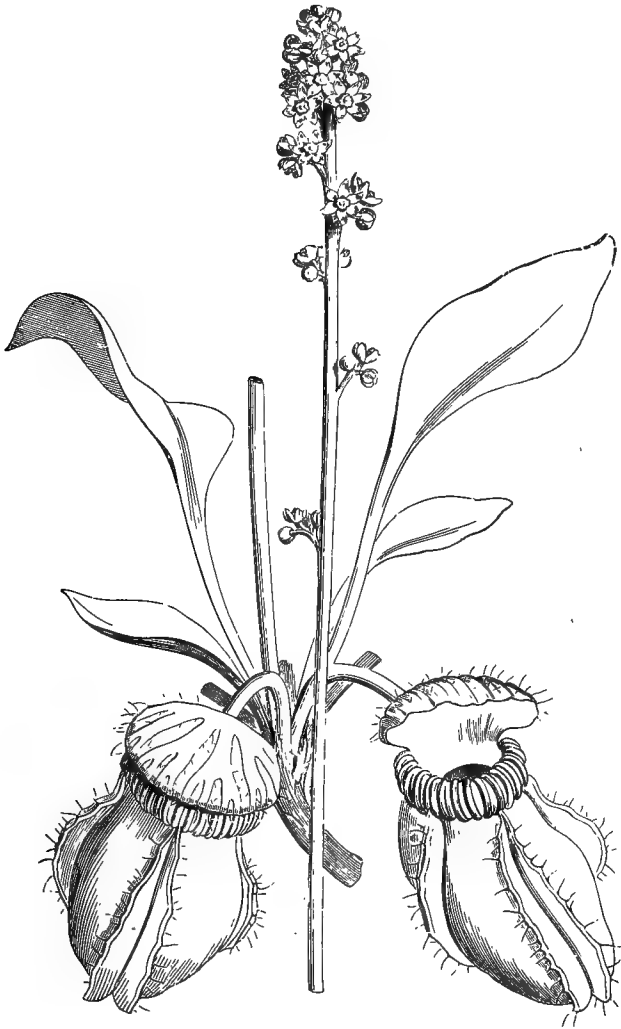


FIG. 409.—*CEPHALOTUS FOLLICULARIS*.

The stock may be increased by divisions of the many little crowns that form on the surface of the potting compost. This should be done just as growth is about to commence in the

early spring, potting up as desired, and using pots according to the size of the plants. The compost used and treatment required will be the same as advised above.

In winter, with lower temperatures and dull, sunless weather, drier conditions will be necessary. The plants should then be allowed to attain a reasonable dry state. *Cephalotus* sometimes shed the whole of their foliage in winter, but with the return of spring I have several times noticed that plants which lose their leaves, usually pitcher far more freely, and make better

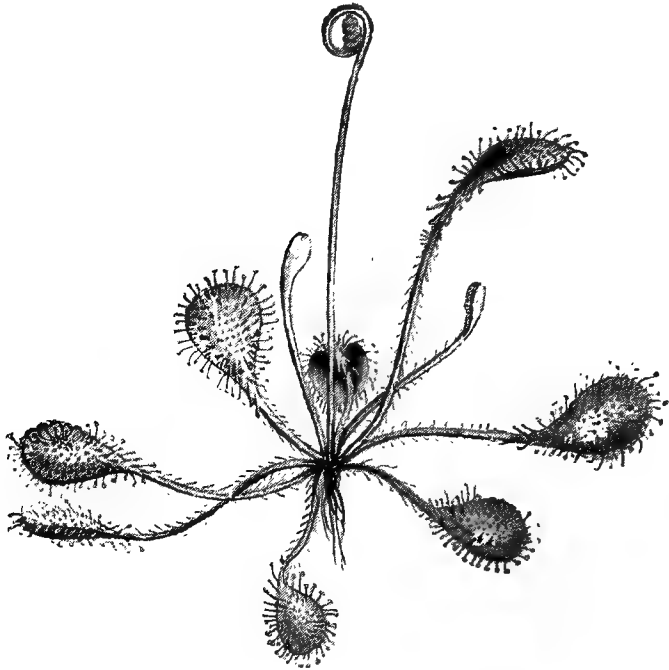


FIG. 410.—*DROSERA ROTUNDIFOLIA*.

specimens than those which have kept their foliage intact. Fig. 409 shows the foliage, pitchers, and a raceme of flowers.

DROSERAS are a most interesting and beautiful genus of Insectivorous Plants. They are commonly known as "Sundews," in consequence of being beset with glandular hairs which appear as if covered with dew. There are about a hundred species of this genus of annual or perennial glandular herbs, sometimes bulbous. *Droseras* are scattered over most parts of the world, and are usually found in marshy, boggy places. Some of the Australian kinds, however, grow in dry spots, where their bulbous

roots remain dormant for the greater part of the year, coming into activity again with the first rains. The ornamental leaves are clothed with numerous hairs, which when exposed to strong light turn to a bright red. At the apex of each of these hairs there is a globular drop of fluid, to which small flies that may chance to get into contact with it become affixed in the same manner as bird-lime acts. Insects thus caught rarely escape with their lives, and may be generally found dead on the native *D. rotundifolia* (Fig. 410), which is commonly met with wherever sphagnum is found growing, and in boggy places. In the latter positions, where the water becomes low in summer, the bright red colour, to which they then turn, is most attractive when the sun is shining full upon them. In the Fenlands of Norfolk especially they are most prominent.

The culture of the *Droseras* is in most cases easily provided for. The cool temperature of a greenhouse or cold frame meets their requirements through the warm months of the year. The Cape and Australian species require a cool intermediate temperature of about 50deg. during the winter season. For potting the compost required is equal proportions of peat and living sphagnum, to which may be added a liberal sprinkling of rough silver-sand and some chopped partly-decayed leaves, the whole being pressed moderately firm. The pots most suitable should be judged by the size and strength of the plants. Drainage should be clean and ample. The best time to pot the plants is about the first week in March.

The stock of *Droseras* may be increased by divisions of the crowns, or from seed, which should be sown as soon as procured. The latter may be sprinkled on baskets or pots on a sweet surface of growing sphagnum; in a good light position. An Orchid pot or basket is admirable for the purpose. But by far the best way, especially with the warm-growing *D. binata*, is to chop the roots of strong plants into pieces about $\frac{1}{2}$ in. long. These should be laid evenly on the surface of a pot containing sandy peat-soil and leaf-mould, and the roots lightly covered with the same material, after adding a little chopped living sphagnum. They should be watered thoroughly with soft rain-water, covered with a bell-glass, and placed in a warm, moist position of the warm house or propagating-stove. In the course of a few days they will commence to emit new growths from the sides of the roots, which quickly gain the surface, and may be pricked out in pots, as desired, as soon as they are large enough to handle, being gradually hardened off, so as to be placed in the cooler temperature under which it is generally found desirable to grow them. *Droseras* need an abundance of rain-water during the growing season; if hard water is used the sphagnum quickly dies and causes the material to turn sour and decay, necessitating repotting of the plants without delay.

The most easily procured species are *D. binata*, which somewhat resembles *D. dichotoma*, but is of dwarfer habit and more highly coloured than the last-named. *D. capensis* is a most distinct and desirable sort, of compact and pretty growth; it gets distinctly red under the influence of the sun's rays. *D. dichotoma* is one of the tallest and most attractive species in cultivation, and is of good constitution; it is very pale green. *D. filiformis*, a distinct and pretty species, does well in the cool frame in winter. *D. rotundifolia*, a British species, is most interesting treated as a greenhouse plant. *D. spathulata* is very distinct, and one of the most desirable species; it has a close

and compact habit. When grown in strong light it turns almost red, and is then most interesting.



FIG. 411.—DIONÆA MUSCIPULA.

DIONÆA MUSCIPULA. — Of the whole section of Insectivorous Plants the Dionæa is the most interesting (Fig. 411). It is familiarly known as Venus's Fly-trap, which popular name is derived from the sensitiveness set up by an insect or some other small object coming in contact with one or more of the three bristles which are placed in the centre of each

lobe of the leaf. Immediately these are touched the outer edges suddenly close up, which prevents the escape of the fly or other insect which may have intruded. This naturally causes the imprisoned insect to struggle more vigorously to gain its freedom. In so doing it is in constant contact with the sensitive bristles, which causes the sides to become compressed more firmly, until at last the unfortunate insect becomes so wedged that it cannot move, and it ultimately dies from suffocation. Soon after

the insect is dead irritation ceases and the apical lobe assumes its normal proportions, spreading its sides ready to entrap the next insect that may come in contact with its central bristles.

Of the carnivorous character of this and the so-called insect-absorbing plants, my experience, derived from close observation of the *Dionæa* and others of this section, is such that I must draw a distinct line between the term "Insect-catching" and the more generally used appellation "Insectivorous" (Insect-eating). As to the former, there can be no dispute; but as to the eating powers, this is quite an open question. I find that immediately after the insect is really dead, as stated above, the plant assumes its proper character. With regard to the insect which has been destroyed, the plant has no power to cast it away, and it gradually decays on the surface of the leaf. I have also noted that when the unfortunate creature happens to be a spider or a fly of unusual proportions, the decomposition that follows after death often causes the destruction of the leaf also; in fact, if allowed to remain on the surface long enough, it will rot the leaf through. This being the case, I cannot see what advantage is derived by the plants, or recognise the carnivorous instincts with which they are popularly credited.

The cultural requirements of *Dionæa muscipula* are not extensive. The plants may be easily cultivated in a cool greenhouse, or with the cold sections of Orchids. They are usually imported from Carolina and Florida by nurserymen. The potting compost required is a mixture of peat, leaf-soil, living sphagnum, and sand. The pots used should be clean, not too large, and well-drained; this latter feature is essential, as the least stagnation is fatal to the well-being of the plants. The potting compost should be pressed moderately firm about the base of the plants, which should be raised to within a short distance of the rim of the pot. During the active season of growth—the early spring and summer months—*Dionæas* require a liberal supply of water at the roots. Drier conditions may be afforded during the resting season, but sufficient must be given to sustain the plants in a plump condition. A bell-glass may be placed over them to prevent dust or insects from coming into contact with the leaves while in an active state of growth.





15.—*On Stove*
By
CHARLES BENNETT. *Plants.*

FOR a number of years the cultivation of stove plants has held a high place in British Gardening, and no wonder when one considers the pleasure of growing, enjoying, and studying the beautiful, curious, and useful plants of tropical countries in our own gardens, and the instruction derived therefrom. The extensive commercial relations Great Britain enjoys in trading with foreign countries, together with her numerous colonies in all parts of the world, places her people in a unique position for investigating the resources of the Vegetable World, and procuring the beautiful and curious plants of the tropics. This has been taken advantage of and extended by the liberality of private individuals and enterprising commercial firms, in sending plant-collectors to all parts of the world. Our Government has also established botanic gardens at home and in many of the colonies, with ardent directors to develop the resources of nature and to extend our knowledge of both economic and decorative plants.

Stove plants are those which are natives of tropical countries, and their successful cultivation requires considerable heat, and generally a large amount of moisture, in order to approximate to the conditions under which they grow naturally. Nevertheless

certain modifications are found to be necessary when under artificial treatment. In treating this subject, it is proposed for facility of reference to divide the plants into three classes: (1), Flowering Plants; (2), Ornamental Foliage Plants; (3) Climbers, Wall and Pillar Plants.

HOUSES.—First, however, as to the houses best adapted for growing the plants, and the method of furnishing the necessary temperature. Span-roofed houses are found to be the most suitable, as the light obtained inside is more equal and better diffused than in other kinds. A central bed to provide bottom-heat, or a stage of slate or similar material, should be provided; this may be covered with broken Derbyshire spar or shell-gravel on which to stand the pots. This has a very neat and tidy appearance, and is easily kept moist when necessary by either syringing between the pots or using a rose watering-pot. On each side may be a bed the length of the house, having hot-water pipes covered with cocoanut-fibre in which plants may be plunged that require bottom-heat. A tank running along under the central stage with a flow-and-return pipe running through it, will help to keep up the necessary aerial moisture, and also be a handy source of supply for watering the pots and syringing overhead. It should be borne in mind that as rain-water is the best for both watering and syringing, it will be advisable to make provision for collecting as much of this as possible; this may be done by enlarging the tank, making it both wider and deeper, and dividing it off from the long narrow and shallow tank.

For maintaining the proper atmospheric temperature hot-water pipes may be laid under the paths, with iron gratings above to allow the heat to pass readily through; or they may be arranged up the side walls or under the staging. The side walls of the house about 3ft. above the ground-level should be glazed so as to make the structure as light as possible, as for several months of the year all the light that it is possible to obtain will be necessary for the proper development of the plants growing inside.

Where only one house is used as a stove, it should be divided across the middle by a glazed partition. The two divisions may then (at certain seasons of the year) be kept at slightly different temperatures, and the atmosphere of one may be kept drier to ripen the wood and also to allow that period of rest which is so necessary to a large number of plants.

SOILS AND POTTING MATERIALS.—Good loam is essential, and this should be the top spit from a pasture, with plenty of fibrous roots in it. It should be stacked for several months before it is required for use in a good-sized heap, with the grassy side downwards.

Good fibrous, turfy peat, of a sandy nature, is another requisite, and when used should be broken into lumps with the hands. For some plants, such as Anthuriums, it is desirable to remove a quantity of the fine matter. This may be done by slightly beating the broken lumps with a stick.

Leaf-mould, when obtained by collecting the leaves of Oak, Beech, Elm, &c. (avoiding those of a poisonous nature, such as Laurels), putting them in a large heap and occasionally turning it over to sweeten it, is very useful for many plants. It is highly important that it is sweet and free from fungus.

Cow-dung, when well decayed, is a very safe manure to use for plants that require a little stimulant.

Coarse silver-sand is extensively used for striking cuttings and for mixing in composts to keep them sweet and porous.

Charcoal, in lumps, is another useful material for mixing in the soil to keep it open, and for the roots of plants to cling to.

Live sphagnum should have all the grass, leaves, and refuse picked out before using.

Cocoa-nut refuse is a clean and suitable material for hot-beds, and for plunging plants that require bottom-heat (if hot-water pipes are supplied to provide the necessary heat).

Artificial manures are offered in abundance. Many of them are of good quality, and are of great benefit if used judiciously.

GENERAL HINTS ON CULTURE.—Stove plants should be encouraged to make most of their growth during the spring and summer months, when there is plenty of sunlight to develop it. They should be repotted in the spring, just as they are commencing to grow, and the heat and moisture in the house increased. In repotting, clean, dry pots, with efficient drainage, should be used, and soil in a proper state as regards moisture, and sufficiently warmed to prevent chilling of the roots. In ventilating, cold draughts must be avoided, and the ventilators be closed as early in the afternoon as is consistent with safety to economise the sun heat, which will be found to be more beneficial to the plants than an indiscriminate use of fire-heat.

Watering.—The water used both for watering the soil and for syringing overhead should be of about the same temperature as that of the house. In watering give sufficient to wet the whole ball of earth quite through, but be careful not to apply any water unless required, or the soil will become sodden and sour. Clean rain-water is much the best when it can be obtained in sufficient quantity. If well-water is used it should be exposed to the air for some time beforehand.

Shading.—During the bright days of spring and summer most plants require a little protection from bright sunshine. For this purpose a material called "hothouse shading" is made into blinds, and fixed to rollers to cover the roof. Care should be taken to

draw up the blinds when the weather becomes cloudy, to prevent the plants from becoming drawn and weak.

Flowering Plants.

From the wealth of species and varieties of stove flowering plants we shall make what we consider a selection of the most popular and best for general cultivation. In some cases we know where so many plants of intrinsic beauty and attraction offer their claims on our attention, it will be somewhat difficult to decide what old friends to leave out of the list. We shall, however, make the selection as varied as possible, and include those which, not by their rarity alone, but by their real merit, are deserving of cultivation, and such as are readily obtainable and to be found in current trade catalogues of the firms making these plants a speciality.

ACHIMENES.—A genus of favourite ornamental perennials with showy, bright-coloured flowers, natives of Central and South America. The species and varieties are now very numerous, with a great variety of shades, most of which are pretty and attractive. They have tuberous roots covered with small scales, and it is from these that the plants are chiefly propagated. Cuttings, however, strike freely, and new varieties are raised from seed. A moist, well-drained soil, consisting of equal parts of peat, loam, and leaf-mould, with a little manure and sand, not too firmly pressed, suits their requirements, and they may be grown in pots, pans, or baskets. The tubers may be planted just under the surface, in batches, from January to April, keeping the pots in a light, warm situation, near the glass, to prevent the young growths from becoming drawn and weak. Water sparingly at first, but freely when well rooted. Attend to staking and tying when the plants are a few inches high. After the flowering season gradually withhold water and keep the roots dry and warm throughout the winter until it is desirable to start them into fresh growth. When growing, a temperature of between 60deg. and 75deg. is suitable for *Achimenes*; and when at rest 50deg., with the pots turned on their sides in a dry place. Some grand varieties are: *Admiration*, *Ambroise Verschaffelt*, *Baumannii*, *Carl Woolfarth*, *Diadem*, *Estelle*, *Firefly*, *Grandiflora*, *Harry Williams*, *Lady Lyttelton*, *Longiflora Major*, *Mauve Queen*, *Pardusa*, *Rosea Magnifica*, *Scarlet Perfection*, and *Venusta*.

ÆCHMEA FULGENS (Fig. 412) is a valuable decorative plant, producing coral-red and violet flowers, which last a long time in perfection. It is an epiphytal plant, growing on trees in the South American forests, but is easily cultivated in pots in a compost of fibrous loam, rough peat, and leaf-mould in equal proportions, if liberally supplied with water. Increased by suckers planted in small pots. *A. Mariæ Reginae*, from Costa Rica, is

another handsome species with recurved leaves from 12 in. to 18 in. long, arranged in a vase-like manner, and having spiny margins. It is of robust growth, producing

an erect flower-spike, the beauty of which is enhanced by rich magenta bracts fading to rose, the upper part being thickly set with dark blue flowers, changing with age to rose-pink. Like the former species, this lasts several weeks in perfection, and it thrives under the same treatment.



FIG. 412.—*ÆCHMEA FULGENS*.

ÆSCHYNANTHUS is a genus of small shrubs with generally rather thick opposite leaves and handsome tubular flowers in terminal fascicles; most of the species are natives of East India and Java. Fibrous lumps of peat with a few clean potsherds and pieces of charcoal and a sprinkling of silver-sand, suit them

very well. Most of the species should be kept moist and growing all the year in a warm part of the stove. They make elegant basket-plants for hanging from the roof. *Æ. Boschianus* (Fig. 413) has vermilion-coloured flowers; *Æ. grandiflorus*, scarlet; *Æ. Lobbianus*, scarlet and purple; *Æ. longiflorus*, scarlet; *Æ. pulcher*, scarlet and yellow; and *Æ. speciosus*, orange and red. *Æ. splendidus* is a hybrid raised from *Æ. grandiflorus* and *Æ. speciosus*, and has violet, scarlet, and orange flowers.

AGALMYLA STAMINEA, from Java, has large, oblong, acuminate leaves, with beautiful axillary bunches of red tubular flowers. It succeeds well on blocks, or in baskets, treated like *Æschynanthus*, to which it is closely allied.

ALLAMANDA NERIIFOLIA, from Mexico, possesses the merit of flowering freely in a young state, and is of easy culture. Flowers, orange-yellow in terminal bunches; leaves resembling those of the Oleander. It may be raised from cuttings of young growths in spring. The old plants should be cut back after flowering.

Repot in the spring, using a good substantial soil of two parts fibrous loam, and one part leaf-mould and sand, in well-drained pots. *A. Williamsii* is of dwarf, compact, bushy habit, with rich dark green foliage, and produces an abundance of beautiful, clear, bright yellow, sweet-scented flowers from $3\frac{1}{2}$ in. to $4\frac{1}{2}$ in. in diameter the whole summer; it also flowers freely in small pots.

AMARYLLIS (*Hippeastrum*).—These truly gorgeous flowers are among the most brilliant and effective in the whole Vegetable Kingdom. By the untiring efforts and skill of the hybridist the most gratifying results have been attained in the improvement of shape, colours, and substance of the flowers, from a horticultural point of view, leaving now little to be desired. The beautiful hybrid varieties are now ousting the formerly high-priced species—so much so that the latter are now comparatively little grown and with difficulty obtained, even if required.

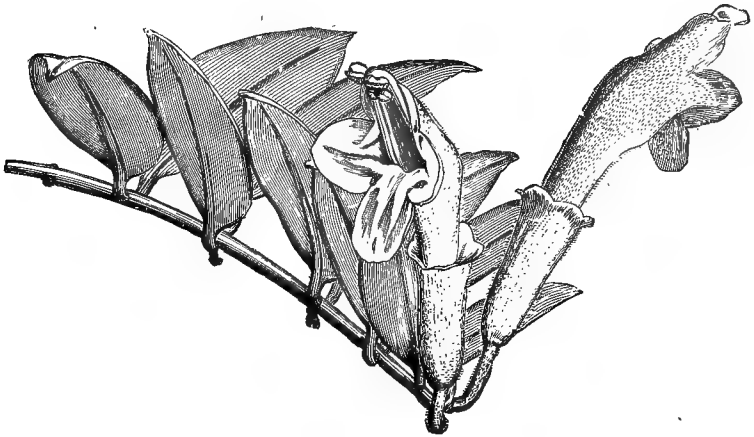


FIG. 413.—ÆSCHYNANTHUS BOSCHIANUS.

Turn the bulbs out of their pots in January or February, remove all the old soil, and thoroughly cleanse them from all decayed matter. Repot rather firmly in a compost of two-thirds good fibrous loam and one-third of equal parts cow-manure and leaf-mould, with a small quantity of sharp sand. It is a good plan to mix the loam and cow-manure in layers in a good-sized heap six months before it is required for use. Insert the bulbs about two-thirds of their depth in the soil and plunge the pots in old tan or leaf-mould, with a gentle bottom-heat, and a night temperature in the atmosphere of 55deg. to 60deg. Water sparingly until growth commences and the flower-stems and foliage appear, and then apply moisture more freely. After

the flowering season, when growth is completed, gradually withhold water, and give the bulbs a period of rest.

Where bottom-heat is not available, it is advisable to prevent the bulbs from rotting, to repot soon after flowering. Remove only a portion of the old soil, and stand the pots on shelves or stages, and when the flower-stems show, water with weak liquid manure. Propagate by offsets from the old bulbs or by seeds sown in March in gentle heat. The seedlings, with careful treatment, flower in three years from time of sowing. The following selection are excellent for shape and substance, and contains a nice variety of colours: Beethoven, light orange, with white veins; Conqueror, bright crimson-scarlet, very large; Eclipse, white, striped with crimson-scarlet; Eldorado, orange-scarlet, with darker veins; Empress of India, scarlet, with white rays; Figaro, crimson, with small grey eye; Meteor, white, striped with reddish-crimson; Southey, scarlet, with white and green rays; The Vigil, white, with red markings.

AMASONIA.—Dwarf shrubs from Tropical America, well deserving of cultivation. *A. calycina* (*punicea*) is a most striking and beautiful species, well adapted for pot culture, and of comparatively recent introduction. Its racemes of creamy-white flowers are highly

enhanced by rich vermilion crimson bracts arranged in pairs. A compost of peat and loam with a little silver-sand suits it best, and it may be propagated from cuttings in heat under a bell-glass or in a propagating-case.



FIG. 414.—ANTHURIUM ANDREANUM.

ANTHURIUM.—A genus of Aroids, many of the species and varieties being of great beauty, and, owing to their novel character, peculiarly fascinating. They thrive best in very fibrous peat, from which a portion of the dusty matter has been removed, and with a little fresh sphagnum and a few clean crocks

and lumps of charcoal interspersed. In potting, keep the crown of the plant raised on a mound above the level of the pot, and ensure thorough drainage. *A. Andreanum* (Fig. 414) is a beautiful species of neat habit, with oval heart-shaped spathes, 5 in. long, of a glowing orange-scarlet, the surface being irregularly

corrugated, and shining as though varnished; the spadix is usually from 3in. to 4in. long, and yellowish. *A. A. album* is an effective white variety, with a less corrugated spathe than the type. *A. Scherzerianum* (Flamingo Flower), from Guatemala, is a popular and striking plant, the gorgeous coral-red spathes and curved spadices lasting a long time in perfection. There is a white variety called *Duvivierianum*, whilst *parisiense* has fine rose-pink spathes, and *Rothschildianum* white, spotted and freckled with red. *Wardii* is the largest and best of the red-spathed varieties, being 6in. long and 4in. wide, and of the most brilliant scarlet.

APHELANDRA AURANTIACA ROEHLII, a native of Mexico, has handsome foliage and terminal spikes of bright scarlet flowers produced in winter. Soil: peat, loam, and sand. Syringe frequently when growing, to nourish the foliage and keep down insects.

ARDISIA CRENULATA (Fig. 415) is a handsome evergreen shrub from Mexico, producing reddish-violet flowers and panicles and coral-red berries. Propagate from seed or cuttings, and

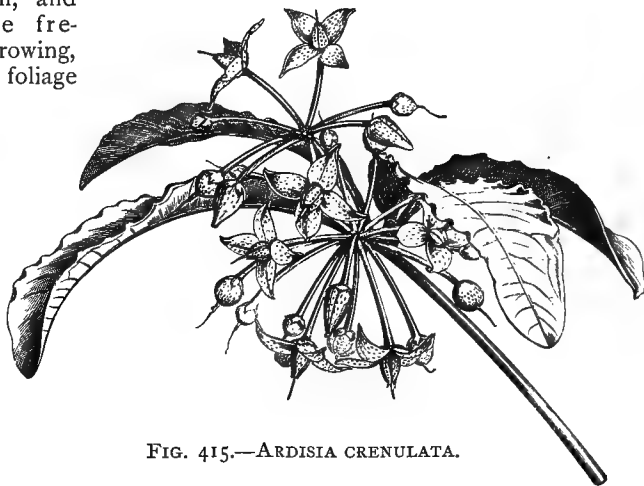


FIG. 415.—*ARDISIA CRENULATA*.

grow in equal parts peat, loam, leaf-mould, and sand. Sponge the leaves and stems to keep down Scale, which are apt to be troublesome if neglected. *A. c. alba* is a variety producing white berries.

ATACCIA (Tacca) CRISTATA, when in flower, is a most curious looking plant, native of the Malayan Archipelago. It has an underground rhizome, from which a few leaves are produced. The flower-scape is erect, terminating in a one-sided umbel in an involucre of four unequal bracts; the flowers are crowded together, of a dark violet-purple, and though not handsome, never fail to attract attention by the quaintness of their grouping: It may be propagated by division, and grown in peat, loam, and sand, with a few lumps of charcoal interspersed.

BEGONIA.—There is probably no class of plants that stand so high in popular favour, or that are more deserving

of extensive culture than the Begonia. The species are very numerous, and the varieties, most of them of great beauty, are innumerable. Diligent hybridisers have taken such an interest in increasing and improving varieties, that we are now never without a good display of flowers the whole year through. Especially is this the case with the tuberous-rooted section, for, by crossing the late-flowering sorts with *B. socotrana*, we now have a class of winter-flowering hybrids of great value as decorative plants. It would be useless to recommend any particular varieties whilst so many new hybrids of sterling worth, both double and single-flowering, are being constantly added. We, however, still have a great liking and admiration for many of the old evergreen and perpetual-flowering kinds, such as *B. fuchsoides*, *B. hydrocotylifolia*, *B. insignis*, *B. manicata* (Fig. 416), *B.*



FIG. 416.—*BEGONIA MANICATA*.

nitida, *B. parviflora*, *B. Davisii* (Fig. 417), &c.; while the newer winter-flowering hybrids, such as John Heal, Mrs. Heal, Adonis, Winter Gem, Gloire de Lorraine, Gloire de Sceaux, and the semi-double Ensign, are so beautiful that they need no word of praise to recommend them.



FIG. 417.—*BEGONIA DAVISII*.

liberal supply of water during growth, and the tuberous-rooted varieties require their tubers well ripened after flowering, and

Equal parts of peat, loam, leaf-mould, and sand form a suitable compost for Begonias, and they are of easy culture. The evergreen sorts need a

to be kept dry during the resting season. Propagation is readily effected by cuttings and by seeds. The latter, being extremely minute, must not be covered with soil as is customary in sowing most seeds. Have the finely-sifted compost made level about $\frac{1}{2}$ in. below the top of the pot, watered with a fine rose, and left for a short time to drain. Then sprinkle the seed thinly and evenly all over the surface, cover the pot with a pane of glass, and shade with a piece of paper till germination takes place; gradually inure the young seedlings to light and air, and prick out into pans or boxes as soon as big enough to handle, continuing to shade from bright sunshine. Some kinds, such as *B. socotrana*, produce bulbils at the base of the main stem; these may be detached, and grown on to form plants.

BURBIDGEA NITIDA.—This beautiful plant (Fig. 418) was discovered in North-west Borneo by Mr. F. W. Burbidge, B.A. It is a stove herbaceous perennial allied to *Hedychium*, with brilliant orange-scarlet flowers in terminal panicles. It grows freely in a compost of equal parts fibrous loam, peat, and leaf-mould, with a little coarse silver-sand, and is readily propagated by division in spring.



FIG. 418.—BURBIDGEA NITIDA.

BURCHELLIA CAPENSIS, an evergreen shrub from the Cape of Good Hope, produces handsome clusters of scarlet flowers. Propagate by cuttings, and grow in equal parts peat, loam, leaf-mould, and sand, in a cool part of the stove.

CENTROPOGON LUCYANUS is a garden hybrid of French origin, and being of a somewhat procumbent habit is well suited for growing in a hanging-basket. Cuttings taken off with a heel root readily, and the plants thrive in fibrous loam, leaf-mould, and sand. It produces its pretty rosy-carmine tubular flowers very freely in mid-winter, which makes it an especially desirable plant.

CLERODENDRONS.—These beautiful shrubs are readily propagated from cuttings of the non-flowering side shoots, in sandy soil, under a bell-glass, with bottom-heat; also by root-cuttings, and from seed. Old plants should be cut back annually. Remove most of the old soil, trim the roots, and repot in spring in a compost of two parts loam, one part peat, and one part rotten dung. Plunge the pots in a hot-bed to start the plants into growth, and transfer into larger pots as required, according to the strength of the plants, when they will form noble bushes. *C. fallax* (from Java) is one of the most beautiful species, with large heart shaped leaves on long petioles, and bearing bright scarlet flowers in June. *C. fragrans flore-pleno* is a garden variety, 4ft. high, with white and red flowers; August. *C. infortunatum*, from the East Indies, has vivid scarlet flowers; July. *C. Kaempferia* is a fine South American plant, with bold foliage and large panicles of scarlet flowers, produced well above the noble foliage. *C. squamatum* (Fig. 419) is a native of China and Japan; its branches are four-angled and furrowed, and its leaves are heart-shaped; the handsome flowers are of a striking bright scarlet, and borne in terminal panicles.

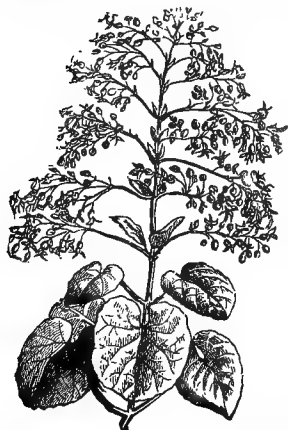


FIG. 419.—CLERODENDRON
SQUAMATUM.

CLIVIA.—See *Imantophyllums*.

CRINUM.—The stove species of this genus of remarkably handsome bulbous plants are especially attractive by reason of their lovely Lily-like fragrant flowers, produced many in an umbel at the end of the rather long solid scape. Some cultivators plant their bulbs in prepared beds, with good results. They also succeed very well in pots. Rich turfy loam, with a little peat, well-decayed manure, and coarse sand form a good compost in which to pot them. Good drainage is essential, as they require an abundance of water when growing, which should be in a light, well-ventilated portion of the house. The bulbs should be thoroughly well ripened after growth is completed, and be kept quite dry during winter. They are propagated by offsets which, however, are but sparingly produced. *C. amabile*, *C. amœnum*, *C. Macowani*, *C. Makoyana*, *C. Moorei*, *C. ornatum*, and *C. purpurascens* are all good sorts.

DIDYMOCARPUS MALAYANUS, a recent acquisition from Malaysia, is a distinct and charming stemless herbaceous plant, producing in cymes primrose-yellow flowers, with a deeper yellow blotch on

the lower segment of the corolla. It flourishes under the treatment recommended for Gloxinias.

EUPHORBIA JACQUINÆFLORA. (*E. fulgens*), a slender-growing plant, is readily propagated from cuttings in heat under a bell-glass in June. Grow on briskly in a good heat, and avoid draughts of cold air. Ripen the shoots well in the autumn by exposing them to sunshine, and they will produce pretty bright orange-scarlet wreaths in winter, and last a long time in beauty. Keep the plants somewhat dry after the flowering season, and let them rest for three or four months. A compost of equal parts fibrous loam and peat, with a little sand and a few lumps of charcoal or broken bricks, suits them. *E. splendens*, owing to its bright red waxy involucre being very showy and durable, is often seen in our hothouses, and requires little care when



FIG. 420.—EUCHARIS AMAZONICA.

EUPHORBIA JACQUINÆFLORA. (*E. fulgens*), a slender-growing plant, is readily propagated from cuttings in heat under a bell-glass in June. Grow on briskly in a good heat, and avoid draughts of cold air. Ripen the shoots well in the autumn by exposing them to sunshine, and they will produce pretty bright orange-scarlet wreaths in winter, and last a long time in beauty. Keep the plants somewhat dry after the flowering season, and let them rest for three or four months. A compost of equal parts fibrous loam and peat, with a little sand and a few lumps of charcoal or broken bricks, suits them. *E. splendens*, owing to its bright red waxy involucre being very showy and durable, is often seen in our hothouses, and requires little care when

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well established. It is a handsome, sturdy, branching species, but owing to its thorny nature is not largely grown. It is a native of Madagascar.

FRANCISCEAS (BRUNFELSIA) are stove evergreen shrubs with alternate, entire, shining leaves. They may be raised from cuttings struck in heat under a bell-glass. The soil for established plants should be a rough turfy compost of three parts peat and one of loam. Keep the atmosphere moist and at a temperature of 65deg. to 85deg. when the plants are growing, but cooler and drier during the resting period. Most of the species have been obtained from Brazil, and have sweet-scented flowers, which are a beautiful purple when they first open, becoming paler with age. *F. Hopeana* (*F. uniflora*) has violet flowers, which change to almost white and are highly odorous.

GARDENIAS.—Beautiful evergreen shrubs, which are without doubt among the most deservedly popular and highly-prized of our stove plants. The purity of their lovely sweet-scented double white flowers, their shining bright green leaves, and their adaptability for bouquets and other decorative purposes, make them especially desirable. Cuttings of the young wood strike freely if planted in sandy peat and loam in bottom-heat under a bell-glass. The young plants should be grown on in a brisk moist heat. The soil best suited for their culture consists of equal parts fibrous loam, sandy peat, and well-rotted dung. Syringe frequently except when in blossom. A temperature of 60deg. to 85deg. from March to September is none too high, but during the winter months 50deg. to 60deg. is sufficient, with, of course, less moisture. The plants, if neglected, are very liable to insect pests; they should therefore be frequently examined and sponged when necessary to keep these in check.

G. florida flore-pleno is Jasmine-scented, and is erroneously called Cape Jasmine, owing to its having been first brought to this country from the Cape of Good Hope, where it was found growing in a garden; but it is in fact a native of China; this and its variety *intermedia* are what are generally grown. *Fortuneana* is a variety with larger flowers. *G. radicans* and its variety *major* are much smaller in habit than the preceding, but very pretty, and flower freely in very small pots.

The following are single-flowered, and may be considered a different section. *G. citriodora*, from Natal, makes a pretty plant, with numerous single Citron-scented white flowers. *G. Stanleyana*, a native of Sierra Leone, is a splendid plant, with handsome foliage and large trumpet-shaped, sweet-scented flowers, 6in. long, which are white, with chocolate-coloured spots, and are freely produced all over the plant.

GESNERAS and NÆGELIAS are herbaceous, tuberous-rooted plants, with attractive flowers, and some varieties have, in addition,

very handsome foliage. Plant the roots just under the surface in two parts fibrous peat, one part leaf-mould, and a liberal sprinkling of sharp silver-sand, in well-drained pots. Water very sparingly until the young plants come up and make some fibrous roots, then rather liberally. Give them plenty of light, heat, and moisture in the atmosphere, but do not syringe much overhead. Avoid cold draughts, the leaves being rather delicate when young. When the plants have done flowering, and show signs of exhaustion, gradually withhold water until the foliage dies down, then turn the pots on their sides in a dry place with a temperature of 45deg. to 55deg., and allow a period of rest until the season comes round for re-potting. Propagation is effected by cuttings of young shoots, and also by mature leaves laid on sandy compost with the leaf-stalk inserted in the soil. There are numerous species and varieties to select from. *Gesnera refulgens* (Fig. 421) has deep red flowers and large cordate ovate foliage, with stout deep red hairs.

GLONERIA (Psychotria) JASMINIFLORA.—A beautiful ever-green shrub from Brazil. It produces terminal corymbose panicles of handsome white tubular flowers, very much resembling those of *Bouvardia jasminiflora*, and may be had in blossom in early spring when white flowers are valuable. It may be propagated and treated like Gardenias.

GLOXINIAS.—Tuberous-rooted perennials with showy and numerous flowers. This is one of the genera in which the skill of the hybridist has worked an important effect, the varieties being now innumerable and of the richest colours and markings. Few of the species with which we were a few years ago acquainted are now grown, except in botanic gardens. The erect-flowering varieties are the most popular, as their lovely flowers are seen to greater advantage.

The thick fleshy tubers should be potted in equal parts fibrous loam, peat, rotten dung, and sand in pots a little larger



FIG. 421.—*GESNERA REFULGENS*.

than the tubers, with the crown just under the surface of the soil and placed on shelves or stages in a position well exposed to the light to prevent the growth from being drawn. When the pots get full of roots water liberally. After the flowering season gradually withhold water to ripen the tubers. During the winter season the pots may be turned on their sides in any warm place to keep the soil dry; or the tubers may be shaken out of the soil and stored in dry silver-sand well protected from the cold. Propagation is readily effected by leaves planted as cuttings, or by seed, which may be sown in March.

GOLDFUSSIA ANISOPHYLLA, a winter blue-flowering stove evergreen from Tropical Asia, makes pretty little bushy plants from cuttings. It should be grown in loam, leaf-mould, and sand in a light place, such as on a shelf near the glass.

HEDYCHUM.—Herbaceous perennials from Tropical Asia, with handsome, fragrant flowers. After the flowering season, keep rather cool and dry, to allow a period of rest through the winter. Remove most of the old soil in January or February, and replot in three parts fibrous loam, one part turfy peat, one part rotten dung, and a little coarse sand. Water freely when in full vigour, and remove to a cooler place when in blossom,



FIG. 422.—**HIBISCUS ROSA SINENSIS**.

422) produce most brilliant scarlet, pink, and yellow flowers. They thrive either in pots or planted out in equal parts fibrous loam and peat, with the addition of a little well-decayed manure, charcoal, and sand. Prune the straggling shoots, and start the plants in a brisk, moist heat in spring; freely water and syringe overhead during growth, but keep rather dry during winter.

to prolong the flowering season. Propagate by division in spring. *H. angustifolium* (orange scarlet), *H. conorarium* (white), and *H. Gardnerianum* (yellow) are the most popular varieties.

HIBISCUS. — A genus of evergreen shrubs, of vigorous habit. The numerous varieties, both single and double, of *H. rosa sinensis* (Fig.

Increase by cuttings or by seeds. *H. schizopetalus* is a most singular and elegant plant, the petals being deeply cut and fringed.

HIPPEASTRUM.—This is the correct name of the plants usually classed as “Amaryllis.”

IMANTOPHYLLUMS (*Clivia*), of which there are now many handsome valuable seedling varieties, may be grown in a greenhouse, but to produce them in perfection a little more heat is necessary during the growing season. They are easily propagated by division, and grow freely in two parts good fibrous loam, one part well-decayed manure, and a little sharp sand. Water freely, and maintain a moist atmosphere when growing, with less both at the roots and in the air when at rest. *I. miniatum* is an amaryllidaceous stemless herb from Natal, with thick fleshy roots, strap-shaped leaves, and umbels of many showy orange-vermilion flowers. Many of the new varieties, such as *Admiration*, *Acquisition*, *Mdlle. Marie Van Houtte*, *President*, and *Superbum* show a marked improvement on the typical form, the flowers being larger, with brighter and more refined shades of colour.

IMPATIENS.—There are several species of this genus easily raised from seed, well suited for growing in a cool part of the stove, and when in flower may be used for decorating the conservatory, e.g., *I. flaccida alba*, a native of Java, with white flowers; *I. Hawkeri*, from the South Sea Islands, deep scarlet; the rose-flowered *I. Sultani* from Zanzibar, and its salmon-flowered and variegated-leaved varieties, are all deserving of culture. Sow the seed thinly in March or April in light, rich soil, and plunge the plants in a gentle hot-bed. Pot off the young seedlings as soon as they have made two pairs of leaves in a compost of fibrous loam, leaf-mould, and sand, and grow on in a light position near the glass.

IXORAS are beautiful evergreen shrubs, and owing to their great beauty are general favourites. Propagate by cuttings of firm young shoots in bottom-heat under a bell-glass. In potting use a compost of two parts peat, one part fibrous loam, and a sprinkling of coarse silver-sand. Pinch the point of the growing shoot to make it form branches, and tie these out to small sticks as they grow. Water carefully and syringe twice or thrice daily when growing, shade from bright sunshine, and maintain a regular bottom-heat of 75deg. about the roots. Keep down Scale and Mealy-bug by sponging with soapy water, using a small brush where necessary, and afterwards syringe with clean water, laying the plant on its side to prevent the soapy water from getting into the soil. The trusses of flowers are produced at the extremities of the shoots so that the pinching of the points must be discontinued in May or numerous shoots and no blossoms will be the result. A high temperature (75deg. to 85deg.) is necessary during the growing season, but during the winter

55deg. to 65deg. is sufficient. The following species and varieties are all desirable, and will produce a good variety of colours: *I. amabilis*, *I. coccinea superba*, *I. Colei*, *I. crocata rutilans*, *I. Dixiana*, *I. Duffi*, *I. Pilgrimii*, Prince of Orange, *I. Westii*, and *I. Williamsii*.

JUSTICIA.—Sub-shrubby plants easily raised from cuttings in spring, and growing freely in equal parts loam, peat, and leaf-mould, with a little sand added. *J. carnea*, from Rio Janeiro, flesh-coloured; *J. coccinea*, from South America, scarlet; and *J. speciosa*, from East India, purple, are well worth growing for autumn- and winter-flowering.

LASIANDBRA MACRANTHA FLORIBUNDA.—This is a lovely plant from Tropical America, and a very free-flowering species if care be taken to obtain the right sort. It is a plant of elegant habit, with bright green leaves, and magnificent rich deep purple flowers 5in. across. Cuttings strike freely in the spring, and may be potted on in a compost of equal parts peat and turfy-loam with a free admixture of silver-sand. As the shoots grow they must be frequently pinched to make them branch and form nice plants until the flowering season approaches, when the pinching must be discontinued.

LIBONIA FLORIBUNDA.—A neat, small, evergreen shrub from Brazil, easily propagated by cuttings in spring and growing freely in peat, loam, leaf-mould, and sand in about equal proportions. The shoots do not require much pinching, as the plant is naturally of a compact, short-jointed, branching habit. It comes from a rather high elevation, and consequently does not need great heat, but will thrive very well in a warm pit or frame during the summer and may be transferred in the autumn to the stove, where it will produce its pretty tubular scarlet and yellow flowers freely all through the winter months. Red Spider is apt to be troublesome if the plants are not kept syringed during the growing season. Attention should be given to keep this pest in check, for the leaves will lose their brightness and even fall off if this be neglected. *L. Penrhosiensis* is a pretty hybrid variety obtained by crossing *L. floribunda* with *Sericographis Ghiesbreghtiana*. Like its parents, it is a very ornamental and useful winter-flowering plant, and its bright crimson funnel-shaped flowers are freely produced.

LINUM TRYGYNUM is an Indian evergreen shrub, with ovate or lance-shaped leaves and large bright yellow flowers $1\frac{1}{2}$ in. in diameter, which are produced in great abundance throughout the winter months. It is an old favourite, of easy culture if care be taken to keep down Red Spider, to which it is peculiarly liable if neglected. It should be frequently syringed when growing to maintain it in good health. Root-cuttings or young shoots soon produce neat little plants if grown in equal parts

of turfy loam and peat, with the addition of a little silver-sand.

LUCULIA.—A genus of very handsome cool-stove flowering shrubs from Nepal, producing large trusses of deliciously fragrant, somewhat fleshy flowers. Propagate by cuttings in heat under a bell-glass. Luculias may be grown in pots, but thrive better when planted in a border in a compost of turfy loam, peat, charcoal, and sand, with good drainage. When well established and growing, water and syringe freely. Prune the shoots after flowering, and keep rather dry, allowing the plants to rest for two or three months before again starting into growth. *L. gratissima*, the best known species, has lovely rose-pink flowers. *L. Pinceana* (Fig. 423) has white flowers, changing with age to a rosy hue.

MAGNOLIA PUMILA is an evergreen shrub, native of China, yielding white flowers, which, when in blossom, will fill the whole of the hothouse with a delicious perfume. Propagate by cuttings of half-ripe shoots. The plants thrive best in good fibrous loam, with a little leaf-mould and sand.

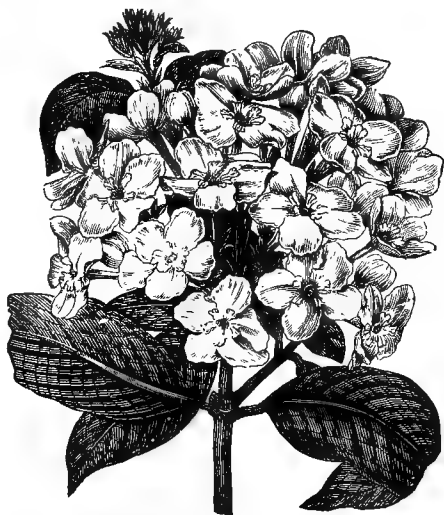


FIG. 423.—LUCULIA PINCEANA.

MEDINELLA, a beautiful genus of bold, handsome, evergreen shrubs. *M. amabilis*, a native of India, has quadrangular-winged stems, with opposite leaves 12 in. long by 7 in. broad, and large erect panicles of rosy-pink flowers. *M. Curtisii*, a native of Sumatra, has rather fleshy opposite leaves and white flowers in terminal panicles. The peduncles and pedicels are red, and the stamens purple. *M. javanensis*, from Java, has sessile heart-shaped leaves and terminal panicles of pale flesh-coloured flowers about 1 in. in diameter, with very dark purple anthers. *M. magnifica* (Fig. 424) is a striking plant, with smooth, rich shining green leaves, 8 in. to 10 in. long, and large terminal paniced drooping racemes of rosy-pink flowers, with violet anthers and rose-coloured bracts, which last a long time in perfection. Propagation is effected by cuttings which, when rooted, should be grown on in a compost of equal parts peat, loam, and

leaf-mould, with a little coarse silver-sand, in well-drained pots, in a hot, moist atmosphere, using a little liquid manure (weak and clear) when the pots are full of roots.

MONOCHÆTUM.—Small shrubs, natives of Central and South

America, with pretty rose and purple flowers. Cuttings of the young shoots strike freely, and make nice little plants if potted on and pinched into shape for winter flowering. A cool part of the stove near the glass induces a sturdy growth. Two parts peat, one part loam, and one part leaf-mould form a suitable compost. *M. dicrantherum*, *M. ensiferum*, and *M. sericeum multiflorum* are the sorts generally grown.



FIG. 424.—MEDINELLA MAGNIFICA.

low flowers are produced in terminal corymbs, but the chief attraction are the pure white bracts with which they are accompanied. Prune moderately into shape after flowering, and encourage a season of rest by keeping the plants drier and cooler.

MUSSÆNDA FRONDOSA is a small shrub from the East Indies. Propagate from cuttings in heat under a bell-glass, and grow in equal parts loam, leaf-mould, and peat, with a dash of silver-sand, in well-drained pots. Water and syringe freely during growth, and pay regular attention to the destruction of insect pests. The small yellow

NÆGELIAS.—See Gesneras.

PANCRATIUM FRAGRANS (Fig. 425) is a very handsome, sweet-



FIG. 425.—PANCRATIUM FRAGRANS.

and foliage from shrivelling. Propagate by offsets. *P. guianensis*, from British Guiana, produces erect scapes with a cluster of elegant white blossoms, the rather narrow segments of which are drooping and prettily curled. It succeeds under the treatment described for *P. fragrans*.

PENTAS CARNEA.—A pretty little soft-wooded shrub from Western Tropical Africa with opposite, ovate-lanceolate leaves, and pink flowers in terminal tufts (Fig. 426). Propagate from cuttings, and as the young plants grow pinch out the points to make them branch, and then allow them to grow away and flower. Equal parts of peat, loam, and leaf-mould, with a little sand, form a suitable compost. *P. kermesina* is a pretty variety with crimson flowers.



FIG. 426.—PENTAS CARNEA.

PILEA MUSCOSA (Artillery Plant).—Its pretty habit and easy culture, and the peculiar way in which the pollen is shot forth when a fine spray of moisture is applied during the flowering period, render this plant a general favourite, although the individual flowers can lay no claim to great beauty. It is readily propagated from cuttings, and grows freely in equal parts loam, peat, leaf-mould, and sand, with good drainage. It is a native of the West Indies. We have seen it planted in broken coke along the margin of stages, where, being well supplied with water, it thrives, makes a pretty edging, and does not encourage insects.

PLUMBAGO ROSEA.—A small shrub from the East Indies, with oblong obtuse leaves and rosy-red flowers in loose spikes. It requires plenty of water when growing, and cutting back after flowering. Soil: loam, peat, leaf-mould, and sand. Propagate by cuttings. The variety *coccinea superba* has brighter, deeper-coloured flowers.

POINSETTIA (*Euphorbia*) **PULCHERRIMA** is a striking plant when well grown; it is a native of Mexico. To obtain sturdy dwarf plants, propagate from cuttings each year. Place the old plants in heat in batches (the first about the beginning of June), and, as the young shoots grow, cut them off with a heel of the old wood and insert singly in small pots. When the cuttings are rooted, grow on liberally, keeping them in a light position near the glass to induce a sturdy growth and preserve the growing point intact, as the flowers and bright crimson bracts are produced at the extremities. Avoid cold draughts. Four parts turfy loam, one part decayed cow-dung, one part leaf-mould, and half a part of sand form a suitable compost. Water with clear weak manure-water when the bracts begin to appear, and after flowering keep the plants quite dry. *P. p. alba* has whitish bracts, but is not much grown. *P. p. plenissima* has brilliant scarlet bracts in clusters, giving them an appearance of being double. *P. p. major* is superior to the type, producing larger bracts, and is now largely grown for market.

POSOQUERIA.—Evergreen shrubs from South America, with corymbs of long, tubular white flowers, valuable for bouquets and decorative purposes. They succeed under the treatment recommended for Gardenias. *P. longiflora* and *P. multiflora* (Fig. 427) are both profuse-flowering species.

REINWARDTIA TETRAGYNE.—A handsome small shrub from the mountainous region of India, and much like *R. trigyna* (better known under its garden name, *Linum trigynum*), with flowers of a deeper yellow, produced in great profusion, which keep up an uninterrupted display for several weeks during the dull winter months. It may be readily increased by cuttings, and grows freely in peat, loam, and leaf-mould in equal proportions, with a

dash of silver-sand. It should be frequently syringed when growing, to keep Red Spider in check.

RHODODENDRONS.

—The *javanico jasmini-florum* hybrids form a group of this gorgeous family well adapted for cultivation in the cool stove or intermediate house, and where a collection is kept some of their lovely flowers are thus obtainable all through the year. They range from almost pure white through handsome shades of orange, yellow, pink, rose, and brilliant scarlet. Cuttings of half-ripened wood strike

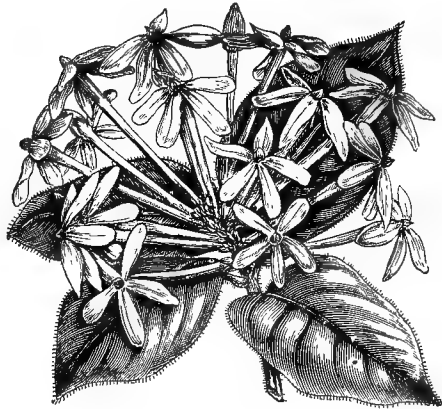


FIG. 427.—*POSOQUERIA MULTIFLORA*.

tolerably freely in heat in a propagating-case, and the plants thrive in fibrous peat and sand with good drainage.

RIVINA HUMILIS.—A pretty little West Indian plant, producing racemes of rosy flowers, succeeded by little bright scarlet berries. It is readily raised from seed or cuttings, and delights in a compost of equal parts loam and leaf-mould with the usual dash of silver-sand.

RONDELETIA.—Stove evergreen shrubs from the West Indies and Tropical America, with opposite leaves and fragrant flowers in terminal corymbs. Propagate by cuttings and grow in fibrous peat and loam with a few lumps of charcoal and a dash of sand. Tie out the shoots to neat stakes. Sorts: *R. cordata*, rose-coloured; *R. gratissima*, carmine and very sweet-scented; *R. speciosa (odorata)*, bright vermilion, salver-shaped, with a yellow centre; and *R. speciosa major*, a form with larger flowers than the type.

RUSSELIA JUNCEA.—This is a somewhat singular-looking plant from Mexico. It grows about 3ft. high, with very small leaves, and these only sparingly produced. The slender, angular, rush-like branches hang out gracefully, producing at various seasons rich crimson tubular flowers, which droop in an elegant manner. It is of very easy culture, growing freely in peat, loam, and sand, and is readily propagated by cuttings, or by allowing a branch to lie on the moist soil, where it will soon throw out roots, and may then be cut off and planted in a fresh pot of compost.

SAINTPAULIA IONANTHA is a charming little plant of somewhat recent introduction from East Africa. It is easily raised from

seed, which, being extremely small, should be sown as described for Begonias. If sown in March the plants will produce a profusion of pretty dark blue flowers, something like large Violets, in August, and these cannot fail to please.

SCUTELLARIA MOCINIANA, from Mexico, is a useful scarlet winter-flowering plant, readily increased by cuttings, and easily grown in equal parts of loam and leaf-mould with a little sand. It should have a place near the glass in a cool part of the stove.

SERICOGRAPHIS (*Jacobinia*) GHIESBREGHTIANA.—This handsome Mexican plant has smooth, light green, oval-pointed leaves, and scarlet flowers in terminal panicles. It is an easily-grown and a handsome winter-flowering subject. Cuttings should be struck in the spring, and the plants may be grown on in a warm pit or frame during the summer in a compost of loam, leaf-mould, and silver-sand. The points of the shoots should be pinched out to make them branch and form nice shaped specimens. Transfer the plants to the stove in the autumn for winter flowering.

STRELITZIA.—A genus of herbaceous plants from the Cape of Good Hope, with gorgeous flowers. They are propagated from seed, but more generally by division, and thrive in a compost of four parts fibrous loam, two parts peat, and one part each of well-decayed manure and coarse silver-sand, with efficient drainage. Copious supplies of water are necessary during growth. *S. Reginae* is probably the best known and greatest favourite, producing magnificent orange and purple flowers; but there are *S. augusta*, white and purple; *S. Nicolai*, white and blue; and others.

TABERNÆMONTANA CORONARIA and *T. c. flore-pleno* are evergreen shrubs from India, with sweet-scented white flowers. They may be propagated and treated like Gardenias, which they somewhat resemble.

THYRSACANTHUS RUTILANS.—A stove evergreen flowering shrub from Columbia. Propagate from cuttings of young shoots, and grow in equal parts peat, loam, leaf-mould, and sand. Tie the central stem to a neat stake, and remove Scale should they appear. The graceful thyrses of drooping, long, tubular scarlet flowers are very attractive and ornamental.

TILLANDSIA LINDENI is an epiphyte from the forests of Tropical South America. It, however, succeeds well in pots in a compost of two-thirds fibrous peat, one-third sphagnum, and a sprinkling of silver-sand and potsherds the size of peas. It may be propagated by suckers taken off in the spring, and be grown in a moist part of the stove during the summer; but a slightly drier atmosphere is advisable during the winter. Be careful not to allow water to settle at the base of the leaves, as that often causes this species to rot. The leaves are arranged in a rosulate

manner and recurved. The flower-scape rises from the centre about a foot, and is terminated by a distichous, flattened, rose-coloured spathe, from the bracts of which are produced in succession lovely sky-blue flowers with a distinct white eye, which once seen are not soon forgotten. The variety *tricolor* has a green and rose-coloured spathe, and vivid blue flowers with a pure white eye; whilst another form, *vera*, is of a dwarfer habit, the bright rosy spathe not being extended so high above the foliage, and the flowers being of a beautiful lilac blue. *T. Zahni*, from Costa Rica, is another handsome species. In a young plant the leaves are amber-coloured, with red veins; as the plants advance in age the centre becomes a beautiful scarlet, and this colour continues to increase until the flower-spike appears with its scarlet bracts and clusters of golden-yellow flowers, which are thrown well up above the foliage. *T. splendens* (Fig. 428), yellow, with purple bracts, is another beautiful kind showing considerable variation.

TORENIA.—A genus of beautiful small-growing plants, with most charming flowers. They are easily propagated from seed or cuttings, and grow freely in equal parts of peat and loam with a little sand and charcoal. Pinch the points of the young shoots as they grow to make them branch, and train on sticks. Torenias are also well adapted for growing in baskets to suspend from the roof. The lovely tubular gamopetalous corolla and the pretty arrangement of the stamens and beautiful colours of the flowers render them especially attractive. *T. asiatica*, from China, has marble-like blendings of blue, purple, and lilac. *T. Bailloni*, a native of India, produces golden-yellow flowers with a purple throat. *T. Fournieri grandiflora*, from Cochin China, has sky-blue flowers with dark purple spots and yellow throat; and *alba* is a beautiful new white variety. *T. rubens*, from Hong Kong, is purple. The last four are best treated as tender annuals, sowing the seed in March in pots plunged in a gentle hot-bed.

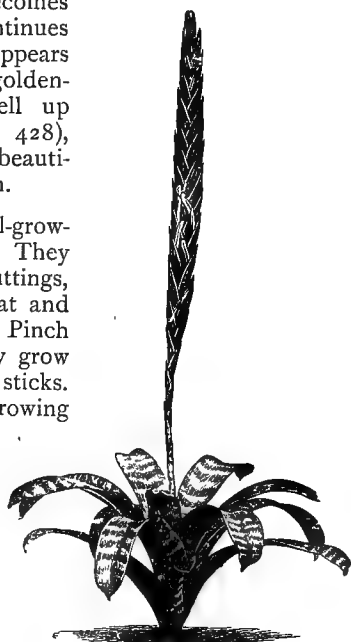


FIG. 428.—TILLANDSIA
SPLENDENS.

TOXICOPHLEA SPECTABILIS.—This is a poisonous, but very handsome winter-flowering shrub, native of South Africa, and sometimes called Winter-Sweet. The leaves are elliptic, and the flowers are produced in large, dense, terminal and axillary sprays

which are sweet-scented and sometimes 2ft. long. Cuttings root readily in heat under a bell-glass, and the plants thrive in peat, loam, and sand.

TYDÆAS (Isolomas) are very handsome plants, and will thrive



FIG. 429.—TYDÆA AMABILIS.

and mature for some time after the leaves show signs of exhaustion. *T. amabilis* (Fig. 429) is one of the best. It is deep rose, dotted with purple, and intensely hairy.

URCEOLINA AUREA (*U. pendula*).—A handsome bulbous plant from Peru, with tubular, pendulous, golden flowers, the segments of which are reflexed and tipped with green; they are produced in an

under the treatment recommended for Achimenes. The varieties differ in the shape of their blossoms, ranging from small and funnel-shaped to large and salver-shaped, and are of the most gaudy colours, streaked or spotted with scarlet, deep maroon, blackish-purple, &c. They may be had in blossom for a long season through summer, autumn, and winter by potting the tubers and bringing them on at different intervals. After growth is completed the roots should not be disturbed for some time, as the tubers continue to swell

umbel on a scape about 9in. high. Propagate by offsets, and grow in rich fibrous loam, inserting the bulb to about two-thirds of its depth. Give very little water when not growing.

VINCA.—The stove species and varieties of this genus are erect evergreen herbs, with opposite leaves, from the East Indies. Propagate from cuttings in spring, and grow on in three parts of fibrous loam, one part peat, one part manure, and a little sand. Pinch the points of the shoots to make them branch, and tie into a nice shape. Vincas flower from May to October. Keep rather dry in winter, to allow the plants a period of rest. The old plants may be cut back and repotted in the spring, removing most of the old soil with a pointed stick. *V. rosea* has rose-coloured flowers with a purple eye; *V. alba* is white with a yellowish eye; and *V. a. oculata*, white with a crimson eye.

VRIESIAS (now included under the genus *Tillandsia*) are plants of great beauty, and thrive under the treatment recommended for *Æchmeas*. To induce them to flower, give them a season of rest by standing them on a shelf and keeping them drier at the root; then excite them into growth by plunging the pots in a brisk bottom-heat, and water freely with weak manure-water. *V. brachystachys* and *V. psittacina* are particularly handsome.

An extended list of Flowering Plants will be found in the "Appendix."

Ornamental Foliage Plants.

Among the denizens of the stove-house we have a great choice of plants with attractive foliage, which are interesting all the year round. Many, too, are valued for their suitability for dwelling-house and conservatory decoration; while as exhibition plants they are especially popular at the present time, both for showing in groups and for mixing with flowering plants. Anyone who has seen the noble groups staged at the Royal Horticultural Society's annual flower show in the Inner Temple Gardens can appreciate their full value.

As in the case of the flowering plants, our endeavour in this section will be to make a choice and varied selection of those which are readily obtainable at the present time. In horticulture, as in other departments of life, Fashion holds a certain control over the choice of subjects sought after. It is, however, a fact that, notwithstanding the many meritorious acquisitions that are being year by year brought from their distant habitats, and the many new hybrid varieties raised by the skill of our indefatigable horticulturists, some of the older favourites continue to hold their own. Thus while paying due regard to the importance of the newer species and varieties, it is not our intention to abandon old favourites.

ACALYPHA.—A genus of Euphorbiaceous plants with very ornamental foliage. The leaves of some of the species have very

peculiar-shaped blotches, and are mottled and splashed in a curious manner with scarlet and crimson, the ground colour being a coppery-green. These interesting colourings are pleasingly developed in *A. Wilkesiana* when grown in a light position not too far from the glass:

Two new species of considerable merit have recently been added to those already in cultivation. One of these, *A. Godseffiana*, is a dwarf shrub of dense, bushy habit, having ovate-lanceolate shining green leaves, with creamy-white margins. A plant of a very ornamental appearance lately obtained from New Guinea. *A. hispida* (*Sanderiana*) (Fig. 430), another new species,



FIG. 430.—ACALYPHA HISPIDA.

is one of the most striking plants ever introduced into this country. It is a branching shrub with broad, ovate, deep green leaves and pendulous, crimson, velvety, tassel-like spikes of flowers 12in. to 18in. long, arising from the axils of the leaves, and somewhat resembling those of Love-Lies-Bleeding. This important acquisition was obtained from the Bismarck Archipelago; and deserves growing even more for its remarkable inflorescences than for its bold, stately foliage and habit.

Of the older varieties, *A. Macafeeana*, *A. macrophylla*, *A. marginata*, and *A. musaica* are all attractive and ornamental.

These plants are readily propagated by cuttings in spring, and thrive in a mixture of peat, loam, and sand.

ALOCASIA.—Handsome foliage plants, with often bronzy or variegated and generally peltate leaves; these when well grown have a noble appearance. Use as compost two parts very fibrous peat, broken into lumps (discarding most of the fine dusty portion), and one part of live sphagnum, with a little fibrous loam and silver-sand. Put an extra quantity of drainage material in the pots, and raise the crown of the plants on a mound above the rim. Make the compost just firm, but not hard, and place the plants in a warm, moist, shady part of the house. Apply water freely when in full growth, but rather sparingly during the resting period. Alocasias may be propagated by dividing the rhizomes in spring.

A. Jenningsii is a free, dwarf-growing, prettily-marked species from India; in habit it more resembles a *Caladium* than



FIG. 431.—ALOCASIA LOWII.

any of the following named sorts: *A. Lowii*, from Borneo (Fig. 431) has large handsome dark green leaves, veined with white. *A. macrorhiza variegata*, a robust, free-growing species from Ceylon, has large, somewhat heart-shaped leaves, blotched and marbled with white, and with striped leaf-stalks. *A. metallica* (*A. cuprea*) produces bronzy peltate leaves 12in. to 18in. long, resembling highly-polished metal shields; a native of Borneo. *A. Sedeni* is a hybrid variety obtained by crossing *A. metallica* with *A. Lowii*, and in which the characters of the parents can be distinctly traced, the leaves being bronzy-green, with ivory white veins on the upper surface and purple beneath.

A. Thibautiana, from Borneo, is the finest of the genus; it is of robust habit, with leaves from 2ft. to 2½ft. long, and 15in. to 20in. broad, of a deep olive greyish-green, with numerous grey veinlets branching from the midrib, which is of a greyish-white; the under-surface of the blade is purple.

ANANASSA SATIVA VARIEGATA (Variegated Pine-Apple) is a pretty Bromeliaceous plant having handsome striped leaves with spiny margins. It is increased by suckers taken off the old plant, potted into small pots, and grown on in bottom-heat. The crown of the fruit may be treated in the same way. Equal parts loam and peat and just a sprinkling of crushed bones form a compost in which the plants will thrive. Give frequent syringings and a moderate supply of water when growing, but only just sufficient to prevent shrivelling when at rest.

ANDROPOGON SCHŒNANTHUS.—This grass is a great favourite owing to its easy culture and the fragrant odour emitted by the leaves when slightly rubbed, which has gained for it the name of Lemon Grass. It is readily increased by division or by seed, and grows freely in peat, loam, and sand. In India, where this plant grows wild, the Europeans make an agreeable tea with the fresh leaves, which is considered a tonic. An essential oil is obtained by distillation which is used in the adulteration of Otto of Roses.

ANTHURIUM.—The fine foliage species of Anthurium, from Tropical America, have a striking aspect, and are valuable for exhibition purposes as well as for decorating the stove: They may be propagated and grown in the same manner as Alocasias.



FIG. 432.—ANTHURIUM
CRYSTALLINUM.

A. crystallinum (Fig. 432) has large, oval, heart-shaped leaves of a bright velvety green, and veins beautifully marked with pure silvery-white lines. The young leaves are violet-coloured. *A. magnificentum* (sometimes called *A. cordifolium* and *A. grande*) produces deep shining green leaves 3ft. long and 28in. broad. It is something like *A. crystallinum*, but lacks the silvery lines so conspicuous in that species. *A. splendidum* (Fig. 433) is very distinct from all the other species. It has large, handsome, heart-shaped leaves, with blendings of pale yellowish and deep velvety lustrous-green shades. *A. Veitchii*

makes a noble and handsome exhibition plant. It has elongated leaves of a leathery texture and waved appearance, 3ft. to 4ft.

long, and 10in. to 15in. broad, with a deep green and glossy metallic surface. *A. Warocqueanum* is another handsome and distinct species, with leaves 30in. to 40in. long, and 8in. to 12in. broad, of a very rich deep green, with a velvety lustre, with which the light colour of the midrib and veins forms a pleasing contrast.

APHELANDRA. — Some very attractive species belonging to this family deserve to be classed among ornamental foliage plants. *A. fascinator* has rich dark green leaves, beautifully banded with white, and in addition produces dazzling vermilion-coloured flowers; it is a native of Columbia. *A. Leopoldii* (from Brazil) has opposite leaves, 6in. long by 2½in. broad, of a deep green shade, with pure white veins running from the midrib to the margin. *A. Margaritæ* has the upper surface of the leaves dark green, with nerves of a lighter shade and the under-side rose-coloured; the flowers are of a bright orange colour. *A. nitens*, also from South America, has dark green leaves, with a brilliant glossy polish on the upper surface, the under-side being of a deep claret colour; the flowers are bright vermilion and freely produced, even on very small plants, during the winter months.

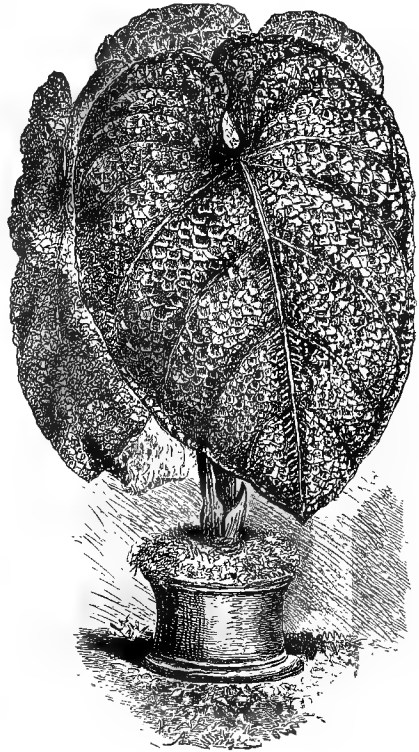


FIG. 433.—ANTHURIUM SPLENDIDUM.

ARALIA.—The stove shrubby species of this genus form very useful and ornamental plants for dinner-table and general decoration, and are of very easy culture. They may be propagated by cuttings, or still better by grafting on free-rooting species such as *A. reticulata* and *A. Guilfoylei*. For compost use equal parts loam and peat, with a little leaf-mould and sand. *A. elegantissima* (from the South Sea Islands), *A. Veitchii* (from New Caledonia) (Fig. 434), and its variety, *A. V. gracillima*, are charming plants, of most elegant appearance, with erect stems and

beautiful dark green digitate leaves, with bright midribs in the leaflets. *A. Chabrierii* (*Elæodendron orientale*) (from the Mauritius) has graceful pinnate leaves, and, like the above, is admirably suited for table decoration.

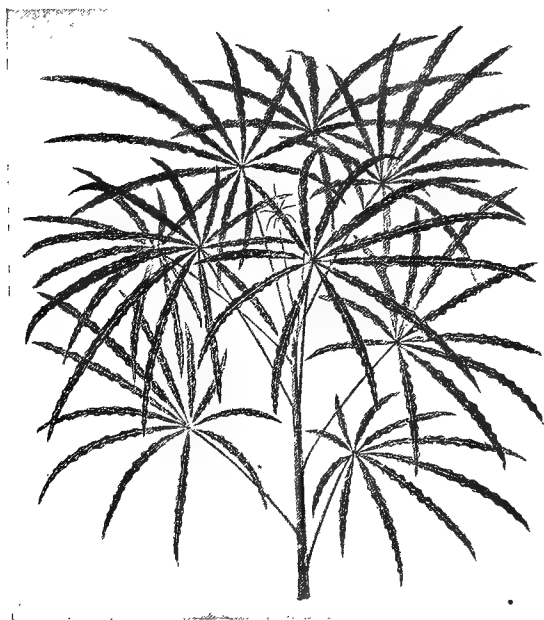


FIG. 434.—ARALIA VEITCHII.

ASPARAGUS.—The stove species of this genus recommend themselves by their very graceful and elegant foliage, sprays of which are in great demand for mixing with cut flowers for bouquets, &c., lending a charm by their lightness and beauty. Nice grown plants are invaluable for mixing with flowering subjects to show off and enhance their attractions. They may be propagated by seed, thinly covered with light soil, or by dividing the roots in spring. Grow on the plants in three parts fibrous loam, one part well-decayed manure, and a good dash of sand. *A. plumosus nanus* we consider the most useful, whilst *A. p. scandens* and its sub-variety *deflexus*, *A. Sprengeri*, and *A. tenuissimus*, are all worth attention.

BEGONIAS.—*B. Rex*, a species obtained from Assam, with bronze-green leaves and a beautiful silvery zone, and its numerous varieties with various shaped leaves of different shades of green blended with pink and crimson and silvery markings,

are of easy growth, and admit of a numerous and varied selection. All the Rex type are easily increased by laying mature leaves on a pan of light sandy compost with the leaf-stalk inserted in the soil, cutting through the principal veins, and placing a few pieces of broken pots to press them down on the compost and keep them in position. Young plants will grow from wherever the veins have been cut, if kept moist in a close, shady place. In due course these may be potted off separately in a compost of peat, loam, leaf-mould, and sand, in about equal proportions:

B. Eudoxa is a new hybrid raised from seed obtained from *B. Burkei* crossed with *B. decora*. It is of dwarf and spreading habit. The leaves are 6in. to 9in. long, of a bronzy-green, beautifully marked with white and rose. There are also some new hybrids possessing the two-fold attraction of handsome foliage and pretty flowers, of which Arthur Malet, Margaritacea, and Monsieur Hardy are the best. Other varieties of this handsome family we shall leave enthusiastic cultivators to select according to their individual taste.

BERTOLONIA.—Dwarf perennial herbs with opposite and generally five-ribbed leaves, which are prettily spotted or otherwise marked above, and purple or pink on the under-surface. They inhabit the dense, hot, moist, tropical forests of South America. Under cultivation they succeed best in shallow, well-drained pans in peat, leaf-mould, and silver-sand, covered with bell-glasses in a shady situation. They may be increased by cuttings in spring. There are several hybrid varieties in cultivation of continental origin, which, with their bright colourings and silvery markings, are little gems.

BREXIA.—The species of this genus are handsome stove shrubs, with rather leathery leaves. They are easily increased by cuttings; or a leaf cut off with a bud at the base and planted in sandy soil under a propagating-glass will grow into a young plant. Two parts loam with one of peat and sand suit them for a compost, with good drainage, as they require a liberal supply of water. *B. madagascariensis* and *B. spinosa* are natives of Madagascar. *B. chrysophylla* was obtained from the Mauritius.

BROWNEA GRANDICEPS is a handsome leguminous evergreen shrub from Venezuela, with pinnate leaves, having about twelve pairs of leaflets. Cuttings of ripened wood will strike in heat under a bell-glass, and the plants may be grown in loam, peat, and sand, with good drainage and careful watering in winter.

CALADIUM.—The various species and numerous hybrid varieties of this genus constitute a very attractive and useful class of plants for general decorative and exhibition purposes. The beautiful shadings and bright colourings of their leaves are truly deserving of admiration. They have, so far as we know, only one

drawback, that is, some cultivators are apt to lose the tuberous roots by decay during the winter season. This is, however, easily overcome if a little care is exercised to thoroughly ripen the tubers in the autumn by gradually withholding water. After the leaves have died down, and the roots are quite dormant, turn them out, remove all the soil, and store them in dry silver-sand, placing a layer of sand and a layer of tubers alternately in a dry place out of the reach of dripping of water, such as under the staging near the hot-water pipes in a temperature of 70deg.



FIG. 435.—*CALADIUM MACULATUM*.

Equal parts of good turfy loam, peat, and leaf-mould, with a liberal sprinkling of coarse silver-sand, form a suitable compost. Pot the tubers just under the surface in February or March. A little bottom-heat will help them to start into growth, but it is not absolutely necessary. Transfer to larger pots as the plants grow and require more room, making the soil rather firm. As they require an abundant supply of water when well established, it is necessary to provide efficient drainage, so that the superfluous moisture may pass readily away and not sour the soil. When the pots become full of roots frequent waterings with clear,

weak manure-water, and plenty of light, are beneficial to increase the colourings and size of the leaves. Shading from bright sunshine will, however, be necessary. The leaves of most kinds require supporting with neat green sticks, and a little taste is required to tie them in a manner to show off their beauty to the best advantage. Propagation is readily effected by dividing the roots just after growth has commenced.

The kinds are now so plentiful that the selection must be left to the choice of the grower. The pretty and useful little *C. argyrites* and *C. minus erubescens* should, however, be included in every collection.

C. maculatum (Fig. 435) and *C. Chantini* (Fig. 436) are also deserving of a place.

CAMPYLOBOTRYS (*Hoffmannia*) **REFULGENS** is a small-growing perennial from South America. It has dull green leaves suffused with red, and makes a pretty plant when grown in a shallow pan in peaty, sandy soil. *C. Ghiesbreghtianus*, *C. G. variegatus*, *C. pyrophyllus*, and *C. regalis* may be added to make a variety.



FIG. 436.—*CALADIUM CHANTINI*.

COSSIGNIA BORBONICA.—A pretty evergreen shrub from the Mauritius, valued for its golden-veined leaves. Cuttings root readily under a bell-glass in bottom-heat, and equal parts of turfy loam and peat, with a little leaf-mould and sand, suit it for a compost.

CROTONS (*Codiæums*).—The beautiful variegated leaves of various bright colours and the distinct characters of growth and foliage of these tropical evergreen shrubs place them among the most useful and attractive plants grown for exhibition and general decorative purposes. Propagate by cuttings in a brisk bottom-heat under a bell-glass, and grow on in three parts loam, one part each peat and leaf-mould, and a little silver-sand. The pots may either be plunged in a hot-bed or stood on shelves or stages in a light position as near the glass as convenient, as plenty of light is required to bring out their full colouring. Syringe frequently and water liberally when well-rooted and growing, but not quite so freely during the winter.

Among the graceful Narrow-leaved varieties, Aigburth Gem, Aigburthiensis, Angustifolius, Elegantissimus, Golden Ring, and Ruberrimus are all excellent; whilst for Medium-sized leaved sorts

Caudatus Tortilis, Earl of Derby, Hawkerii, Mortefontanensis, Sunbeam, and Warrenii are all good. For the Larger-leaved varieties we select Baroness James de Rothschild, Emperor Alexander III., Evansianus, Musaicus, Reidii, and Williamsii. There are many other handsome sorts well deserving of cultivation where there is space for a larger collection. For these see "Appendix."

CURCULIGO.—Ornamental evergreen foliage plants with grassy, ribbed leaves. *C. recurvata*, from Bengal, with its recurved Palm-like foliage, is a very handsome species, while its variety *variegata*, with bands of pure white variegation, is still more striking. Propagate by offsets and grow in sandy loam and peat.



FIG. 437.—DIEFFENBACHIA CARDERI.

CYPERUS.—Very useful plants of the Sedge family for general decorative purposes. *C. alternifolius* and *C. a. variegatus* are the sorts principally grown. *C. distans* and *C. laxus* and its variegated form are also deserving of cultivation. Propagate by division, and pot in a compost of peat, loam, leaf-mould, and sand. Give an abundance of water when making growth. With the variegated sorts it is advisable to cut away some of the green growths that return to the original form, which they often do, or they crowd out the variegated portions.

DICHORISANDRAS are South American herbaceous plants, and although not extensively grown a few will help to make an

CYANOPHYLLUM MAGNIFICUM, from Mexico, is a truly magnificent plant. With good cultivation it will produce splendid velvety leaves 1 yd. long and $\frac{1}{2}$ yd. wide. Propagate from cuttings, and grow on in a hot, moist temperature, with shade from bright sunshine. Repot into larger pots as required, using a compost of two parts good fibrous peat, one part leaf-mould, and a good sprinkling of silver-sand. As the pots get filled with roots water copiously, and give occasional syringings overhead all through the growing season.

interesting variety. They are propagated by division just as growth commences, and thrive in a mixture of peat, loam, leaf-mould, and sand. Keep rather dry in winter. *D. musaica* is of dwarf habit, with rich deep shining green leaves, traversed with numerous fine white lines on the upper surface, the under-side being deep purple. *D. Regina*, *D. tæniensis*, and *D. undata* are also attractive.

DIEFFENBACHIA.—The handsome foliage of this genus, with different shades of green, yellow, and white irregular-shaped spots and blotches, are very ornamental and interesting. They grow naturally in the moist, shady forests of the West Indies and South America. In our hothouses they thrive in a compost of turfy peat, loam, leaf-mould, and sand, in a brisk, moist atmosphere. The acidity of the juice of these plants is very great; if a stem be bitten it will cause the mouth to swell to such an extent that a person is rendered speechless for several days. This has gained for it the common name of Dumb Cane, and West Indian planters were formerly credited with using it as a means of punishing refractory slaves by forcing them to bite a piece of the stem of *D. Seguine*. Propagation is effected by cuttings. *D. Barquiniana*, *D. Bausei*, *D. Bowmani*, *D. Carderi* (Fig. 437), *D. picta*, *D. Regina* (Fig. 438), and *D. Weirii superba* are all handsome.

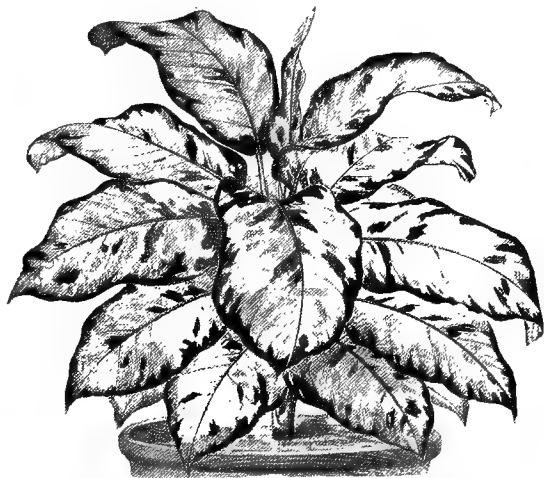


FIG. 438.—DIEFFENBACHIA REGINA.

DRACÆNA.—A genus of numerous species and varieties remarkable for the beautiful colourings of their foliage and their diversity of character. They are readily propagated from cuttings of the tops or side-shoots of old plants, by the fleshy underground rhizomes, or by cutting the stems of old plants into pieces about 1 in. long, and planting them in sandy soil in bottom-heat in a propagating-case or under a bell-glass. As the young plants grow they should be potted on in two parts peat, with one part fibrous loam and a liberal sprinkling of silver-sand, plunging the pots in a hot-bed or standing them on shelves or

stages well exposed to the light near the glass to bring out their bright colourings. Whilst growing maintain a hot, moist atmosphere, with frequent syringings overhead, and shade from bright sunshine. Carefully sponge the leaves occasionally with warm water to keep them clean and healthy.

Among the Red-leaved sorts *D. angustata*, *D. Cooperii*, Exquisite, Madame F. Bergmann, *D. elegantissima*, Lord Wolseley, *D. Jamesii*, *D. pendula*, and *D. (Cordylina) terminalis* (Fig. 439) form a good selection. For Green-leaved sorts, with white and yellow variegations, we recommend *D. albo-marginata*, Alexandra, *D. Lindenii*, Madame Charles Heine, *D. Regina*, *D. terminalis alba*, and Victoria.



FIG. 439.—DRACÆNA (CORDYLINA) TERMINALIS.

D. Godseffiana is a very distinct kind, of branching habit, having bright green leaves handsomely spotted with white. *D. Goldieana*, from Western Tropical Africa, is one of the finest plants ever introduced; it is very distinct in character from all the other cultivated species of this genus, being of erect habit with closely set, spreading leaves, which are beautifully marbled and banded transversely with dark green and silvery-grey, while the back of the young leaves is reddish-purple. *D. Sanderiana* is a remarkably effective species for decorative and exhibition work, being of a hardy constitution and neat habit; the stems are erect, with leaves rather closely set and 4in. to 5in. long by 1in. broad, the centre being green with grey lines and broad creamy-white margins. This species produces the best effect when planted three in each pot, selecting for the purpose plants of equal size and strength.

ERANTHEMUM.—The fine foliage varieties of this genus are small-growing plants, well deserving of notice. In some, the leaves are margined with white, while others are veined with a

network of gold or scarlet. They are readily propagated by cuttings, and require a sandy, peaty soil, with shade from bright sunshine. The bright colours are heightened by placing bell-glasses over the plants. The following are all good: *E. argenteo-marginatum*, *E. argenteum*, *E. igneum*, and *E. sanguinolentum*.

ERIOCNEMA MARMORATA is a pretty small-growing plant from South Brazil, with beautiful variegated leaves. It will thrive under the same treatment as Bertolonias.

ERYTHRINA MARMORATA, a free growing Leguminous shrubby plant from the South Sea Islands, is deserving of notice for its handsome leaves, which are blotched and spotted with white in a very effective manner. The young shoots strike freely in spring, and may be potted on in equal parts peat and loam with a little leaf-mould and sand.

FIGUS.—*F. elastica* (Indiarubber Plant), with its smooth, shining green leaves, is well-known for its adaptibility as a decorative plant for dwelling rooms. When properly established and hardened off it will stand the variations of temperature and dryness of the atmosphere better than any other stove plant. The variegated variety, *albo-variegata*, with its creamy-white margined leaves, is also growing in popularity, though it will probably never oust its green-leaved rival. *F. Parcelli* is another variegated species of considerable merit. It has leaves of a thinner texture than *F. elastica*, but equally large, and beautifully blotched and spotted with creamy-white and dark green, and coarsely toothed on the edges. *F. indica* (Banyan Tree) and *F. religiosa* (Pippul Tree, held in sacred veneration by the Hindoos), both natives of India, and *F. sycomorus* (the Sycomore of Scripture), from Egypt, are sometimes grown in hothouses for their historical associations.

Propagation of all the above may be effected by cuttings taken in the usual way. Eyes with a leaf attached will also form plants, but take a longer time. The cut part should be allowed to dry a little before planting. When rooted, repot in three parts turfy loam and one part peat, with a dash of silver-sand.

FITTONIA.—Small-growing, evergreen, trailing perennials, with spreading and beautifully-veined leaves, from the tropical forests of South America. They propagate freely by division and cuttings in spring and summer, and may be grown in either pots or pans in peat, loam, and sand, in a moist, shady part of the stove. *F. Verschaffeltii argyroneura* has bright green leaves, with a reticulated pure white venation. *F. Pearcei* has dark green blades, with bright red veins.

HELICONIA.—These handsome foliage plants, of Canna-like habit, are most valuable subjects for exhibition and grouping.

They are easily propagated by division just as growth is commencing in spring, and thrive in a mixture of loam, peat, leaf-mould, and sand, with a liberal supply of water when in full vigour, gradually reducing it as the growth matures. *H. aureo-striata*, from the Solomon Islands, is a plant that well repays the little trouble required to grow it successfully. The stems are streaked with green and yellow, and the deep green leaves are handsomely veined with golden-yellow. *H. illustris rubricaulis* is another handsome species, with leaves 12in. to 18in. long and 5in. to 7in. broad, having reddish foot-stalks, pink midribs, and pink veins, with some paler streaks and markings.

ISOLEPIS GRACILIS.—A favourite grassy-looking plant, native of India. It is extensively cultivated, and much used for decorative purposes, being of elegant habit and a bright green. It has a very pleasing effect when arranged along the front row on stages, where it can droop and form a sort of edging to taller subjects, especially when intermixed with such plants as *Thunbergia alata* and *Panicum variegatum*. It will grow freely in peat and loam with an abundant supply of water, and is readily increased by division in spring.

JACARANDA MIMOSÆFOLIA.—This is a very elegant foliage plant, having bipinnate leaves with numerous pairs of opposite leaflets. Cuttings of half-ripened shoots will strike in heat in the beginning of summer, and the plants delight in fibrous peat and loam mixed with silver-sand. When grown with single stems they make very useful decorative subjects. The species is a native of Brazil, where, as a moderate-sized tree, it is extremely handsome with its profusion of lovely blue flowers. It, however, does not flower freely in a young state, and is chiefly prized as a foliage plant in our hothouses and conservatories.

LEEA AMABILIS SPLENDENS.—A handsome fine foliage shrub from Borneo. The leaves are pinnate, with two pairs of leaflets and an odd one, which are from 4in. to 6in. long and 2in. broad. The young leaflets, when first expanded, are bright crimson, tinged with brown, and develop into a rich glossy green, with a silver band running down the midrib, from which silvery veins spread out to the margin. It is propagated from cuttings, and thrives in peat, loam, and sand, with partial shade.

MARANTA.—The various shades and often bright colourings in the leaves of this handsome genus, with their peculiar blotches and feather-like markings, constitute interesting attractions of a high order. They are easily increased by division in spring, and grow freely in two parts fibrous peat and one part turfy loam, with a liberal addition of silver-sand, in thoroughly well-drained pots. A moist and shady part of the stove is best suited to their growth, and plunging the pots in a bottom-heat of about

8odeg. is beneficial, but not absolutely necessary. Water freely during active growth, and remove all flower-stems as they appear, in order to throw all the nourishment into the leaves. During

the winter supply only just enough water to keep the leaves from flagging.

M. Warscewiczii and

M. (Calathea) zebrina

(Fig. 440), also

M. major, will

thrive very well in a cool stove.

The last-named

is highly recom-

mended for dwelling-

house and conserva-

tory adornment,

enduring without in-

jury the dry atmo-

sphere and lower

temperature. Al-

though it has been grown in botanic gardens many years under

the name of *Ichnosiphon leucophæus*, its value as a decorative plant to horticulturists has only been discovered recently; for

the majority of species a hot, moist atmosphere, free from cold draughts, is necessary to maintain them in good health.



FIG. 440.—MARANTA (CALATHEA) ZEBRINA.



FIG. 441.—MIMOSA PUDICA.

MIMOSA PUDICA (Sensitive Plant) is very attractive (Fig. 441) owing to the remarkable sensibility of the foliage. The peculiar manner in which the leaves close up and droop when touched never fails to excite interest. It is a small leguminous shrub with digitately pinnate leaves, native of Tropical America, and succeeds best treated as an annual, sowing the seeds in February or March, and potting the young seedlings off when big enough to handle in sandy peat and loam. This species is far more irritable than *M. sensitiva*, another stove shrub from the same

region, and which succeeds under similar treatment.

MUSA.—The several species of this genus have very handsome foliage and give a tropical effect, where room can be allowed

for their full development. They succeed either planted out or in pots or tubs, and are propagated by suckers. These, after being detached from the parent plants, should be grown on in



FIG. 442.—MUSA CAVENDISHII.

rich loam and freely supplied with weak, clear manure-water when in full growth.

M. Cavendishii (Fig. 442) is the sort mostly grown, but if more variety is desired, *M. coccinea*, *M. sapientum vittata*, and *M. superba* may be added.

NEPENTHES.—The Pitcher Plants form one of the most interesting and attractive families of the Vegetable Kingdom for stove cultivation. They are, however, dealt with in a separate chapter.

NIDULARIUM.—The following will be found distinct and attractive species, worthy of cultivation, and will

succeed if treated as recommended for *Æchmeas*. *N. aureo-striatum*, *N. cardinale*, *N. fulgens*, *N. Innocentii*, *N. Meyendorffii*, *N. pictum*, and *N. spectabile* are all good kinds. This genus is now regarded as *Karatas*.

OPLISMENUS.—See *Panicum*.

PANAX.—These evergreen shrubs are deserving of culture for their ornamental foliage and neat habit. The leaves are divided and cut in an elegant manner. The plants are easily increased by cuttings, and grow freely in peat, loam, and sand. The following are handsome varieties of *P. fruticosum*: *bipinnatum*, *multifidum*, and *Victoria*. The last-named is a very pretty variegated sort.

PANDANUS.—Notwithstanding the sharp recurved prickles with which the leaves of the Screw-Pines are armed, these plants are

very valuable for decorative purposes. Especially is this the case with *P. Veitchii*, which, with its beautiful variegated striped leaves, is one of the ornamental foliage plants most in demand for decorative and exhibition work. It is propagated by offsets, and grows freely in equal parts peat and loam with a little leaf-mould and sand. *P. graminifolius* and *P. utilis*, from Madagascar, are good green-leaved forms. *P. Sanderi* (Fig. 443) is a new species of tufted habit, the sword-like leaves having small marginal spines something like *P. Veitchii*, but the variegation consists of narrow bands of golden-yellow, alternated with



FIG. 443.—PANDANUS SANDERI.

green throughout the length of the leaves, and not confined to the margins; it is a plant of promising appearance, and will probably become a great favourite.

PANICUM VARIEGATUM.—A pretty, free-growing grass from Tropical Asia, with white-striped and pink-tinted foliage; it is well known and valued in gardens for its usefulness and adaptability for mixing with other plants, also for hanging-baskets and other decorative purposes, being of a light trailing habit. It is readily increased by cuttings or division in spring, and will thrive in any light sandy soil in pots on a shelf near the glass or in almost any light warm position. Although it is generally known as above, its correct name is *Oplismenus Burmanni variegatus*.

PAVETTA BORBONICA.—A handsome plant from the Isle of Bourbon, having oblong-lanceolate olive-green leaves studded with

white spots, which are pleasingly shaded with light green, while the midribs are of a bright salmon-red tint. It is propagated from half-ripened shoots in bottom-heat under a bell-glass, and may be grown in equal parts fibrous peat and loam with a free admixture of silver-sand, in a moist, shady position.



FIG. 444.—PEPEROMIA SAUNDERSII.

PEPEROMIA.—The cultivated species of this widely-distributed family, principally from Tropical America, do not seem to be so much in favour as formerly. Some of the sorts are, however, very pretty and easily grown. They have thick, fleshy leaves, which in some cases are striped, spotted, veined, or marbled with purple and silver on different shades of green. Fibrous peat, with a little loam and sand, suits them, and they require well-drained pots and a moist, shady position. *P. arifolia argyrea*, *P. maculosa*, *P. metallica*, *P. prostrata*, and *P. Saundersii* (*P. Verschaffeltii*) (Fig. 444) are all pretty and free growing.

PHRYNIUM VARIEGATUM (Fig. 445).—An elegant plant closely allied to *Maranta* ;

it may be propagated and treated in the manner recommended for that genus. It requires a shady position to develop its handsome variegations. The bright pale green leaves, with diverse creamy-white variegation, are borne on erect footstalks about 1ft. high, and its dwarf, compact habit renders the plant a desirable acquisition in every collection. It is, without doubt, one of the handsomest and most useful foliage plants ever introduced, being invaluable for exhibition and all decorative work.

PHYLLANTHUS ROSEO-PICTUM is a shrub of easy culture and good habit, with rich and varied variegation, consisting of bronzy-green, delicate pink, creamy-white, and crimson in different shades. Nicely grown plants are useful for grouping, and cut sprigs are invaluable for vases and bouquets. It is propagated by cuttings, and thrives in peat, loam, and sand in an intermediate house. *P. Chantrieri*, from Cochin China, is another elegant shrub of symmetrical habit, with glossy green leaves which have the aspect

of being pinnate. *P. myrtifolius*, *P. nivosus*, and *P. speciosus* (*Xylophylla latifolia*) are also worth growing.

PHYLLOTÆNIUM LINDENI is a very handsome evergreen Aroid from Columbia; with large, oblong-sagittate leaves, the ground-colour of which is a bright glossy green, whilst the midrib and veins are a beautiful silvery-white. It is a plant well deserving cultivation for its attractive appearance, and is easily grown in a compost of peat, loam, and silver-sand, and propagated by dividing the fleshy roots in spring.

RHOPALA.—See Roupala.

ROUPALA.—The stove species of *Roupala* (also spelt *Rhopala*) are handsome evergreen shrubs with divided leaves, the ferruginous downy covering on the young growths of some of the species adding to their beauty. When the cuttings have rooted, which should be effected in a propagating-case, they are not much trouble, requiring only occasional repotting in rich loamy soil and a plentiful supply of water when growing. The sorts most in favour are *R. aurea*, *R. corcovadensis* (*R. Pohlii*), *R. De Jonghei*, *R. elegantissima*, and *R. Vervæneana*.

SANCHEZIA NOBILIS VARIEGATA (*S. n. glaucophylla*) (Fig. 446) is an evergreen perennial, native of Ecuador. It has green leaves, prettily striped with yellow, and is readily increased by cuttings, and easily grown in peat, loam, and sand, in a moist part of the hothouse.

SONERILLA.—Handsome plants with beautifully marked foliage, which in some varieties is blotched and banded with creamy-



FIG. 445.—PHRYNIUM VARIEGATUM.

white, and in others studded with a multitude of pearly and silvery spots, whilst some produce pretty rose or purple flowers. In addition to the species, which are principally natives of India, there are several garden varieties possessing great attractions. They are increased by seed or cuttings, and require a hot, moist atmosphere, with partial shade, and a sandy, peaty soil. *S. margaritacea*, introduced in 1854, continues to be a great favourite, and its several varieties are decidedly handsome little plants.

SPHÆROGYNE LATIFOLIA is a noble plant from South America. It produces very large and handsome leaves, and requires the the same treatment as *Cyanophyllum*. It should be grown with a single stem, and should receive no check until growth is completed.



FIG. 446.—*SANCHEZIA NOBILIS VARIEGATA*.

readily from cuttings of young shoots, and thrives in sandy peat.

TILLANDSIA.—There are some handsome species of this interesting genus worthy of notice as foliage plants, such as *T. musaica*, *T. splendens* (*T. zebrina*), *T. tessellata*, and *T. vittata*. They succeed under the treatment recommended for *Æchmeas*.

TRADESCANTIA ZEBRINA (*Zebrina pendula*).—This old and well-known plant of decumbent habit, having green leaves striped with silvery-white, is a native of Mexico. It is useful for clothing spaces under stages and for edging, thriving where few other plants will grow, also as a basket-plant. Cuttings planted in any light, rich soil soon spread and flourish. To make a

variety, *T. alba-vittata*, *T. argentea*, Madame Duquesne, and *T. zebrina multicolor* may be added, all of which are bright and prettily variegated.

ZEBRINA.—See *Tradescantia*.

ZINGIBER D'ARCEYI is an elegant plant with tuberous rhizomes. The leaves are from 6in. to 8in. long and about 2in. wide, of a bright shining green, with creamy-white margins and stripes. It grows from 2ft. to 3ft. high. *Z. officinalis*, of similar growth, with glossy green leaves, is the plant from which the ginger of commerce is obtained, and is often grown as an economic specimen. Propagate by division in spring, and grow in rich loamy soil. Keep rather dry during winter when at rest.

Climbers.—Wall and Pillar Plants.

Among the plants that come under this heading are some of the most beautiful and gorgeous flowering species, while others are attractive on account of their handsome foliage, and not a few by their curious and interesting characters of growth. Apart from this their utility for clothing the walls and roofs of hothouses renders their introduction desirable, as they can be trained up out of the way of the other occupants, and thus provide a little of the necessary shade for those plants growing below.

It is, however, necessary to be judicious in the use of creepers so as not to crowd the whole of the roof with thick masses, otherwise sufficient light for the plants growing on the stages and beds below will not be obtained, and this will result in weak and immature development. It is better to have a moderate number of good, healthy, well-grown specimens than a crowd of individuals striving for existence, as though intended to form a practical illustration of the survival of the fittest. We are well aware that in the virgin forests of the tropics the vegetation is very dense and luxurious—so much so that it requires the free use of a large knife to cut a way through untrodden paths. But the greatest profusion of blossom is seen on the margin of the forests and round the lakes and riverbanks, where the sunlight can freely act on plants of moderate stature. Others, consisting of a larger proportion of foliage plants, Ferns, Selaginellas, and subjects generally of a more sombre tint, luxuriate in the thickly-shaded portions of the forests. It is therefore an important point to study the positions in which the different plants will thrive and grow freely when under artificial treatment, and at the same time mature the growth they make to carry on a healthy existence for an indefinite period.

The climbing plants which have been introduced into this country are extremely numerous, and many of them are of the

and lilac flowers. *B. venusta* is a vigorous-growing species from the same country, with gorgeous orange-red flowers, produced in large loose bunches at the extremities of the shoots in succession from October to February.

BOUGAINVILLEA.—These South American climbing shrubs, by reason of their pretty reticulated rose-tinted bracts, which are produced in threes, almost concealing the tubular inconspicuous yellow corollas, are very ornamental. The paniced masses of inflorescence are of an unusual and most attractive character. All the sorts succeed best when planted in a well-drained border of turfy loam, peat, and sand, with the branches trained up the



FIG. 447.—BOUGAINVILLEA SPECTABILIS.

rafters near the glass, where they can enjoy an abundance of sunlight. Very little shading is required, or they run too much to foliage. During the growing season water freely, but gradually withhold the supply in the autumn, and keep nearly dry all the winter. In February, before the plants start into fresh growth, the branches should be spurred back as Grape vines are pruned, and if they break too thickly when the young shoots grow, disbudding should be resorted to, so as to avoid overcrowding of branches. Some growers adopt a different system with *B. spectabilis* (Fig. 447); that is, they cut some of the branches, clean out and lay in the others, after cutting off the extremities,

instead of spurring them back as with the other sorts. These branches shoot and flower earlier than when treated in the ordinary way. Plants may be raised from cuttings of young shoots taken off with a héel of the old wood, or from half-ripened shoots in heat under a bell-glass.

B. glabra has smooth leaves and very pretty rosy-lilac bracts, beautifully veined. The variety *Sanderiana* is very similar; it is claimed for the latter that it is much more free-flowering in a young state, and we have seen plants in small pots covered with blossoms. *B. lateritia* has bracts approaching a brick-red colour, and the branches are thornless. *B. spectabilis* (sometimes *B. speciosa*) is a very showy kind, with large rosy-pink bracts, and hairy leaves and stems, which are armed with strong thorns.

CISSUS.—Although several new species have been introduced from time to time, none have been found to approach the beauty of our old favourite *C. discolor* from Java, so well known to all plant lovers for its handsome velvety-green leaves, charmingly marked with silvery-white and rose on the upper surface and reddish-purple underneath. Its elegant habit, when allowed to festoon the roof and rafters of the hothouse, is very effective. Cuttings are easy to strike, and it grows freely in peat and sand with shade from the noonday sun.

CLERODENDRON.—Among the climbing species of this genus, *C. Balfouri* (*C. Thomsoniæ*) and *C. splendens*, both natives of Africa, are deserving a place in all collections. They are not at all fastidious as to soil or treatment, being of easy culture, and readily increased by cuttings of rather firm shoots, which, when rooted, may be grown on in loam, peat, and sand, and trained up the rafters or on wire trellises. After flowering, and when the shoots are thoroughly matured, the plants may be rather closely pruned back to cause them to break and grow vigorously when the season comes round for starting them again.

C. Balfouri produces large clusters of flowers, the large pure white inflated calyx forming a pleasing and striking contrast to the bright scarlet tubular corolla, while the protruding pistil and stamens considerably add to the beauty of the inflorescence. *C. splendens* yields large bunches of bright scarlet flowers which are always much admired.

COMBRETUM PURPUREUM.—This well-known and favourite climbing shrub is a native of Madagascar. It has handsome opposite leaves, with bright scarlet flowers in terminal racemes. Although the individual flowers are small, the large number contained in each raceme, with their long stamens, have an elegant feathery appearance. It is admirably suited for training up columns and walls, along the roof, or on a wire trellis. Cuttings do not root freely. It thrives best when whip-grafted on a free-rooting species, such as *C. Pinceana*. Peat,

loam, and sand suit it for growing in; if too rich a compost be used, an abundance of growth and very few flowers will be the result. It is necessary to thoroughly ripen the growth in the autumn and to keep the plants rather dry during the winter. Before they show signs of starting into growth in the following spring, the branches should be rather freely pruned and the weak shoots cut out.

DIPLADENIA.—These beautiful South American evergreen twiners, to which several garden varieties have been added, are of free and good habit and remarkably floriferous. They are



FIG. 448.—DIPLADENIA INSIGNIS.

not surpassed by any other for beauty of tint and delicateness of texture of their lovely tubular, funnel-shaped blossoms, which are of pleasing shades of white, pink, and crimson, from 3in. to 4in. in diameter. Their habit of growth renders them admirably adapted for training up the rafters or on wire trellises, and they make excellent exhibition plants.

Cuttings of short

side-shoots will strike root in heat under a bell-glass. The plants thrive best in rough fibrous peat, with a free admixture of silver-sand. In pruning, which should be done when they are at rest, cut away all the weak shoots and exhausted growths that have flowered, and, just as they show signs of starting into growth, remove most of the old soil and repot into clean, well-drained pots. The following are of good habit and give a pleasing variety of colours: *D. amabilis*, *D. boliviensis*, *D. Brearleyana*, *D. Elliotii*, and *D. insignis* (Fig. 448).

FICUS STIPULATA (better known in gardens as *F. repens*) is a creeping evergreen shrub, with small, heart-shaped, green leaves, native of China. It is a most useful plant for rockwork or hanging baskets, for covering damp walls, and for general

decorative purposes. The flowering branches when produced are of a larger growth than, and otherwise distinct from, the creeping branches. It is readily increased by cuttings, and will grow in any light, sandy soil, with either warm or cool treatment in a moist, shady situation. The variety *minima* is the above species in miniature, and the charmingly quaint and graceful manner in which it spreads over rockwork is most interesting. *F. barbata*, from Singapore, is another species, of larger growth, which will also cling to and climb up a damp wall, and form an effective covering.

GLORIOSA.—These deciduous tuberous-rooted climbers are splendid ornaments to the stove, when trained up the rafters and along wires under the roof near the glass. Propagation is usually effected by dividing the tubers. Though seed may be obtained by artificially fertilising the flowers, some patience is required to grow the seedlings on to a flowering size, two or three years being necessary, with careful treatment. We will, therefore, suppose we are dealing with tubers of a flowering size. The pots in which they are to grow must be clean, well drained, and filled with a compost of two parts fibrous loam and one part peat, with a free admixture of sharp silver-sand to keep the soil open and porous. Place the tubers about 1in. under the surface in March, handling them very carefully so as not to bruise them. This is especially necessary on account of the small scale that protects the bud, for if that be only slightly damaged no growth will ensue. Plunge the pots, if possible, in a hotbed, but give no water until the young shoots appear. These must be carefully trained to sticks or wires, being always cautious to preserve the growing points from damage and watering liberally as they increase in strength until after flowering. Then gradually withhold water, and when the plants die down turn the pots on their sides and keep quite dry all the winter until the season comes round for repotting in the following spring.

G. superba (Fig. 449) is a native of the East Indies and produces large and curious flowers, the orange, scarlet, and yellow segments of which are prettily

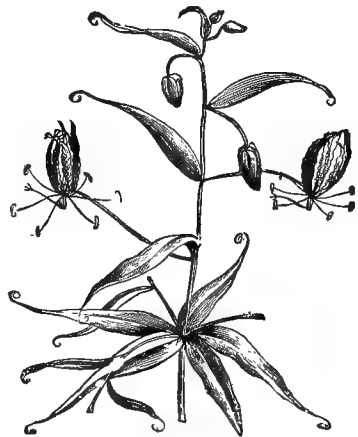


FIG. 449.—GLORIOSA SUPERBA.

crimped and waved. *G. s. grandiflora* is a superior variety with larger flowers and still brighter colourings. *G. Plantii* has very long and curious-

shaped tubers, but the flowers are not so bright as in the others named.

HOYA.—These plants in their native habitats are epiphytes, growing on the trunks of trees in the tropical forests of Asia. They are principally climbers or trailers, with ornamental generally thick, leathery, opposite leaves, and lovely flowers produced in axillary umbels. Hoyas are of easy culture. The soil best suited to them is a mixture of fibrous peat and loam with a sprinkling of coarse silver-sand, and pieces of charcoal or lime rubbish and potsherds; clean, well-drained pots must be used. They require plenty of heat and moisture, both at the roots and in the atmosphere during the growing season;

but during the resting period they may be kept much cooler and drier both at the roots and in the atmosphere. They are not much liable to the attacks of insects, but an occasional sponging with warm water is beneficial, keeping the foliage clean and healthy. Propagation is readily effected by cuttings placed in bottom-heat under a bell-glass, but it is a good plan to leave the cuttings a day or two to dry before inserting them. *H. carnosa* may be propagated from single leaves with or without a bud at the base, but except as a matter of curiosity this method is not resorted to.



FIG. 450.—HOYA CARNOSA.

H. carnosa (Fig. 450), the best-known and greatest favourite of this fine genus, is an evergreen climber with thick, fleshy, opposite, ovate-oblong leaves and pink flowers, freely produced in umbels. It is a native of the East Indies, and was introduced in 1802.

It is sometimes called the Honey Plant, owing to the secretion of a thick fluid which hangs like a dew-drop from the centre of each flower, and has the consistency and sweet taste of honey. When the waxy flowers drop off, the short, thick flower-stems should not be cut away, as they possess the remarkable property of reproducing flowers for several years. This plant may be grown on a wire trellis or trained

up the rafters of the house, and will thrive when trained up the moist back wall of a stove in partial shade, where comparatively few other plants will flourish. *H. c. picta* and *H. c. variegata* (Fig. 451) are two distinct variegated forms. The first has leaves with a creamy-white centre and green margins, while in the second the middle of the leaves is green and the margins are white. They are free-growing varieties, and very ornamental, but to retain the variegation it is necessary to use a little more lime rubbish in the compost and smaller pots, for if treated too liberally they are apt to revert to the type form. *H. imperialis* (Imperial Hoya) is a noble and vigorous species from Borneo; it has obovate lanceolate leaves as large as the common Laurel, which are in pairs, and covered with a silky down. When well grown on a pyramidal or balloon-shaped wire trellis it forms a fine specimen plant. Its large umbels of reddish-chocolate flowers, with a central ivory-white column, each flower 3 in. across, polished and glossy like wax or ivory, are very curious and beautiful. The flowers have the merit of being sweet-scented in the evening. This plant requires liberal treatment, and coming as it does from one of the hottest parts of the world, must have plenty of heat and moisture when growing.



FIG. 451.—HOYA CARNOSA VARIEGATA.

H. campanulata, from Java, is a stove twiner, with oval, pointed, leathery leaves, and umbels of rather large, greenish-white, sweetly citron-scented flowers; the somewhat bell-shaped flowers are best seen when the plant is trained up the rafters, and can be observed from beneath. *H. bella* is a gem from Java, of dwarf habit, and with small, Myrtle-like leaves placed opposite; the flowers are produced freely in numerous small umbels, and the individual blossom has been aptly compared to an "amethyst star set in frosted silver," the corolla being ivory white with nectaries of a pleasing amethyst or violet. Being a dwarf grower it may be tied into a neat shape with

green flower sticks; it also makes a capital basket-plant to suspend from the roof. Next to *H. carnosâ* this species is probably the most popular of the genus.

H. Paxtonii is considered by some to be a variety of *H. bella*, and requires the same treatment. It has longer and more pointed leaves, umbels less compact, and the habit is a little more straggling.

IPOMŒA.—The stove climbers of this large genus are of extraordinary beauty, and cannot be too strongly recommended. Although the individual blossoms are of short duration, they are rapidly succeeded by others, which keep up a continuous display for a long season. Cuttings of the young shoots taken off with a heel of the old wood will strike root in heat under a bell-glass. Soil: loam, with a little well-decayed manure and sand.

The gem of the genus is probably *I. Horsfalliæ*, an evergreen twiner, native of the East Indies; it has handsome digitate leaves and funnel-shaped flowers in terminal bunches of the most brilliant crimson. It thrives best when whip-grafted on a free-rooting sort, such as *I. insignis*. *I. Briggsii* resembles *I. Horsfalliæ*, and is said to be of freer growth, producing in profusion clusters of blossoms of a rich magenta-crimson late in autumn. *I. Learii*, native of Buenos Ayres, is another very handsome free-growing species, requiring plenty of space for full development; it produces in succession numerous large flowers of the most brilliant azure-blue.

JASMINUM.—The stove Jasmines are highly prized for their sweet-scented pure white flowers, which are freely produced, and their climbing nature renders them useful plants for training up columns and trellis-work. They are propagated by cuttings of rather firm short-jointed shoots, which when rooted will grow away freely in a compost of loam, leaf-mould, and silver-sand, in well-drained pots, and even better if planted out in a prepared bed or border. Pruning should be done after the flowering season, and in such a manner as to effect an even balance. During the season of repose, which should always be encouraged, the soil may be kept rather dry, but when in full growth a liberal supply of moisture at the roots is necessary, with frequent syringings overhead, except when in blossom.

J. gracillimum, a native of Borneo, is, without doubt, one of the best plants ever introduced, and should be in every collection; it is of neat, slender, and graceful habit, with terminal panicles of large sweet-scented white flowers produced in great profusion from October to January, and more or less throughout the year; it should not be over-potted, the flowers being much more freely produced when the roots are somewhat

confined. Duchesse d'Orleans is another very beautiful variety, the individual flowers somewhat resembling small Gardenias in their texture and purity. *J. Sambac* and its semi-double form, *flore-pleno*, are deservedly popular. Other good sorts are found in *J. azoricum*, *J. hirsutum*, and *J. ligustrifolium*, all of which will thrive in a cool stove, and yield their sweet white flowers plentifully.

MANETTIA. — These are climbing shrubs from Tropical America; they will thrive in a cool stove or an intermediate house, where they form pretty subjects trained on wire trellises. They may be propagated by cuttings, and grow nicely in equal parts of peat and loam, with a little silver-sand added. The best sorts are *M. bicolor*, scarlet and yellow; *M. cordifolia* (*M. glabra*), scarlet; and *M. micans*, scarlet.

MARCGRAVIA. — These curious climbing shrubs, natives of Tropical America, are useful for covering damp walls, to which they cling closely. *M. dubia* is sometimes used to train up the door-posts of the hothouse, where its oval-pointed leaves spread out alternately on each side of the stems and always attract attention by the unusual character of the growth and by the bright, pleasing, rosy colour of the young shoots and leaves. *M. paradoxa*, with elliptic deep green leaves, which spread flatly on the surface of a damp wall, covering it with verdure, is another interesting species. Both increase readily from cuttings, and thrive in a peaty soil.

OXERA PULCHELLA, from New Caledonia, is closely allied to *Clerodendron*, and succeeds under the treatment recommended for the climbing species of that genus. The large, showy, greenish-white flowers are produced in great abundance in axillary clusters. The long stamens, with golden-yellow anthers extending beyond the funnel-shaped corolla, add considerably to its beauty and attraction.

PASSIFLORA. — The Passion-flowers are so well known that to describe their characters here would be superfluous. The stove kinds embrace species and varieties of the most brilliant shades of scarlet, rose, white, and blue. They are natives of both the Eastern and the Western Hemispheres, and are most elegant creepers when trained up the rafters and festooned under the roof. Propagation is readily effected by seed or by cuttings, and the plants succeed when planted in loam and peat either with or without bottom-heat.

P. edulis and *P. quadrangularis* produce delicious fruits, and several other kinds are edible. The flowers of *P. quadrangularis*, however, require to be artificially fertilised when grown in our hothouses to cause them to yield fruit. For ornamental purposes we would suggest the following: *P. Buonapartea*, red, blue, and white; *P. cardinalis*, scarlet; *P. Decaisneana*, carmine, purple,

and white; *P. Raddiana* (*P. kermesina*) (Fig. 452), blood-red and purple; *P. princeps* (*P. racemosa*) (Fig. 453), scarlet; *P. trifasciata*, white, leaves prettily blotched with white, yellow, and pink; *P. vitifolia*, vermilion red; and *P. Watsonii*, green, white, violet, and lilac.

PAULLINIA THALICTRIFOLIA.—This is a very handsome semi-scandent foliage plant, native of Brazil, with pretty leaves much resembling the fronds of the Maidenhair Fern. The mature leaves are of a bright green, while in the young growth the stems and foliage have a pleasing rosy tint. It is very useful for cutting for bouquets and



FIG. 452.—PASSIFLORA RADDIANA.

vases, as it keeps fresh for a considerable time, and imparts an air of lightness and elegance when intermixed with cut flowers. *P. thalictrifolia* forms a nice trellis plant, or if kept pinched

into shape makes pretty bushy subjects for table decoration. It is propagated by cuttings, and grows freely in peat, loam, and sand.

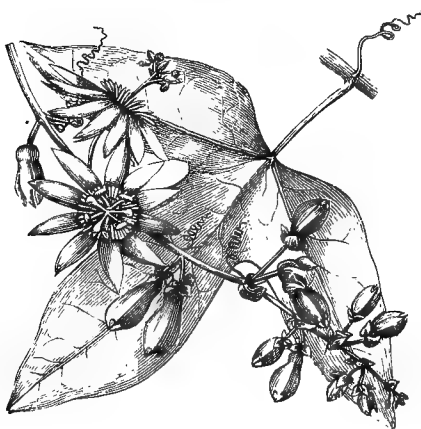


FIG. 453.—PASSIFLORA PRINCEPS.

pretty effect. *P. pulchra*, also from Cochin China, has oblong, very obtuse leaves, the upper surface of which is of a dull blackish colour along the midrib and veins, the interspaces being

PELLIONIA.—These creeping perennial ornamental foliaged herbs are suitable subjects for baskets, for rockwork, or for covering damp walls, to which they readily cling. *P. Daveauana* is a native of Cochin China; it has dark olive-green leaves, 1in. to 2in. long, slightly violet-tinted, with an irregular silvery band running down the middle of the blade on the upper surface; the succulent stems cling to a damp surface, and have a very

green, while the under-side is a pale delicate purple; the fleshy stems have a dull purplish shade. Both species require a moist warm atmosphere, thrive in a sandy soil, and are readily increased by cuttings or by division.

PORHOS.—These singular plants are worthy of notice for their adaptability for covering damp walls in shady places where few other subjects will thrive. They are not at all fastidious as to soil, sandy peat suiting them very well. Propagation is readily effected by cuttings.

P. argyrea, from the West Indies, is a species with pretty green leaves, blotched and marked with silvery-white, and delights in a damp, shady situation. *P. celatocaulis*, a native of Borneo, has elliptic dark green leaves, and is a rapid grower. It is one of the best plants for quickly covering a damp wall, to which it will cling by numerous adventitious roots, the leaves spreading out quite flat and close to the surface; it somewhat resembles *Marcgravia paradoxa*, but is a much more rapid grower. *P. flexuosa*, a good wall climber, from the East Indies, has oblong-lanceolate pale green leaves, arranged alternately to right and left of the closely-clinging stems, and lying quite flat on the surface over which they climb.

SCHUBERTIA GRAVEOLENS is an evergreen twiner, native of Brazil; it produces umbels of handsome pale yellow very sweet-scented flowers, the corolla of which is funnel-shaped, with the tube swollen below. Cuttings of short stubby shoots will strike in heat under a bell-glass, and the compost for the plants should be fibrous loam and peat with the addition of some silver-sand.

SOLANUM.—From this large and useful family we may select two climbing species, which may be used with advantage for adding to the variety of the hothouse. Both propagate freely by cuttings, and thrive in loam, peat, and sand. *S. Seafortianum*, a native of the West Indies, is a neat-growing species well adapted for training up a pillar, where its numerous clusters of pretty light blue flowers are shown off to advantage. *S. Wendlandii* is an effective climber, producing terminal cymes of purplish-blue flowers 2in. in diameter. It is well suited for training up the rafters, and lasts several months in flower.

STEPHANOTIS FLORIBUNDA is a stove evergreen twining shrub, native of Madagascar, and having opposite, thick, leathery, smooth, dark green, shining leaves, and umbels of pure white, tubular, salver-shaped, sweet-scented flowers. There are few stove plants so well-known and highly-valued as this. It is one of the best climbers for training up the rafters and on wires under the roof, and the beautiful flowers are produced at nearly all seasons of the year, and are invaluable for bouquets, wreaths, and vases. Cuttings of nice, short-jointed, firm shoots strike readily in heat

under a bell-glass. The plants may be either put out in a border or grown in pots in equal parts of peat and loam with a little leaf-mould and sand added. Water copiously and use the syringe freely all through the summer months. Sponge the leaves with warm water when necessary to keep them clean and healthy, and prune out all weak shoots. Should Mealy-bug appear attend diligently to its destruction by washing with sponge and brush, and by smart syringings with tepid water. The sort known in the trade as *Stephanotis floribunda* Elvaston var., should be obtained, as it is by far the best and freest to blossom.

TECOMA SPECTABILIS (*Tabebuia spectabilis*), a native of Santa Cruz, is an elegant plant with conjugate leaves and purple flowers; admirably adapted for training up a pillar. It flourishes in peat, loam, and sand, and may be raised from cuttings of firm young shoots. Keep rather dry in winter, and prune moderately.



FIG. 454.—THUNBERGIA
LAURIFOLIA.

THUNBERGIA.—Of these pretty flowering creepers, the following is a selection of the best sorts and most varied colours: *T. chrysops*, with blue and violet flowers, native of Sierra Leone; *T. coccinea*, scarlet, from Trinidad; *T. fragrans*, white, East Indies; *T. grandiflora*, large light blue flowers, East-Indies; *T. laurifolia* (Fig. 454) (*T. Harrisii*), blue and yellow, Madras. The above species may be propagated by cuttings, growing the plants on in loam, peat, and sand, with shade from bright sunshine.

T. alata, with a buff-yellow corolla, and a very dark eye nearly approaching black (hence the common name Black-eyed Susan); *T. alata alba*, white limb, with very dark purple throat; and *T. aurantiaca*, deep orange, with nearly black centre; are best treated as tender annuals, sowing the seed in February or March. They are sometimes hardened off and planted in a warm, sheltered position out of doors. The flowers, however, come much brighter when grown in the stove or greenhouse. Frequent syringings under and over the foliage is necessary while the plants are growing to keep down Red Spider, a pest to which these plants are peculiarly liable if the precaution named is neglected.



16.—*On Greenhouse Plants.*

BY F. M. MARK.

Most plants which can be grown in glass houses with the aid of very little or no artificial heat during summer, and which in winter require a temperature ranging from 45deg. up to 60deg. Fahr., may be termed "greenhouse plants." Almost all known plants which grow in warm temperate regions may, with a few exceptions, be successfully cultivated under greenhouse treatment. The object of every cultivator should be to obtain a continuous supply of plants in blossom all the year round, and with such an immense variety to select from, coming from various parts of the world, and having different periods of flowering and resting, there is not much difficulty presented in its attainment.

But before this can be done it is necessary to have suitable structures in which to grow and to show the plants off when in blossom. The best plan is to have at least two "growing houses" and a series of frames, in which the plants can receive suitable treatment. It is often impossible to provide the necessary conditions to enable plants to complete growth or to rest after flowering when grown amongst others that are starting; and in most cases plants that are at rest are unsightly, thus spoiling the effect of others that are in blossom. It is therefore a great advantage to have, in addition to the growing houses, another specially fitted for accommodating the

various plants as they flower: this is known as the "green-house" or "show-house," and before proceeding further it will be as well to give a description of this and the other structures to be used.

THE GREENHOUSE.—This differs from a conservatory in that all, or nearly all, the plants employed for furnishing it are portable, whilst in a conservatory they are permanent, consisting mostly of large subjects grown in beds; but a combination of the two may be managed, and is very effective.

The structure should be as light and airy as possible. For this purpose it is best to employ plenty of iron-work, having no large heavy wooden rafters or sash-bars to obstruct the light. Of course, this mode of construction is expensive at first, but will be found far cheaper and durable than wood in the end, in addition to having the advantage of admitting more light. When wood is used, teak will be found most serviceable, being both very strong and durable.

The span-roof form of house is preferable to the lean-to, for it has the advantage of admitting light on every side, while in the case of a lean-to light is on one side, and the plants will all grow in that direction, necessitating frequent turning to maintain their shape. The house should only be of moderate height—about 12ft., and having a lantern about 2ft. wide; rising $2\frac{1}{2}$ ft. higher at the top, making the actual height in the centre $14\frac{1}{2}$ ft. The width may vary according to convenience, but 16ft. will be suitable. There should be shelves 3ft. wide at the sides, two $2\frac{1}{2}$ ft. paths on each side, and a central bed 5ft. wide. The height of the sides may be 6ft., half being glass, resting on a wall 3ft. from the ground.

The side shelves or stages should come to within 6in. of the top of the wall. They are best made of slate with a few holes bored in about 18in. apart, and having a raised rim all round the edge. These should be filled with well washed small gravel stones. Wooden shelves are not to be recommended: they soon decay if not well looked after, and in so doing make harbouring places for all manner of insect and fungus pests, which are most injurious to plants. Shelves or stages made of wooden battens, with spaces in between, should never be used, as they allow water to run away at once, and by permitting dry air to come from *below*, and to circulate freely amongst the pots, cause too rapid evaporation. Thus in hot weather constant watering will be necessary, or the plants must be stood in saucers, which is not advisable, as in that case the water does not run away at all, and the pot is liable to become water-logged, causing the soil to become sour. In the case of slate covered with loose gravel stones, the stones allow water to run freely from the pot, but yet retain it; thus continual evaporation takes place,

and the air passes up amongst the foliage of the plants laden with moisture. This is especially the case when they are damped two or three times a day.

In the centre of the house it is usual to have shelves placed in tiers one above the other. These should also be made of slate and covered with gravel stones; but it is a better plan to have a flat bed raised 6in. above the ground. In the centre of this tall plants in tubs or large pots may be placed; or they may even be planted out, and then others not quite so tall arranged next them, the plants getting lower towards the edge. This bed should also be covered with loose gravel. The paths should either be tiled or cemented over, and it should be noted that cleanliness is a very important consideration.

The temperature of this house should range from 50deg. to 60deg., and in all cases it should be at least 5deg. lower in the night than in the day, both in this and the growing-houses.

When the soil is very heavy and wet, the ground on which the greenhouse is to stand should be raised above the rest, so as to ensure perfect drainage. The growing-pits will also, in such cases, be better raised instead of sunk.

THE GROWING-HOUSES.—Of these there should be at least two: one structure can be divided into two parts, and sometimes three divisions can be made. The sunk house or pit is the best form, as, not being so exposed, the heat is more easily retained. This is a house having a low exterior wall about 1ft. high on which the roof rests, coming down nearly to the level of the ground. It is entered by an exterior flight of steps, the path in the centre being 3½ft. below the level of the ground; side shelves are fitted similar to those in the greenhouse, but they may be wider. The two divisions should be warm and cool respectively, the first having a winter temperature ranging from 55deg. to 65deg., and the second from 45deg. to 55deg. In summer artificial heat will not be necessary in the cool end, and in the warm one only during very damp weather, or for the purposes of propagation, when a little bottom-heat may be required. The warm pit can be used for growing plants on, and for bringing them into blossom quickly, or for gentle forcing in the spring. The cool pit will serve for hardening off plants in blossom before shifting to the greenhouse, as well as young ones that are intended to grow outside in the summer; it can also be used as a resting pit. Both the pits can be used for propagation, but for this purpose they should be fitted with proper cases (*see* Chapter "On Plant Propagation").

It is a good plan in the case of these houses to make sections of the roof to lift on hinges, so that when the weather is suitable they can easily be propped open and the plants shifted without passing up and down through the doors.

FRAMES.—It is very convenient to have a few of these, and it is surprising what a number of plants may be grown in them with the aid of a little heat. They should vary in depth, so as to admit of different sized plants being grown in them, are best built of brick with wooden lights, and should face to the south.

ASPECT.—Both the greenhouse and the growing-pits should run from north to south; thus the sun will rise on one side and set on the other, both sides getting their fair share of sunshine, whilst it will be right over the centre at mid-day.

SHADING.—This is an important item in plant-growing. It is best effected by means of roller-blinds, having a reel and cord at one end by which they can easily be let up and down. Fine tiffany is the best material.

Wooden blinds are also used; these consist of strips $1\frac{1}{2}$ in. wide, having $\frac{1}{2}$ in. space in between, and bound together by cords. They are also made to roll up and down, but require to run on supports about 1 ft. above the surface of the glass.

Permanent shading consisting of washes should never be used, for it is very injurious to plants to be continually shaded on dull days, especially in spring and autumn, when sometimes we get several dull days in succession. On the other hand blinds require constant attention, as many valuable plants are frequently spoilt when in full blossom by the careless cultivator going away and leaving the blinds up, when during his absence the sun has come out and shone fiercely. Permanent shade may be used for the sides of the house, but even there tiffany, hung up by means of hooks and rings, and fastened in a like manner at the base, is better. These blinds may be replaced in winter by blanket ones, which will be of great advantage on exceptionally cold nights or in windy weather, for keeping the heat in.

HEATING.—This is a most important matter. Saddle-boilers are mostly used, and have the advantage of being very durable; but they heat slowly, and it is necessary to burn a considerable quantity of fuel before the temperature of the house can be raised. Tubular boilers are really the best, although not so durable; by their means heat can be got up much more quickly, and they are therefore much more useful, as in the case of a warm spell, when artificial heat has been dispensed with, and there is a sudden change, and it is desired to get the heat up quickly. But if the temperature has once fallen low it must be raised gradually.

If by mischance frost has been allowed to get into a house, it is best to syringe everything with cold water, keep the blinds down all day, and raise the temperature very slowly. By this means many plants may be saved.

When there are only three or four houses and frames one boiler will be sufficient, its size varying according to the area to be heated. In this case, when there are only one show house, two growing pits, and some frames, there should be separate flow and return pipes for each, the heat being regulated by means of valves. The boiler must be below the level of the houses, and have a feeding cistern a little higher than the highest pipes, which must always be kept full of water. In the growing pits the warm division will be at the end by which the pipes enter—next to the boiler; they will then pass on into the cool end, being regulated by valves in both, so that if desired the heat may be cut off from the cool end whilst it is still retained in the warm one.

Four-inch pipes should be used, and plenty of them; it is far better to have a gentle uniform heat from a number of pipes than a fierce, scorching heat from a few, which is very injurious, making it necessary to drive the fire much harder, use more fuel, and thus wear out the boiler quickly. The pipes should pass along under the stages all round the sides of the houses. It is also a good plan to carry two "flows" and "returns" along the roof to dry up excessive moisture and prevent drip, and in the warm pit to have a couple along the top of the shelf next the outside wall.

In summer no artificial heat will be required for any of the houses except in very damp or cold weather.

VENTILATION.—The art of giving the right amount of air at the right time can only be acquired after long experience. All the houses should be plentifully supplied with ventilators, especially the greenhouse. This should have lights on hinges along each side of the house and along the whole length of the lantern on either side, and wooden ventilators under the shelves, let in the brickwork on a level with the pipes, all opening from the inside.

Plenty of air should be given on every occasion when it can be done without lowering the temperature unduly. Fresh air is life to plants, but when cold and damp it is injurious, and should be excluded. When a cold or strong wind is blowing only those ventilators on the opposite side from that which is exposed thereto should be opened. Bottom air can always be given by means of the ventilators in the brickwork, except when the thermometer stands below freezing-point or the wind is very cold. By this means the air of the house is kept fresh, whilst by passing over the pipes first it is warmed before reaching the plants.

The same rules apply to the growing pits, except that not quite so much air should be given to many plants making growth as to those that have finished flowering or are in full blossom, and this shows the necessity of having a warm as well as a cool pit even in summer. Each pit should have ventilators

at the top of the roof, and also at the sides between the roof and the ground. When the nights are cool, but the sun is strong and bright during the day, the temperature may be kept up by closing the ventilators early and storing the sun heat.

In the frames air can be given by means of wooden blocks notched in stair fashion, so that the lights can be raised to various heights when it is not desired to remove them altogether.

WATER TANKS.—Every house should be provided with water-tanks. These can be let in the ground on a level with the floor, and service water laid on. But they should also be made to collect all the rain-water from the roof, and this should be used in preference to any other. It is as well to have a couple of hot-water pipes running through the tanks, so that the water may be heated to the same temperature as that of the house. Self-registering thermometers should be placed in every house, so that variations of temperature may be observed.

CULTIVATION.—After describing the structures for growing the plants in it will be advisable to give a general outline of their cultivation, proceeding to fuller details later on.

As greenhouse plants vary so much in their habit and growth, they require different methods of treatment and different composts for growing in, the various soils for making which should always be stacked for some time before using.

Watering requires extreme care. It is almost impossible to tell anyone how to water properly, but the cultivator who takes a real interest in his plants will soon get to know the requirements of each individual, and will water it accordingly. On no account should a plant—except in special cases—be allowed to become dry. Very often a plant will suffer so much damage from being dry for only one day that it will not recover during the rest of the year. Generally if the pot in which a plant is growing gives a hollow ring when tapped it may be said to be dry, but this is not always a true test, and one can only tell correctly after long experience. Again, care must be exercised not to over-water, as quite as much damage can be done in that way. The great art is to give a plant water just sufficient at the time when it is beginning to require it.

All plants when potted should have perfectly clean pots and good drainage. If this latter becomes blocked it must be renewed, otherwise the soil will become sour and the plant will suffer. To prevent this, the drainage should be covered with some loose material, such as dry leaves or moss.

Worms are sometimes a great trouble in this respect. They can often be got at by carefully knocking the plant out of the pot, taking care not to injure the roots or break the ball. If this cannot be done, watering with soot or clear lime-water will kill them.

When potting it is important that the compost should be in good condition—neither dry nor wet. It is a good test to take a handful, giving it a good squeeze; then if it remains in a lump, which will yet readily break up when thrown down, it may be said to be fit for use. Sufficient room must be left between the surface of the soil and the rim of the pot to enable it to hold a good quantity of water.

When plants have been potted on they should always be kept a little closer and warmer than they have previously been till they have recovered the check. Give the plants one good soaking and then allow them to go without water for a time, but not to become dry. If it is summer, and the foliage is inclined to flag, syringe gently overhead three or four times a day.

Careful attention must be paid to the watering of freshly-potted plants, as numbers are often killed from over-watering. It must be borne in mind that the soil round a freshly-potted plant has no roots in it, and therefore nothing to absorb the moisture; and if this be kept wet it will become sour, so that when the plant begins to send fresh roots into it, instead of growing they will be poisoned and rot off. It will thus be seen that it is best to keep the plant rather on the dry side till its roots have got a good hold, and are capable of assimilating the moisture.

All plants must be watered before potting, for if the ball is dry at that time it can never be got moist again by watering after potting.

The gravel on which the plants stand and the floors of the houses should receive a slight sprinkling of water throughout the year, except when damp, close weather prevails, at least once a day in the cool pit and greenhouse, and oftener in the warm pit. In very hot weather during summer this should be repeated three or four times, at the same time syringing the plants overhead, giving those that are in blossom just a slight spray, and letting those that are not have the full benefit of the syringe.

Many people are afraid to syringe plants in blossom, saying that the flowers are thus caused to damp, or are discoloured. This is a great mistake, for if it is done whilst the air is dry, with full ventilation on the house and the blinds down, it is of the greatest benefit, enabling the flowers to last much longer. It must, however, be done carefully, in order to avoid bruising, and only perfectly clean water should be used. Watering should be done with a rose-can to avoid washing the soil out of the pots. The summer watering is best done in the afternoon after four o'clock, and in winter in the morning.

Cleanliness is most important for the health of the plants. Always keep everything in, and every part of, the house clean, washing frequently leaves and pots, and continually removing dead

foliage or flowers, for these, if allowed to remain, form breeding-grounds for fungi, as well as looking unsightly. Also by continually cleaning the house noxious insects are turned out of their lairs, whilst when the glass is kept clean the maximum amount of light is admitted. All these may seem trivial matters, but it is attention to such small details that makes the difference between good and bad cultivation.

Never allow a plant to spoil for want of a stake. Many weak-stemmed or top-heavy plants require stakes, and in the case of those that throw up several flowering stems each should have a separate one, which looks better than when only one is placed in the centre. Use the stakes as thin as possible, provided they are sufficiently strong for the purpose. Bamboos painted green are best, being light, strong, and durable, and they can be obtained in all sizes.

Arrangement is a matter requiring careful consideration. Never put two similar colours together. It is better to have batches of one species arranged in groups. The finest effects are obtained when two species of contrasting colours are mixed together, and fine foliage plants dotted in between. A splendid effect may be obtained by mixing plants having tall loose spikes of flower amongst other dwarfer-growing kinds of a contrasting colour.

Avoid overcrowding. A far better effect is always obtained by having a few good groups with plenty of room between the plants, so that their full beauty may be seen, than by having a lot huddled together, which is not good either for the plants or for the observer.

PESTS are a continual source of trouble to the cultivator of greenhouse plants. Greenfly, Red-spider, Thrips, Mealy-bug, and Scale are the chief enemies. For all these, except the last, fumigation with the XL All Vaporiser and Liquid is the best and safest remedy for any plant, whether in blossom or not, but is rather expensive. Tobacco-paper may also be used with good effect for the first-named, but many plants cannot stand it, especially if young and tender, whilst most flowers will suffer. Syringing or sponging with some insecticide is very effective, and is necessary for Scale, but these preparations must be used with care, especially in the case of young or rough-leaved plants. Small plants may be dipped in a solution of insecticide, but in any case they should all be washed clean an hour or so later with pure water. Perhaps the safest insecticide is Fir-tree Oil. The best of all consists of pure paraffin, soft-soap, and warm water, but should only be used by an experienced man. It has been said that "the man who can use paraffin properly in a garden is a jewel." Dissolve from 10z. to 20z. of soft-soap in 1gal. of water, adding 10z. of neat paraffin; then boil for half-an-hour.

Use when slightly warm, and continually stir so as to keep it well mixed. The quantities vary, however, according to whether the plant is strong and hard-wooded, with smooth leaves, or is tender, with rough, hairy leaves. In any case, whatever insecticide is used, dipping is best for small plants, excepting in the case of Scale. First place the right hand over the top of the pot, having the stem between the middle fingers, then keeping the hand so, turn upside down and dip in solution (which should be in a wide-mouthed pail) until the plant is immersed almost as far as the soil in the pot; keep the plants in the solution for one or two minutes, and then place them on their sides for an hour, after which syringe with clean water, and replace. It is very important that none of the solution should be allowed to soak into the soil. Scale must be rubbed off with a sponge soaked in the insecticide.

There are many other pests than those named above which do damage, but there is not room in the present chapter to give a detailed account of them all. For fuller particulars, the reader is referred to the Chapter "On Pests Generally."

Fungi also do a great deal of damage, amongst the worst being Mildew, and this more especially affects Chrysanthemums, Roses, and Cinerarias. It is mostly induced by damp and cold combined, and seizes on weak, unhealthy plants most readily. When it makes its appearance—generally in late summer and autumn—it is best to give a little heat, and at the same time plenty of ventilation. Syringing with potassium sulphide dissolved in water (1oz. to 2 gallons) is a good remedy; while dusting with dry black sulphur also answers very well.

The foregoing remarks give a brief idea of the cultivation of greenhouse plants and general management as far as space will permit. We will now proceed to give a selection of the most useful plants for decorative purposes, mentioning special details as to cultivation of the most difficult species.

Greenhouse plants may be divided into five groups: (1) Soft-wooded, (2) Hard-wooded, (3) Tuberous-rooted and Bulbous Flowering Plants, (4) Foliage Plants, and (5) Ornamental Climbers.

Soft-wooded Plants.

Under this head may be classed all plants which have an herbaceous (soft and fleshy) stem and fibrous roots; they may be either annual, biennial, or perennial, and include many of our most useful greenhouse subjects. They mostly require a rich, light compost of loam, leaf-soil, and silver-sand, with the addition of well-rotted stable manure or dry cow-dung, to be potted moderately firm, and when growing to receive continual shifts, so as not to suffer from want of root-room. They are very quick to suffer from want of water, and are generally easy to

propagate by either seeds or cuttings. Feeding may be practised to advantage with nearly all when a good size and in full growth ; this may be effected either by using some of the artificial manures (of which Clay's Fertiliser is very good) as a top-dressing, or dissolved in water, or by manure-water, obtained by placing cow-dung or other manure in water.

ABUTILON.—This is a most useful genus of plants, having large bell-shaped flowers beautifully veined and of various



FIG. 455.—*ABUTILON INSIGNE*.

colours : orange, white, yellow, and red. Propagate by cuttings taken in April, struck in the warm pit, and afterwards grown cool, pinching once or twice. Young plants are best for pot work, and should be raised every year. Flowers all the summer. The best sorts are *Boule-de-Neige*, *Boule d'Or*, *Tancred*, *Golden Fleece*, *Sanglant*, *insigne* (*A. igneum*) (Fig. 455), and *Scarlet Gem*.

AGATHÆA CÆLESTIS is a beautiful little Capeplant, having blue flowers, and known as the *Blue Marguerite*, owing

to their resemblance to that flower. It is readily raised from seed sown in March or from cuttings in June, and should be grown cool during winter. Flowers all the summer. Height 6in.

ALONSOA LINIFOLIA and *A. gracilis* are useful for summer flowering, having bright scarlet flowers and graceful foliage. Raise from seed sown in March or by cuttings struck in autumn, and grow cool. Height from 1ft. to 1½ft.

BALSAMS (*Impatiens hybrids*).—These beautiful annuals, although largely used for outdoor work, are really greenhouse plants,

and are seen to the greatest advantage when grown as such. Those known as Camellia-flowered, having large double flowers, should be grown; they can easily be raised from seed sown in March, pricking out and potting on as required, giving frequent shifts so as not to allow them to become pot-bound, and finally flowering in 8in. pots. It is well to increase the richness of the soil at each shift. Successions may be obtained by making several sowings up to May, and thus plants may be had in blossom well into the autumn. Grow in a cool pit or frame. Height from 1½ft. to 2ft.

CALCEOLARIAS.—Many people find considerable difficulty in growing herbaceous Calceolarias successfully, and they certainly require careful treatment. Raise from seed sown (which is extremely fine and requires care in handling) in May or June. Sow on the surface of the soil, covering with sheets of glass. When the second leaf has appeared prick off, pot on singly when ready, and continue to shift as the plants grow, never allowing them to become the least pot-bound. Use a very light compost of loam, leaf-soil, and sand, adding dry cow-dung as they get big. Keep very cool and shady, having plenty of moisture about, but not on the leaves, with ventilation, excepting when the wind is very cold. Do not shift in winter. Grow in the cool pit or frame, giving only sufficient heat to keep out frost, or during very damp weather, continue to give as much air as possible, and in March shift into 10in. pots for flowering. Calceolarias are very subject to the attacks of Green-fly, which get under the leaves, causing them to curl. As soon as this appears fumigate slightly two or three times a week, or else dust with tobacco-powder, using a puff distributor, which enables the under-sides of the leaves to be reached easily. The plants do not stand tobacco smoke well, so that this, if used at all, must only be very slight. The great diversity of colour, and the varied markings of the blossoms, are very beautiful. Height 2ft.



FIG. 456.—*CAMPANULA PERSICIFOLIA* AND *C. P. GRANDIFLORA ALBA*.

CAMPANULAS.—*C. persicifolia grandiflora alba* (Fig. 456), *C. pyramidalis* (blue), and *C. p. alba* (white) are grand summer flowers for greenhouse decoration, the blossoms being borne on tall, straight spikes, a succession being kept up for a long time, especially when the dead ones are continually picked off. Although hardy perennials they are much better when grown in pots, and no greenhouse should be without them. *C. pyramidalis* and its var. *alba* reach a height of 4ft., making a splendid show when in a group in the centre bed. Propagate by division of the roots in spring. *C. pyramidalis* is, however, best treated as a biennial. Raise from seed sown in May, grow in fairly rich compost in the open during summer, and in frames during winter, only giving sufficient protection to keep away frost. Flower in 8in. pots. *C. persicifolia* is best flowered in 6in. pots, but it can also be grown three together in 8in. pots. *C. fragilis* is a small trailing plant, very useful for hanging-baskets. Light blue. Propagate by cuttings in May, and grow in a cool pit.

CARNATIONS and PICOTEES are useful for both summer- and winter-flowering. Carnations are divided into three groups: (1) Show, (2) Tree or Perpetuals, and (3) Malmaisons.

(1) *Show Carnations*.—These are again divided in Bizarres, Flakes, and Cloves or Sels. They are propagated by layers; this should be done in August, plunging the plants in large pots, and layering all round the outside. Pot the rooted layers in October in 3in. pots, keeping in a cool frame during winter, and shift into 6in. pots in March to flower. Sorts: Dr. Hogg, Rifleman, Harmony, Mrs. Douglas (Fig. 457), James Douglas, Sportsman, and Rob Roy.



FIG. 457.—CARNATION MRS. DOUGLAS.

(2) *Tree Carnations* are most valuable for winter blossoms. Propagate by cuttings in slight bottom-heat in February, grow on in a frame at first, later on standing outside on a hard ash bottom; pot into 6in. pots, and take inside in the cool pit in September, placing them in the warm pit to open the flowers in January and February. Sorts: Mrs. Leopold de Rothschild, Mrs. Moore, Mrs. Muir, Winter Cheer, and Uriah Pike.

(3) *Malmaisons* should be struck from side-growths in April or May, and a dung hot-bed in a frame is best for this purpose. Pot on and grow in the cool house to flower in March, April, and May. Sorts: These are all varieties obtained from the original Souvenir de la Malmaison—Nell Gwynne, Prime Minister, Princess May, and Trumpeter. *

Picotees are summer flowerers, and only differ from Show Carnations in having a pure white or yellow ground to their flowers, with coloured edges. They have not quite so robust an appearance, but are quite as free blossoming. They require the same culture as Show Carnations.

The compost for all should be fibrous loam, sand, and broken lime rubble. Carnations are very subject to a fungus, and it has been found best to grow them on the dry side as much as possible during winter to prevent this. Spraying with Bordeaux Mixture is also a good preventive. Directly the fungus appears on any of the leaves they should be removed and burnt.

CELOSIA CRISTATA (Cockscomb) is well worth cultivating for its curious heads of flower, having a very marked resemblance to the comb of a cock; hence the popular name. Raise from seed sown in February or March, prick off into pans, and pot on frequently to prevent them from becoming pot-bound; use a very light and rich compost, pot lightly, and grow in the warm pit, to flower in July and August. Height 9in. To obtain very dwarf plants, from 3in. to 4in., keep growing freely for a little while in the warm pit, then suddenly check by removing to the cool pit, and keep almost dry. As soon as the combs appear, start growing again in the warm pit, and feed with manure-water. Another plan is to cut off the tops of the young plants a little below the comb as it is developing, rooting as a cutting in strong bottom-heat, and afterwards potting in $4\frac{1}{2}$ in. or 6in. pots. Dwarf varieties may also be obtained from seed. Colours: deep crimson, rose, gold, and white. *C. pyramidalis* is a very handsome plant, having long plume-like spikes of various colours (culture as for *C. cristata*).

CELSIA CRETICA (3ft.) is a biennial well suited for the centre bed. It has tall spikes of yellow flowers. *C. Arcturus* (2ft.), also yellow, is a perennial, but is best treated as a biennial; it has shorter spikes and smaller flowers, being suitable for the shelves of the greenhouse. Sow in April in the warm pit, grow outside in the summer, and protect in a cool frame during winter. Flower *C. cretica* in 8in. pots, and *C. Arcturus* in 6in. pots. Flowering period, May and June.

CHRYSANTHEMUMS.—The varieties of *C. sinense* (Fig. 458) form one of the most popular and important groups of plants grown for the greenhouse. With their aid a show of blossom may be had from early autumn till after Christmas—just at the

season when it is most difficult to obtain other plants in flower. For this reason it is advisable to grow a good number, including a variety of sorts, having early, medium, and late blossomers. Excepting when grown for exhibition, their culture is very simple. The large-flowered sorts are best struck in December by cuttings of shoots taken from the base of old plants; but the small-flowered Pompones (Fig. 459) may be left till February. Strike on a hot-bed in a frame, pot into 3in. pots, then shift to 6in., 8in., and finally in June to roin. pots



FIG. 458.—CHRYSANTHEMUM
SINENSE VARIETY.

to flower. The plants are very gross feeders, requiring a rich compost, which should be increased in richness at each shift. It should consist of three parts good fibrous loam and one of leaf-soil and well-rotted manure to start with, and as the plants are shifted the proportion of manure may be slightly increased at the expense of the leaf-soil, and in the last two shifts soot and bone-meal, at the rate of a 3½in. pot full of the first and a 5in. of the latter to one bushel of compost. Pot very firmly, being careful to leave plenty of room between the surface of the soil and the rim of the pot for water. Water must be given frequently, never allowing the plants to flag, and after the last two shifts, when they have become established, water with manure-water every alternate day. All the shoots must be stopped after each of the first three shifts, if compact bushes are desired; but if tall plants with only three or four stems are wanted, only stop once when in 6in. pots. Stand out on a hard ash bottom all the

summer, and as soon as the weather begins to get cold—but before frost comes—move the early sorts inside, keeping them as cool as possible. The late ones should be kept outside as long as possible, and for this purpose a skeleton house, consisting simply of a frame work, fitted with blinds, and having canvas hung round the sides, is advantageous, as by this means protection can be given at night, the plants being held in check for a long time.

The following are some of the most useful sorts, but the number of them is so great that a large catalogue could be made, every one mentioned being good :

Japanese Incurved: Ami Hoste, Baron Hirsch, Empress of India, Mrs. S. Coleman, Lord Alcester, and Queen of England.

Japanese Reflexed: Avalanche, Beauty of Exmouth, Etoile de Lyon, W. H. Lincoln, and Vivian Morel. Hairy varieties, Mrs. Ward and Hairy Wonder.

Japanese Anemones: Bacchus, E. C. Jukes, and James Weston.

Large Anemones: Descartes, Acquisition, Georges Sand, and Thorpe, jun.

Anemone Pompones: Calliope, Firefly, and Marie Stuart.

Pompones: Black Douglas, Croesus, La Purité, and Rubra Perfecta.

Singles: Gus Harris, Jane, Mary Anderson, Terra Cotta, and Yellow Jane.

Early Flowering: Mme. C. Desgrange, G. Wermig, Souvenir d'un Ami, St. Croux, and Jardin des Plantes. These may be had in blossom in August.

C. frutescens is the well-known Marguerite, or Paris Daisy, so useful for decoration in the greenhouse. There are now some very good varieties, amongst which mention may be made of Feu d'Or, Reve d'Or, and Golden Gem (yellow), Chieftain (pale yellow, dark purple centre), Duke of York (deep gold and very dwarf), Halleri, and Elegans (white). Cuttings may be rooted in a cool frame, and are best taken at three or four intervals, from July to the end of September: thus a succession of vigorous young plants are obtained. Grow in cool pit, potting on as required in loam with a little leaf-soil and sand added, and flower in 6in. pots, feeding occasionally with artificial, or else watering twice a week with liquid, manure, after having become pot-bound.

Attention must be paid to disbudding all the above, removing all but one on each shoot.



FIG. 459.—CHRYSANTHEMUM SINENSE, POMPONE VARIETY.

CINERARIAS.—These are showy and extremely useful plants (Fig. 460), but, like *Calceolarias*, are rather difficult to bring to perfection. Sow seed in pans filled with very light sandy soil, in May for winter, and in July for spring-flowering; place in a cool frame, shading well and keeping close till the seedlings are well up. Pot singly into 3in. pots, keeping in the frame, giving plenty of room, and continue to shift as required. In the middle of September remove to the cool pit, transferring



FIG. 460.—SINGLE-FLOWERED CINERARIA.

to the warm pit for a few days when the flowers begin to open. Great care must always be exercised with regard to shade, but as the plants get big this can gradually be lessened. Keep the plants themselves and the ground they stand on moist. In hot weather a gentle spraying with the syringe is advantageous morning and evening. During the primary and late periods of growth great care should be exercised when watering, it being most important at these periods that no water should be allowed to settle on the leaves; thus these should be raised sufficient to permit the passage

of the can's spout beneath them, and as they are very brittle this requires to be done as gently as possible. Use a light compost of fibrous loam, leaf-soil, and sand, and also feed with liquid manure when the plants are big, but not after the blossoms have begun to show. *Cinerarias* may also be raised from offsets, obtained by cutting off the flower-heads as soon as they have begun to fade, and top-dressing with light soil a week or two after. When large enough, the off-sets may be removed with

some roots attached, and potted in 3in. pots. Flower in 8in. pots. Green-fly is very troublesome, but can be kept under by frequent slight fumigations. The plants are also subject to the attacks of Red-spider, but only when sufficient moisture has not been kept about in hot, dry weather. *C. cruenta* (Fig. 461) is one of the original parents. It is much more robust than the garden hybrids, having tall, loose, and graceful panicles of flowers. A new race has recently been evolved by crossing this with the old hybrids. These are known as *C. kewensis*; they have much



FIG. 461.—CINERARIA CRUENTA.

the same habit as *cruenta*, but larger flowers, are very effective, and have a strong constitution. The colours of all the above are very varied and brilliant.

COSMOS BIPINNATUS is an annual which although often grown out of doors is worthy of a place in the greenhouse. Sow seed in March and grow on, flowering in 8in. pots in July and August. For soil use loam, leaf-soil, and sand. The flowers somewhat resemble a single Dahlia, and are of various colours. Height 3ft.

CUPHEA IGNEA is a pretty, compact little plant, with scarlet and black tubular flowers. Propagate by cuttings struck in warmth

in February or March, and grow in a cool pit to flower in summer. Height 1ft.

DATURAS.—The perennial species of these make handsome specimen plants for the centre bed, forming large bushes with tubular hanging flowers. They are very easily rooted from cuttings placed in a little bottom-heat, afterwards being grown on for a time in the warm pit to make large plants. When these have been formed, the young shoots should be cut back every autumn to within three or four eyes; they will break readily in

early spring, flowering in May. In summer it will be advantageous to thin out the young growths, which are very luxuriant. Grow in good loam and sand, and feed well. *D. Knightii*, *D. meteloides* (Fig. 462), *D. sanguinea*, and *D. suaveolens* are the best species. The first has large double white flowers, 3in.



FIG. 462.—*DATURA METELOIDES*.

long, very strongly scented. The second is white, the third scarlet, and the fourth white; flowers single. The heights vary according to conditions, but from 10ft. to 15ft. is easily attained in an ordinary greenhouse.

The annual species and their double forms may be raised from seed sown in March in a cool frame; they make very useful plants for the shelves when grown in 6in. pots. The most suitable are *D. cornucopia*, *D. fastuosa*, and *D. chloranthe*. *D. cornucopia*, double white flowers, marbled purple, and beautifully scented; *D. fastuosa*, white

and purple flowers; and *D. chloranthe* is yellow, with scented trumpet-shaped flowers. Heights of all from 18in. to 2ft.

DIPLACUS.—The hybrids of *D. glutinosus* make very pretty pot-plants. Propagate by cuttings in early spring, and grow in the cool pit in loam, leaf-soil, and sand, giving plenty of moisture. The blossoms greatly resemble *Mimulus* (Musk), to which they are allied, and vary in shades of red and yellow. Height 2½ft.

EUPATORIUM.—*E. odoratum* and *E. riparium* are most useful plants, lasting in flower during the whole summer. The first is tall, and suitable for the centre bed, the second is dwarf and useful for the shelves. Grow in the cool pit in loam, leaf-soil, and sand. *E. ianthinum* is dwarf and shrubby, and requires to be grown in the warm pit in loam, peat, and sand. Propagate by division in spring or by cuttings struck in the warm pit in February and March. *E. odoratum* has pale pink and *E. riparium* white flowers, which are small, being borne on longish stems in good-sized panicles. Height $2\frac{1}{2}$ ft. to 3ft. *E. ianthinum* is blue, and greatly resembles an *Ageratum*.

HELIOTROPES are valuable as greenhouse plants for their beautiful fragrance, and also for the colours of their flowers; they can be grown either as trailing plants in 6in. pots, in hanging-baskets, or as large plants in 8in. and 10in. pots, as standards or trained on balloons. Propagate by cuttings in the warm pit in autumn, and grow in loam, leaf-soil, rotted manure, and sand. Stop two or three times, unless required as standards, when they should not be stopped, but have all the side-shoots pinched out till the required height has been reached. The best varieties are Miss Nightingale, Roi des Noirs, White Lady, and Princess de Sagan.

HUMEA ELEGANS is a biennial, and has a most striking effect, with its graceful pendulous racemes of red flowers on stems 4ft. high; it also has a delightful scent. Raise from seed sown in February in the warm pit. Grow on and place in the cool frame in summer, giving frequent shifts. Remove into the cool pit for the winter, and give a final shift into 10in. pots in March. Grow in a light soil composed of loam, leaf-soil, and sand. Give particular attention to watering, it being most important not to overdo it. The slightest mistake in this respect will prove fatal, therefore it is better to keep rather on the dry side.

PELARGONIUMS.—There are four classes of these: (1) Show, (2) Zonal, (3) Ivy-leaved, and (4) Sweet-scented. All are so well known that it is unnecessary to emphasise their value.

(1) *Show Pelargoniums* blossom in spring and early summer. Propagate by cuttings obtained from old cut-back plants in August, and strike in the warm pit. They are best placed two together in a 3in. pot, using plenty of sand. Afterwards grow in the cool pit in rich loam, leaf-soil, and silver-sand, adding rotten dung or artificial manure. Grow as cool as possible, and feed well in spring and summer. After blossoming place them outdoors in full sun to ripen off, giving a little water at first, and gradually withholding it altogether. After thoroughly drying for about a fortnight, cut back and syringe overhead, when they will begin to break. During this time, and also whilst drying, they should be laid on their sides if the weather is wet. After

the shoots are about 1 in. long, turn out of the pots, shake all the old soil away, and repot, into small pots at first, then gradually pot on as required, growing in the cool pit. There are many excellent varieties which may be seen described in any florist's catalogue, but the following may be mentioned: Fortitude, Hector, Illuminator, Magician, Delicatum, Indian Chief, Vivandière, Goldmine, Edward Perkins, Venus, and Volante Nationale.



FIG. 463.—PELARGONIUM INQUINANS.

(2) *Zonal Pelargoniums* are always valuable for winter blossoms, but to obtain plants for that purpose they require special treatment. Take cuttings early in autumn; after they are rooted pot singly into 3 in. pots, and keep through the winter in the cool pit, placing them near the glass. In the spring shift into 4 in. pots, and later into 6 in. pots, stopping several times to make the plants a good shape. Continually nip off all the blossom trusses directly they appear up till the middle of September. Grow in the open during summer, shifting into the cool pit in September, and afterwards placing them in the warm pit to open the blossoms. Use a rich compost, and also feed well when, after the last shift, the pots have become full of roots; by this means a better supply of blossom is obtained than by potting into large pots. Among the best sorts for winter flowering are—Singles: Flamingo, Lord Rosebery, Henry Jacoby, Blue Peter, Meteor, Mrs. Daniels, Beauty of Kent, and Albion. Doubles: Raspail Improved, Aglaïæ, Nydia, and Swanley Double White.

(3) *Ivy-leaved Pelargoniums* are good either for hanging baskets or for pots when trained on stakes. For winter blossom

take cuttings in early summer and grow like Zonals. They are also useful for training over pillars or on the roof of the greenhouse; when so utilised they should be cut back at the end of every year. Sorts: *Souvenir de Charles Turner*, *Madame Crousse*, *Jeanne d'Arc*, *Abel Carrière*, and *Albert Crousse*.

(4) *Sweet-scented Leaved Pelargoniums*.—These are grown chiefly for the delightful scent of their leaves, but they also flower freely. They are best treated as large trained plants, and flower during the summer. Cut back, shake out old soil, and repot in autumn, and then grow same as the show varieties. Sorts: *P. quercifolium* (Oak-leaved), *P. odoratissimum lobatum*, *P. denticulatum* Shottentham Pet, and *P. capitatum*.

With regard to these plants, it is very interesting to note the insignificance of their first parents, and how they have been evolved and gradually improved during comparatively recent years, until their present state of perfection has been reached. They admirably illustrate the progress of the gardener's art, showing what can be done by hybridisation, cross-fertilisation, care, patience, perseverance, and intelligent selection.

The Zonals of to-day were obtained originally from the small and insignificant *P. inquinans* (Fig. 463), which is really a shrub with scarlet flowers, and the species *P. zonale* (Fig. 464), also scarlet. The Ivy-leaved section were obtained from *P. peltatum* (with tuberous roots, and, as the name implies, peltate-leaves) and Zonal varieties, thus obtaining the leaf and habit of the one and the flowers of the other; while the beautiful Show varieties were obtained from *P. grandiflorum*, a shrubby species with red and white flowers.



FIG. 464.—PELARGONIUM ZONALE.

PETUNIAS.—The double varieties of these (Fig. 465) are fine and effective, and can be propagated by either seed or cuttings. Sow seed in the warm pit in March, and grow in the cool pit or in a frame in light sandy loam. Save only the smallest seedlings, as they produce the best double flowers. Strike cuttings

in warmth in late autumn, and grow warm during winter. The shape of the blossoms, especially of the fringed varieties, is exquisite, and the variation of colour very brilliant and beautiful. Height $1\frac{1}{2}$ ft. to 2 ft.

PICOTEES.—See Carnations and Picotees.

PRIMULAS.—There are many species of these beautiful plants suitable for the greenhouse, the single and double forms of *P. sinensis* (Fig. 466) being most grown. The singles can be raised from seed sown in spring for winter, and in autumn for spring blossoming. Sow in the warm pit and grow the latter in the same, but those for winter-flowering should be grown in a frame during summer. The doubles are



FIG. 465.—DOUBLE GARDEN PETUNIA.



FIG. 466.—PRIMULA SINENSIS.

best propagated by using cocoa-nut fibre and sand mixed in equal quantities, and banking up round the old plants in March or April, when they are going off blossom. By that time several crowns will have been formed, which will root into the mixture. Grow in loam, peat, and sand in the warm pit. Be careful not to over water, and give weak liquid manure once or twice a week during summer. Double Primulas are very liable to damp off during

The doubles are best propagated by using cocoa-nut fibre and sand mixed in equal quantities, and banking up round the old plants in March or April, when they are going off blossom. By that time several crowns will have been formed, which will root into the mixture. Grow in loam, peat, and sand in the warm pit. Be careful not to over water,

winter, and any decay must be removed directly it appears. They are very useful for winter blossom. The colours range from white, pale pink, rose, and crimson, to blue. Height 8 in.

P. obconica, *P. cortusoides*, *P. floribunda*, *P. verticillata*, and *P. japonica* are fine species for spring flowering. They may all be grown in the cool pit during winter, and in frames during summer. Raise from seed sown in spring, or from divisions in the summer after flowering. *P. obconica* is poisonous to some people, causing a painful rash wherever it touches, and, therefore, it requires careful handling. The blossoms of *P. obconica* are white, pale blue, and rose; *P. cortusoides*, varies; *P. floribunda* and *P. verticillata*, yellow; and *P. japonica*, varies. Height 6 in.

REINWARDTIA (*Linum*) TRIGYNUM is a very pretty perennial, having bright yellow flowers. Propagate by cuttings of the strongest points of the old plants in April or May; strike in the warm pit, and grow in a frame during summer, giving plenty of sun. Pinch several times, and grow in loam, peat, and sand. Remove to the cool pit in autumn, and place in the warm pit to open the flowers in winter. Height 2 ft.

RIVINA HUMILIS is a most interesting plant, on account of its bearing racemes of beautiful red berries, resembling currants, but the flowers are of no account. Propagate either by seeds sown in February or by cuttings taken in summer and struck in the warm pit. Grow in the warm pit in loam, leaf-soil, and sand, and pot on till 8 in. pots are reached. Grow as standards, having a stem $2\frac{1}{2}$ ft. long, and pinch off all laterals. The plants require staking, and the shoots forming the head to be trained.

SALVIAS.—There are many species of these very useful for the greenhouse, blossoming in autumn and winter. Propagate by division in spring or by cuttings either in autumn or in spring. Strike in gentle bottom-heat, growing in the cool pit, and outside in summer up till late autumn, when take them in, and place in the warm pit to open the flowers. After flowering, cut the plants back, keep in a cool frame, and start again in spring. Grow in light, rich soil, and flower in 10 in. pots. Sorts: *S. coccinea*, *S. fulgens*, *S. rutilans*, *S. splendens*, *S. purpurea*, and *S. involucreta*. *S. coccinea*, *S. fulgens*, *S. rutilans*, and *S. splendens* have scarlet, *S. purpurea* purple, and *S. involucreta* red blossoms, which are borne on long spikes; they are labiate or lipped, resembling in shape the Dead Nettle, and are very effective. Height $2\frac{1}{2}$ ft.

SCHIZANTHUS PINNATUS is a beautiful annual, and may be had in flower all through the summer and well into the autumn by sowing in succession from March. Seeds sown in autumn will

also furnish flowers in early spring. Grow in the cool pit or frame in rich fibrous loam and sand. Those that are to be grown through the winter should be kept in small pots and have a place near the glass, potting them before coming into blossom in spring. The blossoms, which are purple and white, having fringed petals, make a most pleasing effect resembling a purple ground covered with white muslin. Height 2ft.

SPARMANNIA AFRICANA (Fig. 467) makes a fine specimen plant, suitable either for large pots or for planting out. Propagate by cuttings of young shoots in spring, and grow on, stopping

several times to form good plants. Use rich loam and sand, and feed in summer with liquid or artificial manure. Blossoms white, with yellow centre, small, borne in clusters. The foliage is also very elegant. Height varies, according to conditions, from 4ft. to 10ft.



FIG. 467.—SPARMANNIA AFRICANA.

Sorts: *S. anisophyllus*, *S. isophyllus*, and *S. Wallichii*. Blossoms blue. Height 2ft.

TRACHELIUM CÆRULEUM makes a handsome pot-plant for autumn flowering, having loose feathery panicles of blue flowers. Propagate by seeds sown in warmth in March, and by cuttings in autumn, and grow in loam, leaf-soil, and sand in a cool frame.

Hard-wooded Flowering Plants.

Under this heading are included those plants which have hard woody stems, and do not die down after having completed a season's growth, but form shrubs. Many are most useful and

STATICE.—There are several species of this genus suitable for the greenhouse, having either white or purple flowers. Propagate by division or seeds in early spring, and grow in the cool pit. For soil use loam, peat, and sand. Sorts: *S. Halfordii*, *S. imbricata*, and *S. profusa*.

STROBILANTHES are perennials useful for summer flowering. Propagate by cuttings in summer in bottom, heat, and grow in the warm pit in loam, peat, and sand.

ornamental, especially during the early spring, but many others are also rather difficult to grow, and more especially to propagate, requiring expert cultivation and special accommodation. This is very marked in the case of Azaleas and Heaths. When such is the case it is the best plan for the cultivator who has neither the means nor the time to spend over them to purchase well-established plants from people who make a speciality of their cultivation, for although young plants are difficult to raise, an established specimen may be grown successfully for many years with proper care and attention.

These shrubs are either deciduous or evergreen. The deciduous kinds require to be pruned after the leaves have fallen in most cases, and it is generally necessary to pinch and thin out the young shoots whilst growing. The evergreen kinds require to be pruned just after the flowering period. This usually consists simply in shortening back long growths and thinning the weak and very sappy wood; careful note should be taken of this, for weak shoots, if left, will not flower, but only hinder the development of stronger growths, whilst coarse, sappy growths will run away, taking the nourishment from the rest of the plant. Only firm and well-ripened shoots should be allowed to remain.

All hard-wooded plants have distinct resting and growing periods, during which they require either very little or an abundant supply of water. It is through not paying enough attention to these facts that many are ruined. With a few exceptions they must not be dried off: even when at rest, although very little water is required, the soil should be kept moist.

When potting, the soil should be rammed firmly, leaving at least half an inch for water on the top. Also give special attention to drainage, for after a plant has reached the flowering size it will not require shifting oftener than once a year, and large specimens in pots or tubs are seldom shifted at all, but have to be content with a top-dressing of fresh soil. When this is done it is necessary to remove as much of the surface-soil as possible without injury to the roots, and excepting in the case of those requiring peat, it is best to use richer soil for this purpose than in the case of plants that are repotted. After either repotting or top-dressing sprinkle the soil with clean silver-sand, which will help to keep the surface clean.

During the growing period a good syringing overhead on all bright days is beneficial, and also helps to keep down insects. In the case of evergreens, when the resting period occurs in summer, this should also be done morning and evening. All hard-wooded plants like plenty of ventilation, excepting in some cases just at the time when fresh growth is being made.

Many kinds that are difficult to root from cuttings may be successfully layered, and this should be done in small pots.

Many are also grafted on stocks of the same or an allied genus, *e.g.*, Azaleas and Rhododendrons.

Never on any account allow plants that are potted in peat to become dry, for if this happens no amount of watering will ever get the soil into a proper state again. The best plan in such cases is to immerse the plant in water for several hours.

Insect pests, although quite as troublesome, are more easily got rid of than in the case of soft-wooded plants, as the hard-

wooded species are better able to withstand the effects of either fumigation or insecticides, excepting whilst young growth is being made.

During the period of ripening their wood these plants should have plenty of air and sunshine, only shading on the very hottest days, when the foliage is liable to be scorched; and many kinds are best stood outside altogether in the full sun. In nearly all cases repotting is best done just at the time when the plants are starting into growth after having been at rest, and it is generally advisable not to give big shifts, but to use pots only one size larger. When this



FIG. 468.—ABELIA SPATHULATA.

is done, care must be exercised in removing the drainage and reducing the old ball so as to avoid injury to the roots. Also, in potting, all the space round the old ball must be filled in.

Very often when this operation is carelessly performed spaces are left. To avoid this a thin piece of wood that can be pushed down between the ball and the outside of the pot should be used.

In propagating from cuttings many are best rooted in the cool pit, and when this is done they should be placed either in a proper propagating-frame or under bell-glasses. The heights vary considerably, where not otherwise stated, when grown under various conditions, *i.e.*, planted out, or in large or small pots.

ABELIAS.—These are pretty shrubs, having pink and white flowers; they are best grown in the cool pit during winter and outside during summer. Propagate by cuttings or layers in summer or spring.

Sorts: *A. floribunda* and *A. spathulata* (Fig. 468), flowering in spring, and *A. rupestris* and *A. triflora* in autumn.

ACACIAS.—These are without doubt among the most useful classes of plants for the greenhouse, and yet are very seldom met with. They blossom during early spring, bearing small yellow flowers, which in some species are sweet-scented, whilst the foliage of many is also very graceful. Propagate by cuttings of young firm shoots in August

in bottom-heat; they can also be raised from seed sown in February or March, previously soaking in warm water. Grow in loam, leaf-soil, and sand, stand outside during summer, and give plenty of water. Many will make large specimens, and can be planted out. Most of the species come from Australia, being known as Mimosa, or Wattles. The best are *A. argyrophylla*, *A. armata*, *A. cochlearis* (sweet-scented), *A. dealbata*, *A. falcata*, *A. longifolia floribunda*, *A. pulchella grandis*, *A. Riceana* (Fig. 469), and *A. verticillata*. All the above have yellow blossoms.

ACROPHYLLUM VENOSUM is a small shrub, with pink and white flowers. Propagate by cuttings in July in the warm pit, and grow in peat and sand in the cool pit. Flowers in May and June.

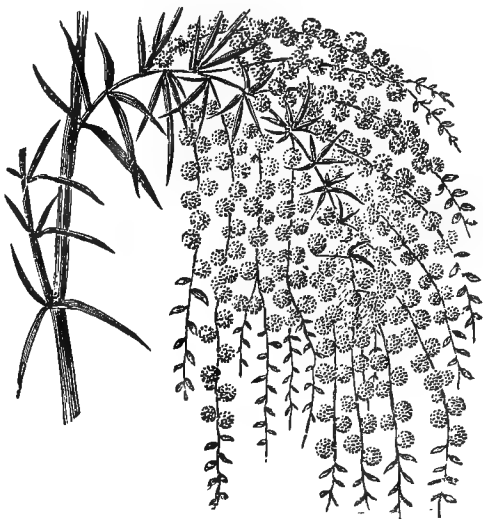


FIG. 469.—ACACIA RICEANA.

ADENANDRAS are dwarf plants from the Cape, and are very showy. Propagate by cuttings taken from the young tops, and root in the cool pit. Grow in peat, sand, and loam. Cut back and keep warm after flowering for a time. Flowering period, May and June. Sorts: *A. fragrans* and *A. umbellatus speciosa*. Blossoms pink.

AOTUS.—A genus of extremely pretty little plants, which are easily propagated by cuttings of partially ripened wood in April or May in the cool pit. Grow in light sandy loam with a little peat added. *A. gracillima* has a procumbent habit, and is suited for hanging-baskets, the long, slender shoots, covered with red and yellow flowers, being very effective. *A. villosa* has a more erect habit and yellow flowers. Flowering period, April and May. The blossoms are pea-shaped, and very much resemble those of Genista.

AZALEAS are well-known and justly-prized plants, but require great care. They are now botanically classed as Rhododendrons, but as they are best known by their old



FIG. 470.—AZALEA INDICA.

name it is kept up here.

A. indica (Fig. 470) is the chief parent of the ever-green hybrids. These present considerable

difficulty in their propagation, which can be effected either by cuttings of the young tops struck in a mixture of half sand and peat, or, which is the better way, by grafting on seedlings or cuttings of *A. i. alba*, or some other strong-growing variety. This method is employed

on the Continent, where so many are raised. It should be done in early spring, and the grafted plants placed in a close frame with gentle heat. Grow in peat and sand, with the addition of a little loam. After flowering, and whilst they are growing, keep warm

and syringe freely. As they begin to complete their growth, gradually give more air and sunlight, finally, during August and September, placing outside in the full sun and continuing to syringe. Keep in the cool pit during winter, removing to a warm one to open the flowers. Water may be given freely during hot, dry weather in summer, but must be administered with care at other times, especially during winter. The plants may be had in flower from March to June, but if wanted earlier forcing will be necessary.

A. Mollis and its hybrids are also very useful for early spring; they are quite hardy, but are at their best when cultivated in pots for the greenhouse. Grow outside in sand and peat during summer and winter, removing to the cool pit in February, but give protection during very severe weather. Propagate by layers in spring after flowering.

BANKSIAS are an interesting and peculiar group of plants, seldom met with now, chiefly on account of their slow growth, but they were largely grown at one time. They bear handsome flowers, which produce rather quaint cones, and the foliage is also ornamental. Banksias do not strike well, and are best raised from seed sown in spring in the warm pit. They can also be layered, which should be done about May. Grow in loam and sand. They make fine specimen plants, and do not like frequent potting. Sorts: *B. Baueri*, red; *B. attenuata*, yellow; *B. ericifolia*, yellow; *B. coccinea*, scarlet; and *B. grandis*, yellow.



FIG. 471.—BORONIA MEGASTIGMA.

BORONIAS are most beautiful little plants, bearing pink, purple, and white flowers. Some of the species have a most

pleasant and very powerful perfume, two or three being sufficient to scent the whole house. Grow in peat, loam, and sand. After flowering, cut back the tops of all the shoots, and place in the cool pit. Propagate by cuttings of the young, half-ripened shoots in June, strike in the cool pit or with very slight bottom-heat, grow in the cool pit during summer and winter, and place in the warm pit in early spring. Flowering period, May and June. Sorts: *B. megastigma* (very sweet scented) (Fig. 471), *B. pinnata*, *B. serrulata* (scented), *B. tetrandra*, and *B. heterophylla*.

BOUvardias are very useful and well-known plants for autumn and early winter blossoms. Propagate by cuttings taken from old



FIG. 472.—BOUvardia ALFRED NEUNER.

cut-back plants in March; pot on as they grow till July, pinching back several times, and growing in the warm pit; then transfer to a cool frame, giving plenty of light and air; bring into the cool pit in September, placing in the warm pit as the flowers begin to open. They may also be grown successfully from cuttings planted out in frames during the summer, and potted up in the autumn. After flowering dry off, and cut back before starting again in February; only syringe overhead at first till they have well broken, then shake out the old soil and repot. Soil: Light, fibrous loam, leaf-soil, sand, with rotten manure or

bone-meal. The plants also benefit by a little manure-water when in the flowering pots. Sorts: Alfred Neuner (Fig. 472), Dazzler, Elegans, Hogarth, Hogarth flore-pleno, President Cleveland, Priory Beauty, Humboldtii *Corymbiflora*, Vreelandi, and Vulcan.

BURTONIAS are small shrubs resembling Heaths, and having bright-coloured flowers. Propagate by cuttings of the young shoots in June. Soil: peat, loam, sand, and charcoal. Flowering period, June and July. Sorts: *B. scabra* and, *B. villosa*.

CAMELIAS are amongst the most ornamental and useful plants that we have for the greenhouse, and they can be grown either as moderate-sized plants or as large specimens. The flowers are either double or single, but the first are the better known. Grow in peat and sand, with the addition of a little loam; after flowering, keep warm whilst growth is being made, and use the syringe liberally. Place outside towards the end of summer to ripen. Keep cool during winter, and be very careful with water at this period, not



FIG. 473.—CAMELLIA JAPONICA.

allowing the plants to become either dry or very wet; carelessness in this respect will cause the buds to drop. Also keep a moist atmosphere, and it is best to dishud just before the flower-buds begin to swell. Propagate singles by cuttings of the young wood in June and July, in a cool frame. The doubles are best grafted or inarched on these; graft at any time during winter in the warm pit, and continue to grow in the same for a time after union has taken place. Inarching should

be done in early spring, when growth is commencing. There are many good hybrids, and the following are a few of the best, the colours ranging from white, pink, and red to scarlet: *Alba Plena*, *Fimbriata*, *Delicata*, *C. H. Hovey*, *Jubilee*, and *Imbricata*. *C. reticulata* and *C. japonica* (Fig. 473) are singles, the last being the chief parent of the hybrids and best for stocks.

CHOISYA TERNATA makes a handsome pot-plant, having white flowers. Propagate by cuttings of ripened wood in July, in slight bottom-heat, and grow in the cool pit. Soil: loam, peat, and sand. Flowers (white) in May and June. Height 3ft. to 4ft. in the case of full-grown plants.

CHORIZEMAS are useful, giving flowers throughout spring and early summer. They have rather a straggly growth, and it is necessary to cut back all the strongest shoots after flowering. Propagate by cuttings of side-shoots in May or June in the cool pit. Grow in peat, loam, and sand. Sorts: *C. cordatum*, *C. Henchmanni*, *C. Lawrenceianum*, and *C. varium*: Colours, orange-red and scarlet. Height 2ft. to 3ft.

CITRUS AURANTIUM is the well-known Orange. There are many varieties, but all require the same treatment. Propagate

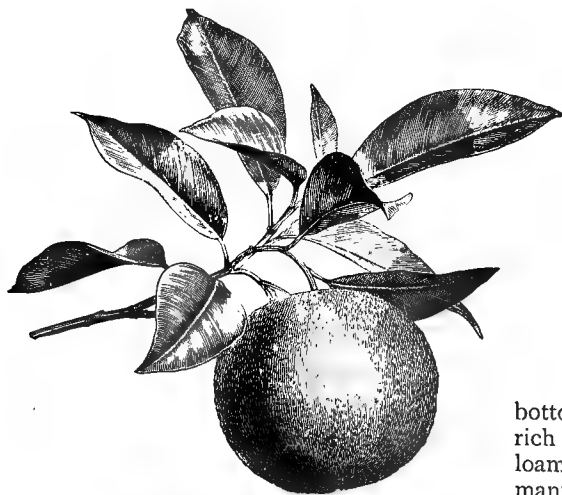


FIG. 474.—*CITRUS AURANTIUM*.

by cuttings of young shoots at any time after growth is finished, placing in strong bottom-heat. Grafting is also largely practised, and for this purpose seedlings are raised, the seed being sown in spring—January or February is the best time. The grafted plant should be placed in strong bottom-heat. Grow in a rich compost of fibrous loam, leaf-soil, dry cow-manure, and sand; using all the materials in a coarse state, and adding lumps of charcoal to keep

the soil open and sweet. Whilst growing give liquid manure twice a week. Grow cool in winter and warm in spring. The plants may be placed outside in August and September if not grown for fruit (to obtain this properly they require special treatment,

and not to be grown as greenhouse-plants). The flowers are borne in summer. Sorts: *C. Aurantium* (Sweet Orange) (Fig. 474), *C. Bigaradia* (Seville Orange), *C. decumana* (Shaddock), *C. Limonum* (Lemon), *C. Limetta* (Lime), and *C. medica* (Citron) (Fig. 475).

CLETHRA ARBorea is known as the Lily of the Valley Tree, having white flowers somewhat resembling those of that plant. Propagate by cuttings of the young wood in April or May, and grow cool. It makes a fine specimen plant, and flowers in August and September.

COLEONEMA PULCHRUM is a pretty shrub, bearing red flowers in May. Propagate from cuttings of the young shoots in June and July. Grow in peat, loam, and sand, in the cool pit. The shrub attains a height of between 4ft. and 5ft.



FIG. 475.—*CITRUS MEDICA*.

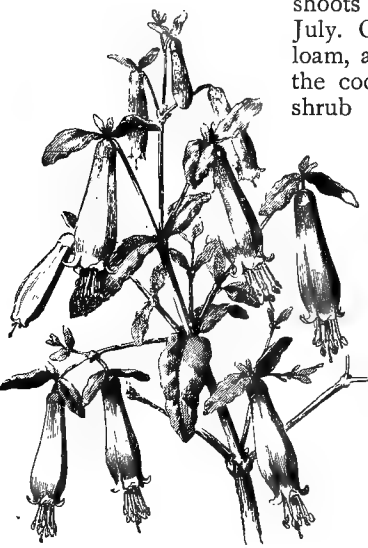


FIG. 476.—*CORREA CARDINALIS*.

CORONILLA GLAUCA is a small-growing plant, having yellow fragrant flowers. Propagate by cuttings (which root freely) in early summer, in the cool pit, growing in the same house, and placing outside towards the end of summer. Soil: loam, leaf-soil, and sand. Flowers in June and July. There is also a yellow variegated form.

CORREAS are useful for summer (June) flowering. Propagate by cuttings in bottom-heat in April and May. Some sorts do not

strike easy, and are best grafted on the common and more robust *C. alba*. Grow in peat, loam, and sand in warm pit in spring, transferring to the cool one later. Sorts: *C. cardinalis* (Fig. 476), *C. Harrisii*, and *C. magnifica*.

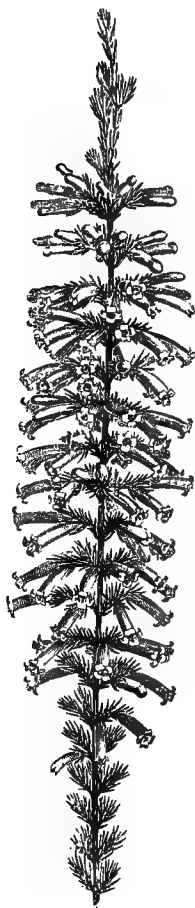


FIG. 477.—ERICA
HYBRIDA.

DAPHNE INDICA is a most desirable plant for the greenhouse, not only on account of its beautiful flowers, but also for the delicious perfume which they give off, and for its free-flowering qualities. It is good either for pots or for planting out, especially if grafted. Propagate by cuttings of half-ripened wood in summer, or graft on *D. Mezereum* (a wild European species) in March in the warm pit. Grow in fibrous peat, loam, and a little sand in the cool pit. Very often Daphnes are found not to succeed well in certain localities, and this is supposed to be due to the water. It is best to use only rain-water, and this must be given with great caution after the growing season. Grafted plants will flower more freely when young, and are more robust than those on their own roots, but do not last so long. Sorts: *D. i. alba* and *D. i. rubra*. The flowers are small, wax-like, and borne in clusters surrounded by a whorl of glossy deep green leaves.

EPACRISES are most useful and very showy plants for winter and early spring blossoming, having long drooping racemes of tubular, wax-like flowers. Propagate by cuttings of the young shoots in May or June in the cool pit. Grow in rather roughly-broken peat and sand, and when large add a little loam. The erect bushy kinds should be cut back after flowering about April, keeping warm, repotting after they have well started, and later transferring to the cool pit. The young shoots should have the points pinched out soon after starting. During August and September place the plants outdoors, and winter in the cool pit. These flower during winter and early spring. The looser and more drooping kinds must not be so pruned, but must only have the longest shoots shortened directly the

flowers begin to fade. These do not flower so early. Sorts.—Erect: *Hyacinthiflora*, *Candidissima*, *Carminata*, *Rosea Elegans*, and *Vesuvius*. Drooping: *Devoniana*, *Rubra Superba*, *Miniata*,

and *Miniata Splendens*. Colours: variations of white, rose, and red. Height $1\frac{1}{2}$ ft. to 2ft.

ERICAS (Heaths) are a very well-known and justly-prized class of plants; they may be had in blossom from October till midsummer. Most of the species come from the Cape, but they are most difficult plants to grow, and can only be successfully managed when provided with a house to themselves, where they can receive special attention. Still, with judicious treatment, many may be grown with a fair share of success along with other plants.

Propagate by cuttings of young shoots in spring or early summer in the cool pit, using plenty of sand in the soil, and having a layer half an inch thick on top. Grow in the cool pit or a close frame, and pot in thumb pots at first. Soil: fibrous peat, well broken or chopped, and silver-sand, with plenty of drainage. Pot very firmly and water very carefully. When growing they may have plenty, provided the drainage is good. Never allow them to suffer from want at any time. After flowering some of the free-growing sorts may be pruned a little; the others should only have just the points of the longest shoots taken out. Grow cool, and give as much air as possible all through the year, only using sufficient heat to keep out frost, or a little in very damp weather. Only shade when the sun is very strong, and from July to the end of September grow outside in full sun; it is better, when this is done, to plunge the pots in ashes, to prevent the plants from getting too dry.

The most useful sorts are: *E. Cavendishiana*, *E. gracilis vernalis*, *E. hybrida* (Fig. 477), *E. hyemalis*, *E. Lambertiana*, *E. McNabiana*, *E. gracilis*, *E. autumnalis*, *E. ventricosa*, *E. coccinea*, vars. *minor* and *superba*, *E. verticillata*, *E. persoluta alba* (Fig. 478), and *E. Wilmoreana*. Large plants may be grown for years in the same pots. Colours range through white, yellow, pink, red, and purple. Height 1ft. to $2\frac{1}{2}$ ft.



FIG. 478.—ERICA
PERSOLUTA ALBA.

EUTAXIAS are useful shrubs, flowering in June and July. Propagate by cuttings of partially-ripened shoots in May. Grow in

the cool pit in peat, loam, and sand. Sorts: *E. myrtifolia* and *E. pungens*. Colour orange. Height 1½ft.

FUCHSIAS are most graceful and ornamental plants for greenhouse decoration during summer. Cuttings may be struck either in March, from freshly-started plants, or in summer from growing plants. Grow in loam, leaf-soil, rotten manure, and sand. After flowering, in early autumn, place out of doors in the full sun. As soon as frost begins, take in, stow under the



FIG. 479.—FUCHSIA EARL OF BEACONSFIELD.

stages of the cool pit, and keep dry. In February cut hard back and start in the warm pit; shake out and repot after the plants have well started, pinch two or three times, and remove into the cool pit after good growth has been made. For pot work it is best not to keep plants longer than three years, but old ones do well planted out, and grown either as standards or trained on pillars. Sorts: General Roberts, Molesworth, Avalanche, Countess of Aberdeen, Eynesford Gem, President, and Earl of Beaconsfield (Fig. 479).

GARDENIAS have white beautifully scented flowers. Propagate by cuttings of half-ripened wood, in strong bottom-heat, in summer. Grow in peat, loam, and sand. After flowering, prune back and place in the warm pit, keeping close and moist; harden off in the cool pit, and keep there during winter, starting again in the warm pit. If desired they may be successfully forced and had in blossom in winter and early spring. Flowering period, April and May. The double form of *G. florida* is usually grown for the greenhouse.

HEATHS.—*See* Ericas.

HYDRANGEAS are useful for summer flowering. Propagate by cuttings of young shoots in March, in heat, and pot on into 6in. pots, growing in the warm pit. Give liquid manure until a good head is formed, when harden off the plants and place outside in the open. When frost sets in, remove to the cool pit, keeping rather dry till February, then move into the warm pit to start, shake out old soil, and repot. By this means fine handsome heads of flower are obtained on single stents. If large

bushy plants are required, after flowering ripen off in the open, cut back, and shift on again in spring after starting. Sorts: *H. hortensis*, *H. paniculata*, and Dr. J. Hogg. *H. hortensis* bears large flat heads of bright rose-coloured flowers; sometimes, when iron is present in the soil, the flowers become a beautiful blue. Dr. H. J. Hogg is an extra fine variety. *H. paniculata* is the plumed Hydrangea, bearing very large trusses of beautiful white flowers. Height 2ft.

LUCULIA GRATISSIMA (Fig. 480) is a magnificent shrub for planting out, and has a very beautiful odour. Propagate by cuttings of young, partially-ripened shoots in June and July in slight bottom-heat, and grow in peat, loam (using it rather rough when the plants are large), sand, and charcoal. The pink flowers are borne during winter.

MAGNOLIA FUSCATA is a dwarf evergreen shrub, the flowers of which, although rather insignificant in themselves, have a very powerful and pleasant perfume. It does best when planted out, but may be grown in a large pot. Propagate by layers in May after flowering, or by cuttings of ripened shoots in August, in a cool pit or frame. Grow in turfy loam, peat, and sand. Flowers in April and May.

MYRTUS (Myrtle).—These are pretty and easily-grown shrubs, having bright green leaves and fragrant white flowers. They do well either as small plants in pots or as large specimens in pots or planted out. Propagate by cuttings of partially-ripened wood in early summer, in a cool pit or frame, and grow in light loam, leaf-soil, and sand, with a little peat, in a cool pit, standing outdoors to ripen during August and the early part of September. The flowers are produced in May and June. Sorts: *M. communis* and varieties.

NERIUM OLEANDER (Fig. 481) is a handsome and well-known plant, commonly called Oleander. Propagate by cuttings of the



FIG. 480.—LUCULIA GRATISSIMA.

young shoots in spring in the warm pit; pot on, keep growing, and give plenty of water; these should flower the same season. Cut back a little after flowering so as to obtain bushy plants, and ripen in the open. Keep cool during the winter and place in



FIG. 481.—NERIUM OLEANDER.

the warm pit in early spring to start. Flowers in June and July. Soil: loam, leaf-soil, and rotten manure. Feed with liquid manure whilst growing. *N. Oleander* has red flowers, and its variety, *N. O. album*, white. Both do well and make handsome plants planted out. Height 4ft. to 5ft.

OLEANDER.—See Nerium.

PERIWINKLES.—See Vincas.

POLYGALA OPPOSITIFOLIA and varieties make good pot-plants. Propagate by cuttings of the side-shoots in summer, in a cool pit or frame, and grow in peat, loam, and sand. Cut back a little after flowering, grow on, and ripen in a cool frame. Flowers purple, borne in early summer.

RHODODENDRONS play a very important part in furnishing the greenhouse during late winter and early spring. There are two sections, (1) those coming from the Himalayas, China, and Japan; and (2) those coming from the Malay Archipelago, Java, and Borneo.

(1) *The Himalayan Section* all form large shrubs, and in some cases trees. They may be grown in large pots or tubs, but are best planted out in peat and sand. Give plenty of water, and syringe well when growing. Propagate either by layers in spring or by cuttings of young shoots in early summer, just as they are beginning to get firm at the base, and insert almost entirely in sand in the cool pit. Grow cool. Sorts: *R. arboreum* (Fig. 482), *R. barbatum*, *R. Gibsonii*, *R. Dalhousiæ*, *R. Manglesii*, *R. niveum*, *R. grande*, *R. Aucklandii*, *R. Jesterianum*, *R. ciliatum*, and *R. kewense*. These all bear large flowers in big trusses, somewhat resembling the hardy varieties of *R. ponticum*, as also in their habit. See illustration of *R. arboreum* (Fig. 482).

(2) *The Malayan Section* require to be grown warm, say in a winter temperature of from 50deg. to 60deg., and in a moist atmosphere; they make small shrubs, and are very suitable for 10in. pots. Propagate the same as the Himalayan species, and grow in peat and sand. They may be had in flower from early winter till late summer. After flowering continue to grow on in warmth, gradually hardening and ripening off. When growth is completed do not prune, but tie in the shoots to obtain a good shape. Sorts: *R. balsamina-florum*, *R. jasminiflorum*, *R. javanicum*, and *R. multicolor*, and of these there are many hybrids. These seldom attain a height of more than 2ft. The flowers are fleshy, having a waxy appearance, with long tubes, and are produced in lax open trusses.



FIG. 482.—RHODODENDRON ARBOREUM.

ROSES.—Although really hardy plants, no greenhouse would be complete without Tea Roses. These should be grafted on seedling Briar stocks in January, in heat. Continue to grow warm for a short time till after union has taken place, and later remove to the cool house, shift into 6in. pots, and later into 8in. or 10in. pots. Grow outside during the summer, and place in the cool pit in autumn. If it is desired to obtain them in blossom early, they must be placed in the warm pit and gently forced. If they are desired for summer blossom, continue to grow in the cool pit. Use a rich compost of yellow loam, dry cow-dung, leaf-soil, and sand. Prune carefully, but not hard, before growth commences. The best sorts for pots are: Catherine Mermet, Marie Van Houtte, Madame Lambard, Niphetos, Sappho, Souvenir de S. A. Prince, The Bride, and Waban.

TECOMA SMITHII and *T. capensis* are very handsome and free-flowering pot-plants for summer use. Propagate by cuttings of young, partially-ripened shoots in summer, in slight heat, and grow in a cool pit or frame in loam, leaf-soil, and sand. Ripen off outside after flowering, and keep cool in winter. These plants have long tubular flowers, borne at the ends of ripened shoots. *T. capensis* is bright orange, and *T. Smithii*, which is

a hybrid between *T. velutina* and *T. capensis*, has brilliant scarlet flowers. Height when grown in pots, 2½ft.

VINCAS (Periwinkles).—These make very pretty pot-plants, flowering in spring and early summer. Propagate by cuttings of partially ripened shoots in early summer, and grow in a warm pit in loam, sand, and leaf-soil. Sorts: *V. ocellata*, *V. rosea*, and *V. r. alba*.

Bulbous and Tuberous Flowering Plants.

These play an important part in keeping the greenhouse supplied with blossoms. Their name is legion, and it will only be possible in the limited space at our disposal to mention a very few of the best known and most useful species and varieties. For the most part they are easy of cultivation, and do not present the same difficulties as many of the subjects described in the foregoing groups.

All these plants have a marked resting period, during which time most of them should be kept quite dry, but it is most necessary that the drying should be done gradually, and that the bulbs should not be forced to ripen off before their time. After flowering is finished watering should be continued, and the



FIG. 483.—VARIOUS ACHIMENES.

plants allowed to complete their growth. When they show signs of dying naturally, the supply of water should be lessened, till at length they become quite dry; at the same time give full exposure to the sun. Many species benefit by being placed close to the glass and "baked."

It is an advantage to have a special shed constructed for the stowing away of these bulbs and tubers whilst resting. This shed should be well ventilated and be perfectly dry, having a concrete floor, and provided with sufficient heat to keep out frost

and dry up damp. If this is fitted with shelves the pots containing the tubers or bulbs may be placed on them and kept perfectly dry till starting time. For bulbs, &c., that are

taken out of the pots, trays having a bottom composed of strips of wood, with spaces in between, should be used, and these must be placed on blocks, so as to admit the free passage of air.

All the bulbs are propagated by offsets, which method is described in the Chapter "On Plant Propagation." All that is necessary is to save these, and grow them on; many may also be raised from seed. The tuberous-rooted plants are propagated by division or by cuttings.

ACHIMENES are tuberous-rooted. They have most beautiful flowers, which are very varied in colour (Fig. 483). Start tubers



FIG. 484.—BEGONIA MRS. PEREIRA.

in heat, placing them first in shallow pans in light soil; afterwards, when the shoots are about 2 in. long, place in pots, and grow on in the warm pit, giving plenty of manure. Use loam,

leaf-soil, and sand, and stand the plants near the glass to ripen off in autumn. Keep the tubers in their pots during winter, shaking out when required again for starting. The flowers are borne all the summer. There are many hybrids.

AGAPANTHUS UMBELLATUS is a well-known tuberous-rooted plant, and is very easy of cultivation. Propagate by division in spring, and grow in rich loam and sand. After the plants have attained a good size in large pots or tubs, do not shift, but feed with weak liquid manure during the growing period. Grow in the



FIG. 485.—*BEGONIA DIAMOND JUBILEE*.

cool pit, ripen off in the open in autumn (but do not allow to become dry), and place in a cool pit again for winter. Flowers all the summer.

AMARYLLIS.—See *Hippeastrums*.

ARUM LILY.—See *Richardia*.

BEGONIAS.—The tuberous-rooted species and varieties of these are extremely ornamental and useful for summer decoration. Raise from seed sown in February in a warm pit, pot on, and grow

in a light, rich compost of fibrous loam, leaf-soil, rotten manure, and sand. Pot lightly, keep in the warm pit near the glass till they have attained a good size, and then remove to the cool pit. After flowering, ripen and dry off outside in full sun. Later in the autumn shake out the roots and lay in trays of sand in a frost-proof shed till required for starting again in February. This should be done by placing in trays of leaf-soil and sand in gentle heat, and potting up after they have started.

There are now a great number of splendid hybrids of many colours and shades—of red, crimson, rose, white, and yellow. The following may receive mention: Double—Daphne, Khartoum, The Geisha, Mrs. Pereira (Fig. 484), The Sirdar, Beatrice, Charlotte Brontë, Diamond Jubilee (Fig. 485), Ivanhoe, and Queen Victoria; single—Ruby, Kitchener, Akbar, Bayard, Falstaff, Poetess, and Rider Haggard.

BRUNSVIGIAS are useful bulbs, very much resembling the Hippeastrums. Grow in loam, peat, sand, and charcoal, starting in February, and continue to grow on after flowering (in July) in the cool pit during summer; dry off in autumn, and store in their pots during winter. Propagate by offsets. Sorts: *B. grandiflora*, *B. Josephinæ* and var. *minor*, and *B. radula*.

CANNAS are most elegant plants, rivalling the orchids in the richness of their colours and the shape of their flowers, borne in July and August. Propagate by seed sown in the warm pit in February, and by divisions just after starting in March. Grow in the warm pit in fibrous loam, leaf-soil, rotten manure, and sand. Ripen off in a frame in autumn, and store in their pots in the shed. There are many hybrids, the best being those raised by Messrs.

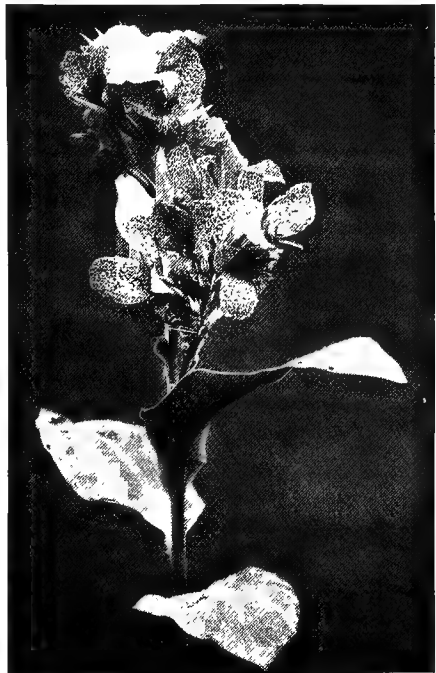


FIG. 486.—CANNA FLORENCE VAUGHAN.

Crozy. The following may be mentioned: Italia, Austria, Aurore, Alphonse Bouvier, Baron de Hirsch, Jules Chrétien, Mme. Crozy,

Florence Vaughan (Fig. 486), and Konigen Charlotte. The foliage is also very handsome, being sometimes a bright glossy green, and in other cases a deep purple. The leaves are large and broad, clasping the flower-stem, which rises from the centre. Height $2\frac{1}{2}$ ft.

CLIVIA.—See *Imantophyllum*.

CRINUMS are very handsome bulbous plants, and make fine specimens. When well established in large pots, do not shift, but top-dress, look to the drainage, and feed well. Grow in rich loam, leaf-soil, and sand. Start in warmth in February, and grow warm, removing to the cool pit later. Ripen off outdoors



FIG. 487.—CYCLAMEN PERSICUM.

in autumn, and store in their pots. Propagate by offsets. Sorts: *C. longiflorum*, *C. capense*, and *C. Moorei*. The flowers, which are of good size with a wide mouth, are borne several together on long fleshy stalks.

CYCLAMEN.—The splendid Cyclamens that are so much grown for the greenhouse are all hybrids from *C. persicum* (Fig. 487). Raise from seed; and it is best to do this at two different periods, so as to have batches for blossoming either in autumn or in winter. These young plants should flower at

eighteen months after sowing. Do not keep them more than three years, as young ones give the best results.

To flower the plants in autumn and winter sow in June in pans, and place in the warm pit; prick off, and when the roots are the size of Peas, shift singly into 3in. pots. Always allow plenty of room between each plant, and keep them near the glass during the whole period of growth. Pot so that the corms are only half buried, and keep the material on which they stand constantly moist. Give air whenever it can be managed without lowering the temperature. In the following May or June shift into 6in. pots, and give more air; also syringe gently overhead. In



FIG. 488.—*FREESIA REFRACTA ALBA*.

September remove to the cool pit and give plenty of air. After blossoming, place again in the cool pit, and in spring shift to a cold frame to rest; there they may be shaded, and must never be allowed to become quite dry. Start again in July, and after a little growth has been made shift into pots a size larger. Treat the same as before, but admit more air.

For flowering in spring, sow in November, prick off, and place in a cool pit. Keep in pans through the winter, and pot in summer. Grow in frames, but near the glass during summer, and in the cool pit during winter, shifting to the warm pit in February to open the flowers. Rest in a shaded frame, and start again in October. For soil use light fibrous loam, leaf-mould, and sand.

FREESIA REFRACTA, and its variety *alba* (Fig. 488), are extremely pretty and very sweet-scented, bulbous plants. Propagate by offsets. Pot up in August in 6in. pots, putting about a dozen corms in each. Grow in the cold frames during winter, protecting enough to keep out frost. From November onwards take in batches to flower in succession, placing first in the cool pit, and later in the warm pit to flower; also feed a little at this time and attend to staking. After flowering, ripen off gradually, and continue to keep in pots when dry in the cool pit near the glass, shaking out and re-potting in August. Soil: loam, leaf-soil, dry cow-manure, and sand.



FIG. 489.—GLADIOLUS NANUS DELICATISSIMA.

GLADIOLUS are very beautiful and attractive bulbous plants. Although most of the species are used for outdoor decoration, there are still several well worth growing for the greenhouse, especially the early-flowering varieties, which make a fine show during April and May. Foremost amongst these are *G. Colvillei*, bright red; *G. C. alba*, white; and that beautiful variety called

The Bride, which is so much grown. This is dwarf, of very neat habit, and produces compact spikes of the purest white flowers.

G. cardinalis has bright orange flowers, with white spots; *G. byzantinus* is very showy, with red and purple flowers, and there are some fine hybrids; *G. blandus* has flesh-coloured flowers; *G. alatus*, scarlet; *G. communis*, red, and its two varieties, *albus*, white, and *carneus*, flesh; *G. floribundus* is citron; *G. nanus delicatissima* (Blushing Bride) (Fig. 489) is white, with pink and carmine flakes; and *G. ramosus* is rose. There are also many beautiful hybrids of most of the above. These should all be potted in good loam, with a free admixture of sand, in autumn, kept in a cool frame till the pots are full of roots, when give a few degrees more heat, and place in the greenhouse as the flower-spikes begin to show. The beautiful

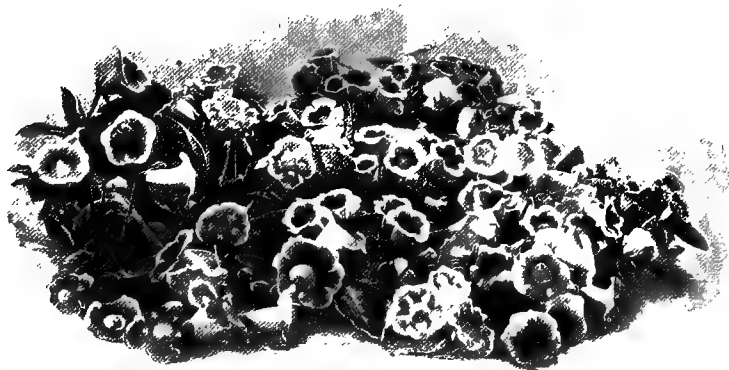


FIG. 490.—GLOXINIAS.

hybrids of *G. gandavensis* may also be utilised for late autumn and early winter blossoming. These are best potted singly in 6in. pots at the end of May, using a similar compost to that already advised. Plunge outdoors in rich soil, covering the tops of the pots about 2in., and during dry weather water well. When frosts begin, lift into a place in the cool pit, shifting into the greenhouse as the buds appear.

GLOXINIAS (Fig. 490) are most valuable for summer flowering, and are best raised from seed. Sow in January or February in pans, and place in the warm pit close to the glass; prick off and pot in 3in. pots, still keeping near the glass, and for this purpose, when the ordinary stage is not close enough, it is best to use either a light extra temporary stage or inverted

flower-pots. In June shift into 4in. pots. After flowering, gradually reduce the water supply, place in the cool frame, and lessen the shade till they ripen off, after which allow them to become quite dry. Keep in pots in the cool pit placed on their sides under the stage. To obtain a succession start at different times from February till the end of March. When potting do not bury the crowns, but let them come just above the surface. Pot in moist soil, and do not water till well started. After the fourth year throw away the old plants. The flowers of these are tubular, with wide open mouths; the varieties and delicate shades of the colours are magnificent, and the markings of the throat very beautiful.

Gloxinias may also be increased by leaf-cuttings, and this method is employed when it is desired to preserve any specially good varieties. Take fully-matured leaves with a portion of the stalk attached in June or July, and split the midrib through in several places; lay flat on the surface of



FIG. 491.—HYBRID HIPPEASTRUM.

the soil, and place in the warm pit. Corms will be formed at each cut; these must be wintered and grown on as already described. Soil: peat, loam, leaf-soil, and sand.

HIPPEASTRUMS (*Amaryllis*). — The splendid hybrids of these bulbs (Fig. 491) have now come well to the fore, and make a grand show in early spring. To raise from seed, sow when ripe in autumn in pans, placing in the warm pit. Prick off, and when large enough plant out in shallow beds of turfy loam and sand prepared in the warm pit. Cover the greater portion of the bulbs, and keep growing warm, giving plenty of moisture for two years. In spring pot into 6in. pots, and in autumn

gradually dry off and ripen, admitting full sun; keep in the cool pit during winter, and start in the warm in February or March; they will then soon come into blossom. When the flowers

begin to expand shift to greenhouse, and as they cease flowering, place in the warm pit again and plunge in old tan, giving plenty of air, light, and moisture. During the summer dry off, and remove from the tan in the autumn, treating as before, and giving a small shift if required. Soil: loam, sand, and charcoal broken small. Hippeastrums may also be increased by offsets removed before potting and planted in beds. The flowers are borne in trusses of three or four on the ends of fleshy stems, about $1\frac{1}{2}$ ft. long. They are large, and the colour varieties are very fine, being shades of red and white.

IMANTOPHYLLUM (*Clivia*) MINIATUM (Fig. 492) is a grand plant for late winter and early spring blossoming. Propagate by division. Grow in the warm pit in early summer, and in the cool pit later.

Give plenty of water and no shade, except when the sun is very scorching.

Ventilate freely, and feed well with manure-water. Reduce the water supply in autumn, and during the winter only give sufficient to prevent the soil from becoming dust-dry. As the

flowers show, place in the warm pit to open. Grow in good

loam and plenty of sand, and do not shift often, but allow the plants to become quite pot-bound.

LACHENALIAS are spring-flowering bulbs. Pot in autumn, five or six together in a 6 in. pot, in good loam, leaf-soil, and sand. Place in the cool frame, and give air whenever possible. After flowering, remove to a frame, gradually dry off, and, when dry, keep in the shed. Propagate by offsets, removed in autumn when potted. Sorts: *L. Nelsoni*, bright golden yellow; *L. pendula*, crimson-purple, tipped with green; *L. tricolor*, yellow, with red suffusions and green tips.

LILIUMS.—There are several species which, although hardy, are better grown in the greenhouse, and which no collection should be without. Pot in autumn, either singly in 6 in., or three



FIG. 492.—IMANTOPHYLLUM (*CLIVIA*)
MINIATUM.

together in 10in. pots. Start into growth under the stages of the cool pit. After they are well started in early spring, shift into a deep frame, and give plenty of air. As soon as they get big, plunge in ashes in the open; and when the blossoms begin



FIG. 493.—LILIUM HANSONI.

to show (about June or July), place in a cool pit to open. After flowering, stand in a shady spot outside to ripen, and pot as before. Soil: good loam, leaf-soil, rotten manure, and sand. Pot firmly, and give plenty of moisture and liquid manure whilst growing. *L. auratum* should have half peat. Propagate by offsets at times of potting, and plant in a bed in frames or in the open. The best sorts for pot-culture are: *L. auratum*, *L. longiflorum*, *L. l. Wallichianum* (creamy-white, sweet scented), *L. eximium*, *L. Hanson* (Fig. 493), *L. speciosum album*, *L. s. rubrum*, *L. s. Kratzeri*, and *L. s. Melpomene*.

RICHARDIA AFRICANA (*athiopica*) (Arum Lily).—This good old plant (Fig. 494) is of great value in the greenhouse. Propagate by division in spring, pot in good rich loam and sand, and place in the warm pit, giving plenty of water. Later shift to the cool pit; giving very little shade, and transfer to larger pots in June, when the plants will flower. After flowering, place out in the open, but remove inside before frost comes, and keep in cool pit. They may be brought into flower in succession by placing in the warm pit as required. *R. Elliottiana* (Fig. 495) has yellow spathes and leaves spotted with white; it requires to be grown in the warm pit during the winter and in the cool pit in summer. Then there is *R. Pentlandii*,

with deep green foliage and golden-yellow spathes.

STRELITZIA (Bird of Paradise Flower) is a very beautiful plant. Propagate by division in spring, and grow in 8in. pots in rich loam and sand in the cool pit in summer and the warm pit in winter. The flowers are produced in April and May. Sorts: *S. Augusta* and *S. Regina* (Fig. 496).

VALLOTA PURPUREA (Scarborough Lily) somewhat resembles a *Hippeastrum*, and should receive similar treatment. Raise from offsets, and grow in sandy loam, peat, and leaf-soil. Keep dry in the cool pit in winter, grow warm in summer after flowering, and then partially dry off in early autumn. The flowers are scarlet.

VELTHEIMIA VIRIDIFOLIA is a useful bulb, flowering in spring. Propagate by offsets. At the time of potting in autumn grow in loam, leaf-soil, and sand, in a cool pit or in frames. Ripen after flowering, keeping in pots, and starting again in February.

Ornamental Foliage Plants.

Plants grown for their ornamental foliage play a very important part in the furnishing of the greenhouse, being of the greatest help in the setting off of groups of flowering subjects.

There are quite a number of subjects that may be utilised for this purpose, and a good selection will add considerably to the interest of the house. For the most part they do not present many difficulties as regards cultivation, and as they are only required for their foliage, many may be grown in the greenhouse altogether. In many cases for placing on the shelves it is best to keep on raising young plants to take the place of older ones when the latter begin to look shabby and become too big. These young plants always give the best coloured and most healthy foliage, and being easy to propagate a supply can readily be kept up.

The effect of these plants, however, and of all the flowering plants, greatly depends on the taste exercised in their arrangement. They should be scattered thinly amongst the groups of flowering plants on the stages, using one species to a group. If the

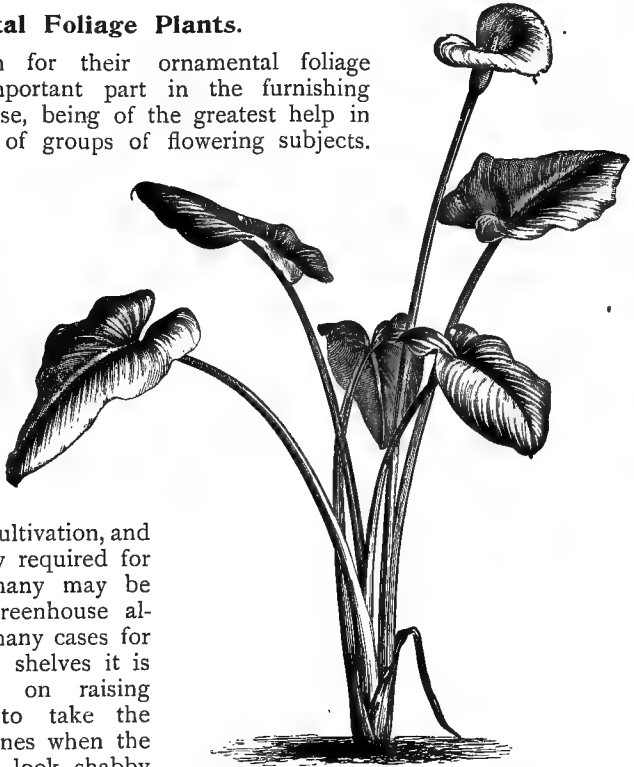


FIG. 494.—*RICHARDIA AFRICANA*.

flowering plants are stiff and heavy, light, graceful-leaved subjects should be used, which will show up above the flowers, and *vice versa*, e.g., *Begonia semperflorens* and *Dracena gracilis*. If the flowering plants are loose and graceful, stiff, erect foliage plants may be used, e.g., *Ficus elastica* and Fuchsias. If the foliage plants used are not tall enough to show above the flowering plants they may be raised on inverted pots. If the flowering plants

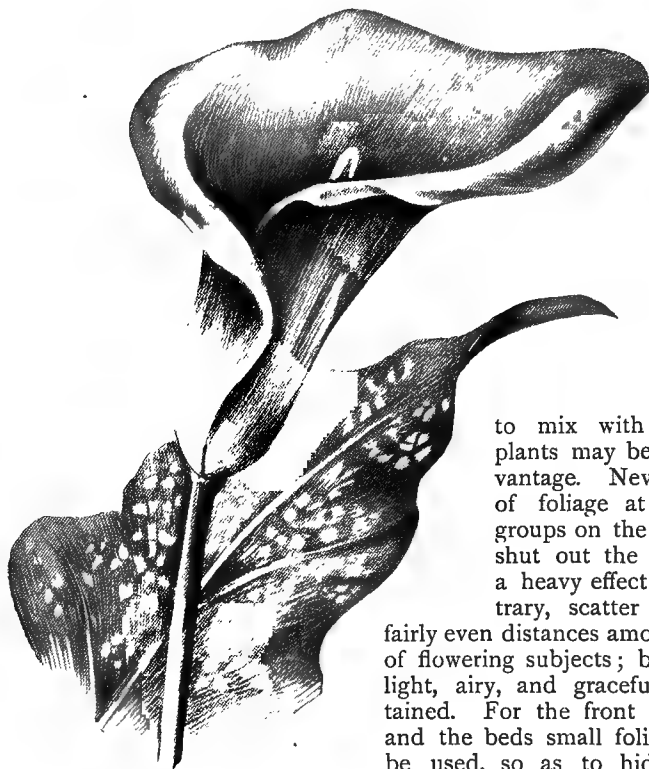


FIG. 495.—RICHARDIA
ELLIOTTIANA.

have long spikes of blossom it is better to use small foliage plants as a groundwork, and to let the spikes show above; and in some cases, if the flowering plants are tall, small foliage plants as groundwork and large ones

to mix with the flowering plants may be used with advantage. Never make banks of foliage at the back of groups on the shelves; these shut out the light and have a heavy effect. On the contrary, scatter the plants at

fairly even distances amongst the groups of flowering subjects; by this means a light, airy, and graceful effect is obtained. For the front of the shelves and the beds small foliage plants may be used, so as to hide the pots as much as possible; and for the centre beds large specimens may be placed in the middle and scattered among the groups of other plants.

In all cases regard must be paid to the colour of the foliage plants used, and the flowers amongst which they are placed. Contrast should be aimed at, placing dark foliage amongst light and gay-coloured flowers, and light foliage amongst dull and dark-coloured flowers. If the foliage is coloured, as in the case of *Dracenas*, *Coleus*, &c., the plants must not be placed amongst

flowers having similar colours. In some instances when the flowering plants themselves have large foliage, such as Cinerarias, many foliage plants would be wasted; but a few Cordylines or Palms tall enough to stand well above them could be used with advantage.

As before stated, foliage plants are nearly all of easy cultivation, requiring nothing beyond ordinary attention, sufficient pot room, good feeding in most cases, plenty of water whilst growing,



FIG. 496.—STRELITZIA REGINÆ.

and to be moist at all times. Of course to this, as to all rules, there are some exceptions. It will be noticed that in the following selections Ferns and Palms are omitted; they will be found fully described in chapters devoted to their culture.

ALBIZZIA LOPHANTHA is a most graceful plant, allied to the Acacias, and having a Fern-like appearance. Propagate by seeds sown in heat in March, pot on, and transfer to the cool pit to grow.

ALOYSIA CITRIODORA (Lemon-scented Verbena).—This can hardly be called an ornamental foliage plant, but should be admitted on account of its beautifully-scented leaves. Hard-wooded. Raise from cuttings of young shoots in the cool pit in summer, grow in fibrous loam and sand, and cut back and transfer to the cool pit in winter, placing in the warm one to break in spring.

ARALIAS are evergreen hard-wooded plants. Raise from cuttings of ripe wood placed in bottom-heat in winter. Grow in loam, sand, and peat. Sorts: *A. quinquefolia*, *A. reticulata* and *A. trifolia*.

ARAUCARIAS.—Some of these are very beautiful, ornamental, tender Conifers, and are most useful either in a young state grown in small pots or as large specimens, planted out or in tubs. Propagate by cuttings of the leading shoots in the cool pit, as only these will form plants. When a plant has been so treated its shape is ruined, and it is either necessary to have a stock plant or else to purchase. Sorts: *A. excelsa*, *A. Bidwillii*, and *A. Cunninghamii*.

ASPARAGUS PLUMOSUS NANUS and var. *scandens* are most elegant plants, and invaluable in the greenhouse. Propagate by division in early spring at the time of starting. Plant in loam with plenty of sand, giving an abundance of moisture whilst growing. In winter they require to be rested (when grown as cool greenhouse plants), and so but little water should be given them, and the old growths cut away as they begin to fade. When grown in the warm pit or stove, growth will be made all the year round. In early spring the plants will start again, and then they should be repotted. *A. p. scandens*, as the name implies, is a climber, and should be grown on a trellis or balloon; it can also be grown on pillars, but will not attain much height in that way. The foliage has a very delicate and Fern-like appearance, and is largely used for cutting.

ASPIDISTRAS are universally grown. Propagate by divisions in spring, and grow in loam, leaf-soil, and sand. They are most useful and effective as good-sized specimens in 8in. pots. Sorts: *A. elatior variegata*, *A. lurida* and *A. l. variegata*. Height 1½ft.

BEGONIAS.—The foliage-leaved section of Begonias are mostly stove plants, but there are some that will adapt themselves very readily to the greenhouse. The hybrids of *B. Rex* (Fig. 497) are most useful; they may be propagated by leaf-cuttings in warmth during summer in the same manner as Gloxinias. Grow in peat, loam, and sand in the warm pit, and remove to the greenhouse

when of a good size. Give plenty of moisture whilst growing. Rest in the autumn (giving less water) in the warm pit, start again in February, and repot. *B. metallica* is very pretty; this



FIG. 497.—*BEGONIA REX*.

plant is tall, and is best when grown as a large specimen. Propagate by cuttings of the points of the shoots in summer, and grow the same as in the case of *B. Rex*.

CHLOROPHYTUM ELATUM ARGENTEA LINEARE is a useful plant; it is tuberous-rooted and has grass-like leaves with white stripes. Height 6in. Propagate by division in spring or by runners in summer. Grow in loam and sand, giving plenty of water, and even in winter do not allow to become at all dry.

COLEUS.—There are many varieties of these beautiful-coloured foliage plants which are most effective either as large plants in 8in. pots or as rooted cuttings in 3in. pots. Propagate by cuttings at any time in the warm pit in bottom-heat. Soil: loam, leaf-soil, and sand.

CORDYLINES are useful either as small plants for the shelves or as large specimens, and may be propagated by ringing with pots in the case of large specimens, also by suckers thrown up from the root after the head has been removed, or by stems laid in cocoanut fibre in a propagating-frame, as described in the Chapter on "Plant Propagation." All these methods may be practised at any time, but are best done in the spring. Grow

in loam, leaf-soil, and sand. Sturdier plants are obtained by growing in small pots and feeding. Sorts: *C. indivisa* and *C. australis*.

CYPERUS ALTERNIFOLIUS and *variegatus* are highly ornamental semi-aquatic grasses. Propagate by division in spring and by cuttings in summer, rooted either in sand or in warm water, in the warm pit. Being semi-aquatic, they must be well supplied with moisture during the summer, and may very well be stood in saucers filled with water, which, however, should be frequently changed and not allowed to become stagnant. Rest in autumn, and gradually withhold water. In mid-winter cut down and only keep just moist in the cool pit. Start again in February in the warm pit. Height $2\frac{1}{2}$ ft.

DRACÆNAS take their place in the front rank amongst foliage plants, but unfortunately most of them require a stove temperature. However, those mentioned here will be found very suitable for greenhouse cultivation. Propagate in the same manner as Cordylines (to which these plants are allied), but towards the middle of winter remove to the warm pit and grow there till early spring. Soil: Fibrous loam, leaf-soil, rotten dung, and sand. Sorts: *D. Brauanti*, *D. congesta* (*Cordyline*) *violacea*, *D. gracilis*, and *D. rubra*.

EUCALYPTUS (Australian Gum-Tree).—Many of these are very ornamental, and some should have a place in the greenhouse, either as small or large specimen plants. Propagate by cuttings of the young, half-ripened side-shoots in summer in the cool pit, or from seeds sown in spring in gentle heat. Grow in loam, peat, and sand in the cool pit. Towards autumn they are better placed outside in the open to ripen, and should be kept rather dry during winter. Sorts: *E. globulus* and *E. citriodora*; the latter has lemon-scented leaves.

EULALIA JAPONICA is a very ornamental grass. Propagate by division or by seed sown in early spring in the warm pit. Grow in the cool pit, using stiff loam, leaf-soil, and sand. Keep rather dry in winter. Varieties of *E. japonica* (*Miscanthus sinensis*) are *albo-lineata*, *foliis-striatis*, and *zebrina*.

FICUS ELASTICA (India-rubber Plant) is well known and very ornamental. Propagate by cuttings of the top or side-shoots in January or February in strong bottom-heat. Grow in loam, sand, and a little peat, and in February remove to the warm pit to make growth for about three months, giving plenty of moisture. *F. repens* is a pretty little creeper, useful for hanging-baskets or for pots on the edges of the shelves. Raise from cuttings in the warm pit.

GREVILLEA ROBUSTA (Fig. 498) is a very ornamental shrub. Propagate by cuttings of the young firm shoots in summer, placed first in the cool pit, and when they have begun to

callus put in bottom-heat in the warm pit. Grow in loam, leaf-soil, and sand.

MUSA ENSETE is a highly ornamental plant, having large, handsome, broad green leaves. When young it is very useful for the shelves, but will not long remain in that state, for it is a quick grower and soon makes a large specimen, requiring a tub or to be planted out. Propagate by suckers, removed when large enough, and grow in rich loam, rotten manure, leaf-soil, and sand; also give liquid manure and water freely whilst growing. After flowering the old stem will die down, but suckers will be thrown up from the base.

PANICUM VARIEGATUM is a very beautiful and brightly tinted creeping grass, most useful for hanging-baskets or for the edges of shelves; it must, however, be grown in the warm pit during winter. Propagate by cuttings rooted in sand in bottom-heat in early summer, and grow in loam and leaf-soil with plenty of sand.

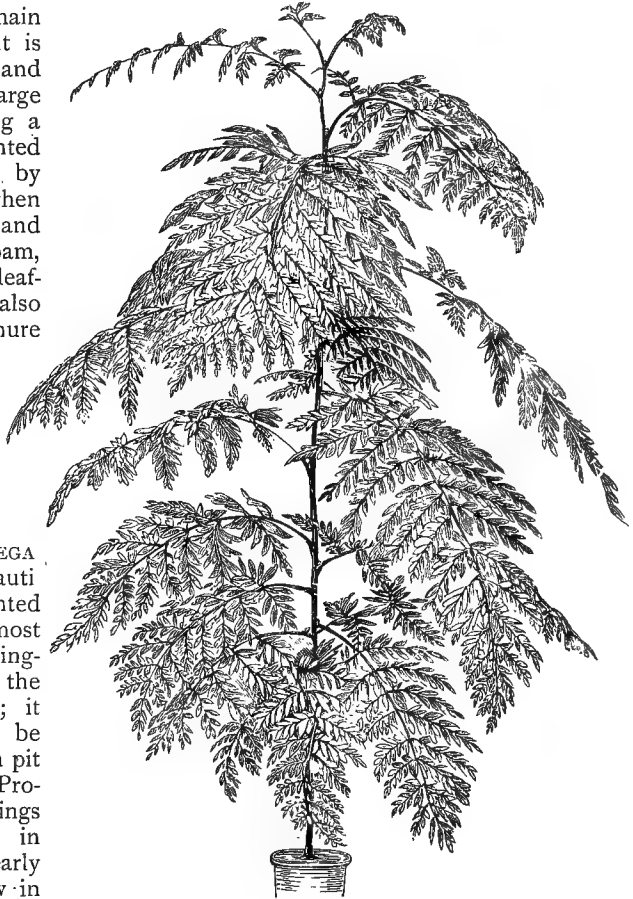


FIG. 498.—GREVILLEA ROBUSTA.

PHORMIUM TENAX (Flax Lily) is a handsome, broad, flag-leaved plant. Propagate by division in early summer, and grow in rather stiff loam and sand. Varieties of *P. tenax* (Fig. 499): *atropurpureum*, *Morlandii*, *nigro-pictum*, and *Veitchii*.

SCIRPUS RIPARIUM (*Isolepis gracilis*) is a pretty little plant, very useful for the edges of shelves or groups in the centre

beds. Propagate by division in spring, give plenty of water during summer, and sufficient to keep the soil just moist in winter. Cut down, and start again in the warm pit in February. This plant very much resembles fine bright green grass.

YUCCAS.—Many of these are useful ornaments in the greenhouse. Propagate by suckers, removed when large enough in early summer. Grow in loam, sand, brick rubbish, and mortar mixed; in breaking the bricks, the size of the pieces should be varied according to the size of the plants. Give very little water except whilst growing in spring and summer. When water is given the plants should receive a thorough soaking, and then they should be allowed to go till nearly dry again. Do not report very often. These plants throw up handsome spikes of flower; but they are

such uncertain blossomers that they are best grown solely as foliage plants. Sorts: *Y. aloifolia* and var. *variegata*, *Y. filamentosa* (Fig. 500), *Y. f. aureo-variegata*, *Y. f. variegata*, *Y. glauca*, and *Y. filifera*.

ZEBRINA PENDULA (*Tradescantia tricolor*) is an extremely pretty creeping plant, most useful for hanging-baskets and also for covering the soil of large pots and tubs containing specimen plants. Propagate by cuttings at any time in the warm pit, and grow in any light soil.

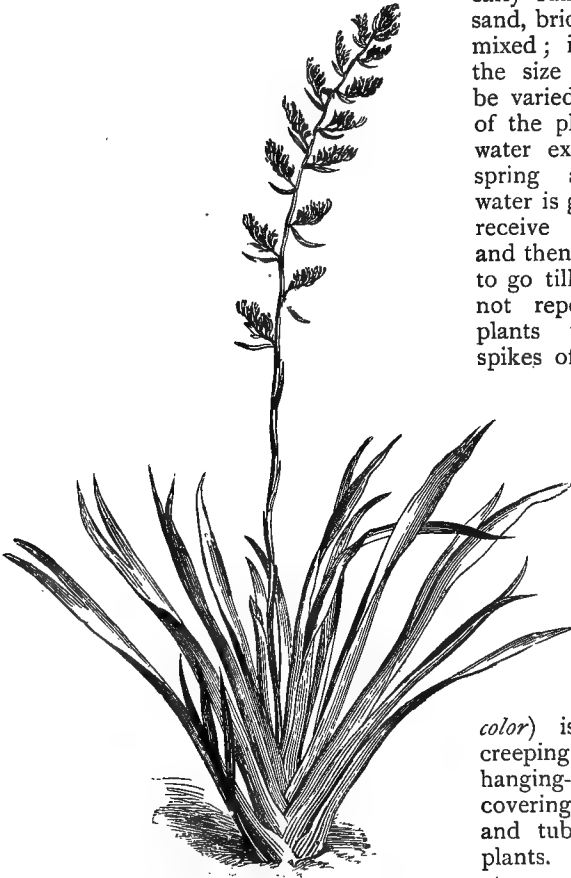


FIG. 499.—PHORMIUM TENAX.

Climbing Plants.

A judicious selection of climbing plants adds very much to the beauty of the greenhouse when they are well looked after and carefully trained, but a great deal depends on these two

points. Too often the climbers are much neglected and allowed to grow as they like, with the result that they never have a really good effect, and spoil that of other plants.



FIG. 500.—*YUCCA FILAMENTOSA*.

The first consideration, and one of great importance, is how to plant climbers. Generally they are planted in the soil under the stage, but this method has been found to be very unsatisfactory, as they are then difficult to get at, and unless beds are made before the house is built they cannot be made at all. Proper drainage cannot be given, and it is a matter of great difficulty to get at the surface of the soil to stir it up or to top-dress; also during the winter the surface is liable to be baked by the heat from the pipes. The best method seems to be to make a slate bed along the back of the shelf about $1\frac{1}{2}$ ft. deep and 1 ft. wide, being 6 in. above the level of the shelf and 1 ft. below, and having separate divisions for each plant, so that their roots can be kept apart and each be given its own particular soil. This, although it does not give the root-run that can be obtained when planted out under the stage, brings the surface of the soil into the full light, and admits of easy access for the purpose of top-dressing, &c., while it also allows good drainage. When planted against pillars, a square slate bed may be made at their base, but they must be well drained. If neither of these methods is convenient large pots may be used, but they are not to be recommended for strong-growing climbers, as they cramp the roots too much.

When training climbers on the roof they should only be taken along the rafters, using wires to train them on; if it is desired to spread any out this should only be done at intervals, or they will shade the other plants too much. It must be borne in mind that they are only auxiliaries, and for this reason frequent thinning out of the strong growers must be practised. It should be the aim to obtain long flowering shoots, to hang down from the roof so that they will just be above the head of a tall person standing beneath; by this means a very fine effect is obtained. Only good-sized plants should be planted out, and when any have grown too large for their beds it will be best to replace them with young plants, at the same time renewing the soil. In the winter nearly all may be cut back a little, and some of the hard-wooded species hard back, when they are at rest. It is also advisable, if a stem has become big and knotted by frequent cutting, to take up a young shoot in its place, cutting the old one out. The climbers are mostly of easy cultivation, and do not present many difficulties regarding propagation. Plenty of water should be given during the growing season, and but little whilst at rest. Care must also be taken to keep them free of insects.

ABUTILON MEGAPOTAMICUM and var. *variegata* make very pretty climbers, having bright scarlet flowers, and the foliage of the variegated variety is very effective. Propagate by cuttings in spring, and grow in loam and sand. Cut back in autumn. Many of the varieties already mentioned under "Soft-wooded Plants."

may also be trained as climbers. The best effect with all these is obtained by training under the roof, so that the drooping flowers hang down and may be observed from beneath.

AKEBIA QUINATA is a very pretty plant, especially for twining round pillars. Propagate by division of the roots in early spring or by cuttings of the firm side-shoots in June or July. Soil: peat, loam, and sand. Flowers during early summer. Blossoms lilac-pink.

BIGNONIAS are handsome climbers, bearing large panicles of bell-shaped flowers. Propagate by cuttings of the young side-shoots in summer in the cool pit. Grow in rich loam, sand, and a little peat.

They flower on the old wood, and, therefore, should be pruned directly after flowering, and the shoots should be shortened back in summer to induce the formation of spurs. Sorts: *B. capreolata* and *B. speciosa*, flowering in early summer; and *B. venusta*, flowering in late summer.

CESTRUMS are very free-flowering and useful plants, especially for pillars. Propagate by cuttings in March or April in the warm pit; thin out well when growing, and cut back a little in autumn. Grow in rich loam, leaf-soil, and sand.

Young plants are also useful for pots, as they will flower soon after being rooted. Sorts: *C. aurantiacum*, *C. elegans*, and *C. Newelli*. Flowers are produced all



FIG. 501.—*COBÆA SCANDENS*.

the summer, and are borne in dense clusters at the end of the shoots; they are most effective for pillars. *aurantiacum* has yellow, *elegans* carmine, and *Newelli* bright red blossoms.

CLIANTHUS PUNICEUS (Glory Pea of Australia).—Propagate by cuttings of the young wood in May and June in the cool pit. Grow in loam, peat, and sand, with lumps of charcoal mixed in. Flowers in early summer.

COBÆA SCANDENS is an extremely handsome and a very easily-grown climber (Fig. 501). It is especially useful for any place where there is plenty of room for it to hang in festoons. Propagate from seed sown in March in the warm pit. Grow in loam and sand. Flowers all the summer. The variety *variegata* has very pretty foliage. This must be propagated by cuttings, which are difficult to root. They should be taken from the young firm side-shoots in July or August, and rooted in the warm pit with bottom-heat. The deep purple cup-shaped flowers, with their broad bright green calyx, are very effective.

ECCREMOCARPUS SCABER (Fig. 502) has pretty orange tubular flowers. Propagate by seed sown in the warm pit in March. Grow in rich loam and sand.

Flowers all the summer.



FIG. 502.—ECCREMOCARPUS SCABER.

flowers. Propagate by cuttings of firm shoots in May in the cool pit. Soil: loam, leaf-soil, and sand. Flowers in summer and autumn.

LAPAGERIA ROSEA and var. *alba* are grand plants, but are rather difficult to cultivate; but when a plant has once become established in a place that suits it, it will grow and flower freely if not disturbed. The two essentials are to have thorough drainage, and to keep the roots moist and shaded. Propagate by layers in pots during summer. By this means the roots will not be disturbed when shifted. Grow on in pots till a considerable size is attained, and then plant out. Use rough peat and loam with plenty of silver-sand and charcoal to keep the soil

HIBBERTIA DENTATA is a pretty climber with yellow

open and porous. The flowers are produced in summer; they are very beautiful, having the appearance of being made of clear red and white wax, and are shaped like a long tubular bell.

MINA LOBATA is a fine annual climber. Propagate by seed sown in the warm pit in February, pot on, and grow in the same pit for a time, and then in the cool one before placing in the greenhouse. Grow in light fibrous loam, leaf-soil, and sand. Flowers in August and September.

MYRSIPHYLLUM ASPARAGOIDES (Smilax) (Fig. 503) has very elegant twining stems and foliage, much used for cutting. The flowers are white and inconspicuous, but very fragrant. Propagate by division in spring, and grow in loam, leaf-soil, and sand. The young shoots of this plant must have strings to twine on, as they do not like wire. Flowers in June and July.



FIG. 503.—*MYRSIPHYLLUM ASPARAGOIDES*.

Showing (1) Portion of Flowering Stem, reduced; (2), ditto, natural size.

PASSIFLORAS (Passion Flowers) are without doubt the best of the greenhouse climbers, and are very easy of cultivation. Propagate by cuttings of the young shoots in June and July in the cool pit, and grow in peat, loam, and sand. Flowers all the summer. Sorts: *P. caerulea* (Fig. 504) and var. *racemosa*, *P. Belottii*, Imperatrice Eugenie, *P. hybrida floribunda*, and Constance Elliot.

PLUMBAGO CAPENSIS is a most handsome and free-flowering hard-wooded climber. Propagate by cuttings of the side-shoots in June and July in the cool pit, and grow in loam, leaf-soil, and sand. The young plants are good for pot-work, and for training on balloons. The flowers are borne in large loose trusses. They are rather small and flat, with long slender tubes, and are bright blue; there is also a white variety. They appear in summer and autumn, and the plants should be cut back afterwards.

SOLANUM JASMINOIDES and var. *floribundum* are fine climbing plants. Propagated by cuttings in June and July in the cool pit. Soil: rich loam, leaf-mould, and sand. Flowers all the summer.

STEPHANOTIS FLORIBUNDA is a beautifully sweet-scented plant, having large trusses of pure white flowers. Propagate by cuttings of the old shoots rooted in the warm pit in February. Grow on in the warm pit till of a good size before planting. Soil: loam, peat, and sand. Flowers from April to June.

SWAINSONIA GALEGIFOLIA and var. *albiflora* are useful climbers. Propagate by cuttings of the points of the young shoots taken in June and July in the warm pit. Grow to a good size before planting out. Soil: loam, peat, and sand. The flowers are borne from July to September.

TACSONIAS closely resemble Passifloras, and chiefly differ from them by having a very elongated calyx tube. The colours of the flowers are brilliant scarlet, rose, and pink. Grow and propagate like Passifloras. Sorts: *T. eriantha*, *T. exoniensis*, *T. ignea*, *T. manicata*, *T. mollissima*, and *T. Van Volxemii*.

TIBOUCHINA MACRANTHA (*Pleroma*) is a hard-wooded plant, having magnificent purple flowers. Propagate from firm side-shoots in June and July in the cool pit. Grow in rough peat, loam, and sand. Flowers in July and August.

TROPÆOLUMS.—The hybrids of these are very useful for winter flowering, giving a fine display of brilliant scarlet flowers. Propagate by cuttings in July and August. Grow on and plant out the following summer. Soil: light fibrous loam, leaf-soil, and sand. Sorts: *T. Lobbianum*, *T. cardinale*, Lucifer, and Ball of Fire.

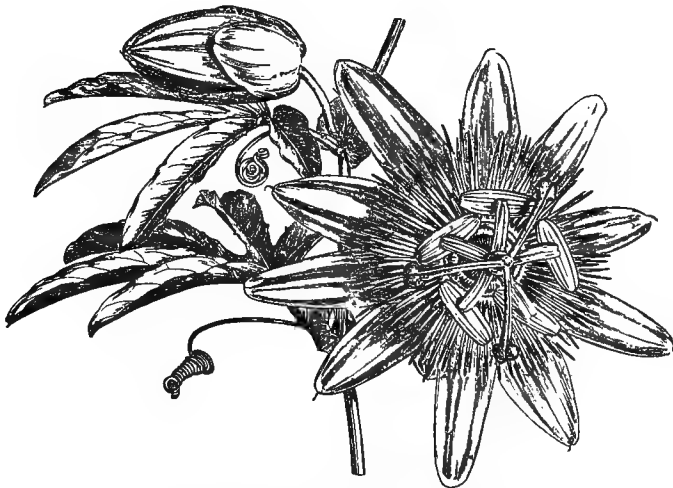


FIG. 504.—PASSIFLORA CÆRULEA.



17.—*On Room*

Plants.

BY W. D. DRURY.

THE cultivation of room plants constitutes a most interesting phase of gardening, and it is wonderful that so little is known about it considering its simplicity. From the appearance of the average room plant one would be inclined to write it down as short-lived; whereas just the opposite is the case with, at any rate, the foliated group, which are by far the most sought after of those generally employed.

The chief causes of failure are: purchasing from a wrong source, injudicious treatment—in either watering, the application of stimulants in too great quantities or at inopportune times—bad potting, too frequent shifts, attempts to increase the stock, frost, draught, dust, and bad drainage. There are comparatively few insect and other enemies to room plants, and those which are in evidence are easily dealt with. Soil, of course, is a factor in their culture, and one that is also but little understood.

It may be well to say here that the application of the term “room plants” is in its widest sense, and meant to apply to

outside window-boxes as well. Of course, where there is a greenhouse from which drafts can be made as required, there is no difficulty in keeping up a good display. In this chapter, however, it is assumed that the gardener is almost entirely dependent upon a sunny window at most to furnish the plants for the room.

SOURCE OF SUPPLY.—The source whence a plant is obtained has a most important bearing upon its future welfare, and particularly in the case of those foliage subjects which in a state of nature require a hot, moist temperature, and whose surroundings have as nearly as possible to be imitated when they are grown artificially here. Despite the fact, however, that many of our finest foliage room plants are natives of warmer climes, they are sufficiently accommodating to live amidst very different surroundings if they are but intelligently treated. First, then, it must be urged upon the enthusiast to “beware of the seller”; for though a plant may look the picture of health and condition when delivered, a very few days—nay, hours—may be sufficient to seal its doom. The travelling hawker is always to be avoided. The plants he has for disposal have been grown on by a method to fit them for quick sale, and their lives are most ephemeral. Indiarubber plants, Palms, Fatsias, and numberless Ferns are raised in large quantities to supply the markets, and such are about the worst that can be purchased if a long life is desired. To get the best possible results with Palms and such like they should be purchased from a trustworthy nurseryman or florist who has prepared the plants for the treatment they are likely to undergo. They should also be purchased in late spring or summer: never in winter or autumn.

FROST AND DRAUGHT.—These are the most powerful enemies against which the cultivator of room plants has to contend. A window is the most suitable position for plants generally in the daytime, as there they get a maximum of light and sunshine. At night, in winter, the case is different: the window then becomes nothing less than a death-trap. A good plan is to have at hand a couple of wire stands, on to which the plants could be moved at night, and these should be placed in the centre of the room, or else in a corner where draughts are not prevalent at night, and, if necessary, further surrounded by a temporary screen of stout tiffany, which can easily be mounted upon a roughly-constructed frame. By this means the dangers from frost are considerably reduced, and the plants can easily be returned to their quarters in the window in the morning. Some further protection may be necessary in the case of Palms, and this will be referred to when dealing specifically with these plants.

VENTILATION.—Air is as necessary to the well-being of a plant as it is to ourselves, and rooms should therefore be carefully ventilated on suitable occasions. In winter time the top sash may be allowed down in living rooms, say a couple of inches, this space being filled by a piece of close wire gauze-like material; this may be so arranged that at any time the window may be at once closed. The door should not be left open at the same time as the window, or the result will be disastrous to plant life, especially in winter and spring, when cold and drying winds are prevalent. Plants, too, which are used for hall decoration must also be guarded against frost and draught.

DUST on the foliage clogs the breathing pores. Where, therefore Palms, Euryas, Aspidistras, Indiarubber plants, and similar stout-textured foliage subjects are employed in rooms, they should be carefully kept clean of dust and dirt, and the best means of doing this is with a piece of sponge and some soft lukewarm water. This should be done twice a week, or oftener in the case of very dusty apartments.

DRAINAGE.—The importance of good drainage in the case of pot- or box-plants can hardly be over-estimated. An imperfectly-drained pot soon causes the best and freest of soils to sour, and quickly destroys the most promising of plants. Especial care must be given to the pieces covering the hole or holes of the pot or box. The other drainage material must be so arranged that the water passes freely through. The amount of drainage, and even the kind employed, will vary a little with the class of plant. As a rule, pieces of old pots and broken or whole oyster shells are amongst the best for plants in general. Cactuses require special treatment in the matter of potting, and this will be dealt with when they are being considered, and more fully in the chapter devoted to those and their allies.

POTTING, though a very necessary operation when plants have amply filled the root-space at command, is nevertheless one which is often overdone to the certain detriment of the plant. A check is certain to result if it is not carefully performed; while not infrequently the plant succumbs. Before a plant can be properly potted, its requirements must be known to a nicety, for whereas in the majority of cases crowded root-space might be taken as an almost certain indication of the need of a shift, there are plants which succeed better the less they are interfered with, so long as they receive some assistance by means of top-dressings or stimulants. All classes of room plants are not equally affected, and therefore no hard-and-fast rule can be laid down. Palms yield the best results when they are not given too much room; and a frequent cause of failure is shifting them too frequently. The roots must be the absolute guide to repotting. So long as these are not too crowded,

the drainage is ample, and the plant exhibits a healthy appearance, it should not be repotted. And so it is with many other of the foliage plants used for room decoration—Aspidistras in particular. Then the manner of potting will vary with the class of plant: Chrysanthemums, for instance, require the compost tightly rammed, and so also do Palms. As a general rule, hard-wooded plants, like Heaths, require to be more firmly potted than soft-wooded ones, like Pelargoniums. Further remarks upon the manner of potting such plants will be found in the chapters devoted to Stove and Greenhouse Plants.

Palms are, we are told in an excellent work on the propagation and cultivation of Palms, by Dr. Udo Dammer, best potted so that the soil slopes gradually from the side down to the centre. By this means moisture is best conveyed to the centre of the ball of earth, which otherwise frequently remains dry, to the detriment of the roots. This should be well borne in mind when repotting.

Again, in potting a plant, the condition of the soil will have to be taken into consideration. If it is too dry, repotting must not be undertaken. The soil must be moist without being wet. The pots must also be thoroughly clean and dry. No plant should be placed in a wet or a dirty pot. Where, therefore, washing has been resorted to, or new pots have been soaked, as they should be, they must be thoroughly dried before being used. Spring may safely be put down as the best time for repotting, as then it is that roots are most active.

WATERING.—The best water for any purpose is pure rain water, but even this should never be applied of a less temperature than that of the room in which the plants are for the time located. Cold tap water should *never* be used. The next best thing to rain water is that from a stream or well. In towns, of course, this latter source of supply is not available, and the cultivator must then use tap- or pump-water. In any case, whether from streams, springs, or tap, it should be kept in a large receptacle where the sun can shine upon it, and be brought to the requisite temperature by the addition of hot water, if necessary. The reason that rain water is preferable is that it usually contains (it may be in very small quantities) some chemical substance like ammonia, as well as certain gases dissolved in it, which tend to liberate soil constituents that are needful for the sustenance of plant-life.

A fairly good method of telling if water is needed is to strike the pot with the knuckles, and if a clear ringing sound is emitted, it may usually be assumed that water is needful, although sometimes the dull, heavy sound one connects with a plant having a sufficiency of water is given off if the roots are amply filling the space at their disposal. Palms are somewhat difficult subjects for the majority of amateurs to judge of, but if the

foliage of the stout-textured species be flaccid and readily rolled, especially towards the apex, water is then badly needed. The rough-and-ready method previously suggested holds good least of all with Palms, for, as already has been stated, they should be restricted as regards root-room, and, therefore, even if dry, the ringing sound is less likely to be given off.

The best time for watering depends upon the season: in the winter, morning should be selected, so long as there is no danger of frosts; while even in summer, if the cultivator does not mind getting up early, morning is the best time, so long as it is done before the sun gets too powerful; otherwise his operation had better be deferred until the evening. In any case merely wetting the top soil is not of the slightest use—indeed harmful, as it cakes the surface—the plant should have a good soaking. Certain species may also be kept in splendid condition by standing them frequently in pans of water, and in summer giving plenty of water to the foliage as well, taking care that the plants are not placed where the sun's rays would cause scorching.

Certain plants—Cactuses, for instance—require special treatment as regards watering, and this will be mentioned under their respective heads.

SOILS.—Room plants are drawn from a variety of genera distributed over a wide geographical area, therefore the soils necessarily differ somewhat with individual plants. Most plants, however, that will be dealt with here may be grown successfully in a combination of fibrous loam, leaf-soil, and sand. Two parts of the first-named to one part of the others will be about the correct proportions. Exceptions are the Cactuses, when to fibrous loam and sand should be added broken brick rubble to the extent of nearly one-half; and some of the hard-wooded plants like Heaths, when peat may replace the leaf-soil, though it is not absolutely necessary, as has often been proved. For Ferns, there should be a preponderance of peat in the compost. Potting soils may be bought ready mixed in those cases where no convenience exists for storing them on the premises. This is the better plan to adopt. In most gardens, however, there would be room, say, for providing a supply of leaf-soil. Leaves of any kind can be thrown into a heap, but the best soil is that prepared from the leaves of Oak and Elm, and such-like forest trees.

STIMULANTS.—All plants require assistance from time to time in order to allow of their perfecting their growth, and of recuperating those energies exhausted in bringing forth their crop of flowers, fruit, or foliage. Taken all round, the most convenient for the general run of gardeners who go in for pot-plants are the "artificial." Where, however, the conveniences exist, there should always be kept a tub of soot-water

(made by sinking a bag of soot in any large tub) and some liquid cow-manure. These two manures are most useful in giving colour to such foliage plants as Palms, Aspidistras, and the like. This is best applied in spring when activity is being resumed after the winter rest. With flowering plants the stimulant is of most service when applied at flowering time, and just prior thereto.

INSECT AND OTHER PESTS.—These are not numerous, and are readily got rid of if measures are taken before the pests have a chance to establish themselves. Greenfly are amongst the most troublesome; but occasionally Red-Spider, Scale, and Mealy Bug are introduced. In the case of Greenfly, it is impossible to fumigate, as in a greenhouse. For the average householder, hot water applied at about 140deg. will be the insecticide readiest to hand. It should be applied with a syringe. In the case of Cactuses, these should be laid upon their sides during the operation.

FOLIAGE PLANTS.—First on the list of this most useful section are the Palms. To be successful with Palms in an unheated structure, it is necessary to be careful as to the source of supply, to select only those species and varieties which have proved their worth, and to purchase them at the proper season.

Of the species best suited to room decoration the following may be named: *Howea Forsteriana* (*Kentia Forsteriana*),

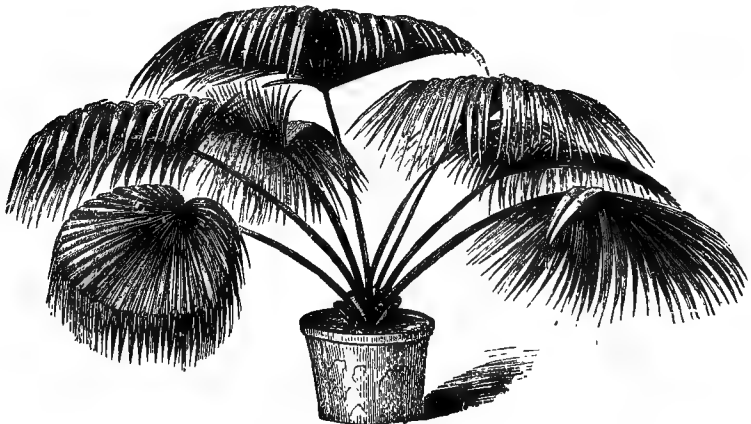


FIG. 505.—LIVISTONA CHINENSIS.

Livistona chinensis (*Latania borbonica*) (Fig. 505), *Trachycarpus excelsus* (*Chamærops excelsa*), *Trachycarpus Fortunei* (*Chamærops Fortunei*), *Rhapis flabelliformis*, *Phoenix rupicola*, *Phoenix reclinata*, *Cocos Weddeliana*, *C. plumosa* (*Leopoldinia*

pulchra), *Archontophoenix Cunninghamiana* (*Seaforthia elegans*; *Ptychosperma Cunninghamiana*), *Sabal Adansonii*, *S. Blackburniana* (*S. umbraculifera*), *Jubæa spectabilis* (Fig. 506), *Nannorhops Ritchieana*, and most of the *Areca*s.

One frequently sees the dwarf and graceful *Geonoma gracilis* in rooms, but it is ill-adapted for such a purpose, and had better be omitted from the list.

The window offers the best position for growing them, as Palms are lovers of light. Here they will succeed if bought in summer, as they should be, and treated on the lines elsewhere laid down, as regards watering and until severe frosts are expected. They should then be removed from the window each evening, and be placed in a part of the room out of the reach of frosts. In addition to the covering already noted, it may be advisable to enclose the pots in a warm frost-proof material like felt.



FIG. 506.—*JUBÆA SPECTABILIS*.



FIG. 507.—*ASPIDISTRA ELATIOR*.

Next to Palms, the *Aspidistras* are the most popular foliage plants. *A. lurida*, *A. l. variegata*, and *A. elatior* (Fig. 507) are the kinds used for room decoration, and there are no

better plants for the purpose, as they will resist the noxious fumes of gas. *Fatsia japonica* (*Aralia Sieboldii*) is robust of constitution and decorative to a degree, and ought not to be forgotten. It bears large, digitate, shining green leaves, while there are two varieties with white or yellow variegation, even more decorative. No special treatment is necessary beyond keeping them freely watered from late spring until late summer, and affording them a shady position.

The genus *Cordylina* also furnishes several good plants for rooms, *C. australis* and *C. indivisa* (Fig. 508) being the best.



FIG. 508.—CORDYLINA INDIVISA.

Ficus elastica (India-rubber Plant) is one of the most popular room plants in cultivation. The only drawback to the plant is the habit it has, for no apparent reason, of shedding its lower leaves, when it is far from presentable. Sometimes, however, this arises from errors in treatment—over-watering, dust, draughts, a very foul atmosphere, and not providing it with a light position.

Maranta major (Fig. 509) is a distinct-looking plant that deserves to be recorded. It is easily managed if given a position where it does not get the direct rays of the

sun. An abundance of water in the growing season, and a loamy soil, are what it likes. Other plants whose merits are but imperfectly known are *Eurya japonica*, and its variegated variety. It is an evergreen shrub, and one delighting in a peat soil. Bold of habit, and stout-textured as to foliage, these Euryas are most useful and long-suffering to a degree. Their chief enemy is dust. One hears so much of the merits of *Grevillea robusta*, and sees it so often recommended, that perhaps it would be best to state at once that no more unsuitable plant for rooms could be named, although there

is no denying its decorative qualities. The exact antithesis of this is, however, to be found in the leathery *Phormium tenax*, and its equally desirable and more effective variegated forms. It has long, sword shaped leaves, and is popularly known as the New Zealand Flax.

Where a very graceful plant is required, *Ophiopogon Jaburan variegata* (Fig. 510) may be strongly recommended. The foliage is narrow, but neatly variegated, and very tough. In summer this plant should be well syringed overhead with rain-water. A comparatively little-known plant. This is not grown entirely for its foliage, although this is its chief attraction.



FIG. 509.—MARANTA MAJOR.

Pretty window and table plants are several species of *Araucaria*, a genus of Conifers to which the formidable-looking Monkey Puzzle belongs. *A. excelsa* (Fig. 511) is very pretty in a young state, the neat habit and tender green combining to make it very attractive. It is evergreen. A fitting companion for this last-named for a dinner-table is the graceful variegated Reed (*Carex japonica variegata*), its grass-like foliage and pretty habit entitling it to consideration.

Uncommon and very serviceable plants are several species of *Dasylyrion*. Correctly speaking these liliaceous plants should

be classed among the flowering subjects; but their leaves being their chief attraction they are for that reason referred to here. The leaves are long, narrow, and drooping. *D. acrotrichum* and *D. glaucophyllum latifolium* are two good kinds. They are evergreen, another feature which enhances their value. Still keeping to liliaceous plants we have some most suitable kinds in the Agaves and Yuccas. Their foliage is capable of withstanding a lot of ill-treatment if the plants are but potted up



FIG. 510.—OPHIOPOGON JABURAN VARIEGATA.

in some good loam and leaf-mould, and the drainage is ample. Broken bricks, as used for the Cactuses, will suit very well. Other desirable near allies are *Yucca filamentosa aureo-variegata*, *Y. aloifolia*, *Agave americana* (Fig. 512) and its variety *variegata*, and *A. univittata*. These plants like plenty of water during late spring and summer, but in winter a very little will suffice. A light position outside suits them best in summer.

Variegated plants are always appreciated, especially if they are sufficiently robust to withstand the winter in an ordinary living-room. For this reason *Chlorophytum elatum variegatum* (better known perhaps as *Anthericum variegatum* and *Phalangium argenteolineare*) must not be forgotten. It is a near relative of the St. Bruno and the St. Bernard Lilies. The grass-like foliage is striped and margined with white, and the habit of the plant is graceful in the extreme. It may readily be grown in a window, if during very severe weather it is removed at night out of the reach of frost. The drainage must be good, as during the growing season plenty of water is necessary; but in winter it must be kept upon the dry side. Propagated readily by division in spring.

Popular subjects with those who make room plants a speciality are *Cyperus alternifolius*, and its variegated form. They are very decorative, too, for the dinner-table. The leaves are long and narrow, and arranged in the form of an umbel, which gives the plants an uncommon appearance. They look like very graceful Palms; indeed by some they are popularly known as Umbrella Palms. They are natives of Australia and about 2ft. in height; they are shade-lovers.

Unfortunately they are not as hardy as some of the subjects already enumerated.

It is scarcely amongst a genus of stove plants that one would look generally for a good room or window subject, yet it has already been shown that in *Ficus elastica* we have a plant sufficiently accommodating to be kept in good health in our rooms, if but a little care is exercised. And so it is with several of the Screw Pines (*Pandanus*), and particularly so with *P. Candelabrum variegatus*, whose long, narrow, gracefully



FIG. 511.—ARAUCARIA EXCELSA.

drooping strap-like leaves are banded with pure white (Fig. 513), and armed with spines of a similar colour. Plenty of water

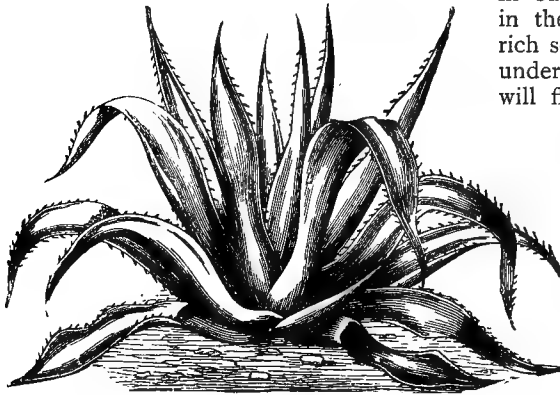


FIG. 512.—AGAVE AMERICANA.

in the summer and very little in the winter, and a good rich soil, are the conditions under which these plants will flourish in our homes.

There are several Eulalias with variegated foliage which make most graceful pot-plants, and which may be grown without much trouble. *E. japonica foliis-variegata* is one of the best. These plants should have plenty of water in summer.

To the above fairly long list of plants which are chiefly grown for their foliage, we might well add such subjects as Rex Begonias and the lovely Coleus; but, ornamental as these undoubtedly are, they require something more than an ordinary window to increase the stock, and for details as to their propagation the reader is referred to the Chapter "On Bedding Plants." There are a number of very useful Conifers which might be utilised even for indoor decoration, but they are certainly more at home in the outside window boxes, and they will be dealt with later in that connection.



FIG 513.—PANDANUS CANDELABRUM VARIEGATUS.

Ferns, again, constitute some of the hardiest and most useful window and room plants that can be named.

Flowering Plants.

Under this somewhat comprehensive heading, it is purposed to describe some of the most popular room plants. It is not of course the place to deal with details of cultivation here, as most of the subjects belong to one or other of the sections into which the work is divided. All that will be attempted will be the enumeration of certain plants which, over a series of years, have proved their worth for the purpose in hand—Cactuses, flowering shrubs, select annuals, striking perennials. In passing along, any of them which require treatment somewhat different from that ordinarily necessary for keeping them in good health and condition will be noticed.

Cactuses occupy a very prominent position in the list of floral subjects that may be grown in windows indoors; while they are

no less remarkable for their fantastic shapes and spiny stems. There is nothing difficult about the culture of a very large number, though popularly there is supposed to be. The writer has grown these plants in windows for years, and never fails to flower them as the seasons come round. In the case of *Phyllocactus* he has had as many as twenty-five blossoms upon a single plant, which throughout the winter had no more shelter than an ordinary window in a living room afforded.



FIG. 514.—GARDEN VARIETY OF PHYLLOCACTUS.

Fig. 514 illustrates a free-flowering *Phyllocactus*,

which was originally obtained from the famous Loddiges Nursery, and is therefore a somewhat historic plant.

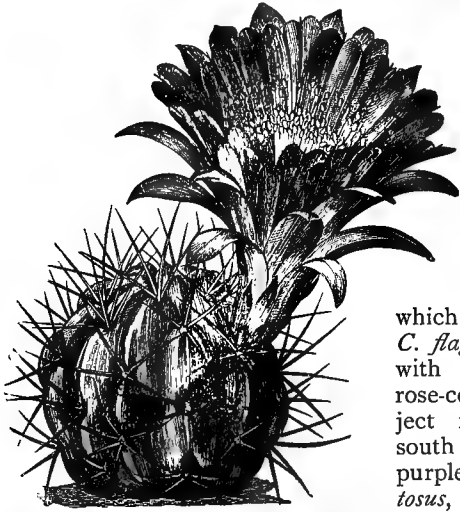


FIG. 515.—ECHINOOPSIS
PENTLANDI.

Turning to the Hedgehog Cactuses (*Echinocactus*), of which the spines are so formidable, we find several species well adapted for windows—*E. gibbosus* (white stems, beset with large needle-like spines), and *E. hexædrophorus* (white and pink, with swollen tubercles). Other genera furnishing some very desirable kinds are *Echinopsis*, *Mammillaria*, and *Phyllocactus*. In the first-named the best are *E. Pentlandi* (red) (Fig. 515), and its varieties; *E. Eyriesii* (white), emitting a nice fragrance; and *E. oxygona*, white at first, but afterwards becoming pinkish. Mammillarias are very wonderful, even amongst Cactuses, combining, as they sometimes do, attractive spines with pretty flowers and showy berries. *M. bicolor*, *M. gracilis*, *M. sanguinea* (Fig. 516), and *M. elongata*, are all good. The

The kinds to be mentioned here all require practically similar treatment—a loamy soil, plenty of drainage material, the sunniest spot that can be found, and the withholding of water from late autumn until April. The genus *Cereus* will furnish a very large number of suitable species and varieties, of

which the following are the best: *C. flagelliformis* (Rat's Tail Cactus), with its pretty pinkish stems and rose-coloured flowers, a capital subject for a hanging-basket for a south window; *C. Berlandieri*, purple, delicately scented; *C. cæspitosus*, bright rose; *C. pentalophus* (*C. leptacanthus*), rose; *C. Blankii*, deep pink, suffused with crimson; and *C. polyacanthus*, deep red, free.



FIG. 516.—MAMMILLARIA
SANGUINEA.

Phyllocactuses are chiefly remarkable for their large flowers, many of them sweetly scented. By way of stimulant, soot-water will be found safe and efficient. Occasionally Cactuses will be attacked by that pest of plant-houses, Mealy-bug. When this is the case, a camel-hair brush should be dipped into a bottle containing methylated spirit, and the insects just lightly brushed with this. In late summer it is an excellent practice to stand window Cactuses in the hottest part of the garden to ripen their growth, and when insect pests appear to turn the plants upon their sides, and syringe them with hot water. For fuller particulars, see the Chapter "On Cacti and Other Succulents."

Bulbs and tubers need very little recommendation to the window-gardener: they constitute, in fact, his sheet-anchor in the dullest days. Crocuses, Hyacinths, Scillas (Squills), Snowdrops, Daffodils, and other Narcissi, are all indispensable. The best way to grow them is to pot them up as soon as procurable in autumn, the earlier the better, and then plunge them outside in cocoanut fibre, transferring them to their quarters when the roots have been formed, and top-growth is in evidence.

One of the finest room plants is the Chinese Sacred Lily, which may be grown in the showy basins sold for the purpose, and as described under "Hardy Bulbs and Tubers." Crocuses, again, may be grown in shallow saucers, partly filled with water; and Hyacinths in the glasses sold for the purpose. To be thoroughly successful with this method of culture the vessels should for a time be stood in a cupboard, or elsewhere, that light may be kept from them until the roots are thoroughly active. Bulbs so treated are not, however, of any service next season. Solomon's Seal (*Polygonatum multiflorum*) makes a most effective room plant. It should be potted up in late autumn, plunged in cocoanut fibre outside until growth is active, watered freely, and after flowering returned to the border.

Quite different from the bulbs enumerated above is the Scarborough Lily (*Vallota purpurea*). This is an ideal window-plant, but not often grown to perfection, as its requirements are but imperfectly understood. Chief among these are good drainage, plenty of water when starting into growth, to be left without repotting for three or four years, and a sunny position. The leaves, too, which are of good substance, accumulate a lot of dust; they should therefore be sponged, as recommended for certain foliage plants. The bulbs are susceptible to frosts, and it is therefore safer to remove the pots containing them from the window in frosty weather.

Ixias and *Sparaxis* are graceful bulbs all too seldom employed as window subjects, though eminently fitted for such a phase of culture. They should be potted in autumn, and when they have ripened their foliage be allowed a rest for a few weeks prior to being repotted. They require no coddling, and they

are best grown in a cool airy room, in which they will blossom in late spring.

All the Alliums make pretty little window-plants, though the scent of them is unpleasant. *A. neapolitanum* (white), *A. azureum* (blue), and *A. Macnabianum* (bright pink) are good kinds to employ. They should be potted up in September and October. *Anomatheca cruenta* is an uncommon bulb, under 1ft. high, that looks well when numerous planted. The bright crimson flowers and graceful, grassy foliage make a very pretty whole. Freesias should always be grown, as they are beautifully white, and very fragrant. *F. refracta alba* is the best kind to employ. This should be potted in late summer, and afterwards plunged until growth has made a good start. Beyond keeping them moist no further treatment is required. The foliage must, however, be allowed to mature, and then the bulbs may be separated from the soil and stored in bags until potting time.



FIG. 517.—LILIUM LONGIFLORUM.

Erythroniums also make good pot-plants, and are desirable alike for their flowers and foliage. They should be potted in summer. Decided acquisitions when grown as window-plants are the Lachenalias, as they are very uncommon as to flower. Sand, loam, and leaf-mould in equal parts will grow them well.

L. pendula makes an excellent basket-plant, while *L. tricolor* may be utilised for pots. Another distinct bulbous subject is *Nerine sarniensis*. The bulbs should be inserted as soon as they arrive, taking care to leave the top just above the soil. They like a fair amount of moisture when growing, but when at rest the supply must be reduced. There is a beautiful variety known as *N. Fothergilli (curvifolia) major*, which is of a rich scarlet. Many fail with these bulbs as window-plants by disturbing them too often.

Tuberose are always appreciated, and they can be grown in windows. Early in the year three bulbs should be planted in a well-drained 6in. pot, using three parts sandy loam and one part leaf-mould. They should be plunged in cocoanut fibre, and drafted to the window when growth is made. The Pearl is an excellent variety. Tuberose are not of any use after flowering.

Lilies (*Lilium*) are perhaps the most appreciated of all plants grown for window decoration, as they combine beautiful and

often fragrant flowers with ease of culture. There are such a number adapted for pot culture, that it is impossible to enumerate them all. *L. speciosum* and its varieties, *L. longiflorum* (Fig. 517), *L. auratum* and its varieties, and *L. Harrisii* are all suitable for pot-work. The soil should be two parts fibrous peat to one part each of peat and decayed manure, with plenty of sound and good drainage material. The pots should be plunged as advised for other bulbs, and when there is evidence of growth being active the plants should be given a place in the window. As they grow they should be liberally treated in the matter of watering, and receive a stimulant, either in the shape of a mulch (for which some gardeners leave ample room when potting) of loam and well-rotted manure, or one of the artificial manures so largely used for pot-plants. This treatment should be given until after flowering, when the stimulant must be withheld and the moisture reduced to allow the bulbs to ripen; after this, they should be re-potted.

Fritillarias are seldom grown as pot-plants by amateurs, though most are admirably suited for such a mode of culture alike as regards their distinctness of flower and dwarf habit. Some beautifully chequered flowers are found amongst the species and varieties available. *F. Meleagris*, *F. aurea*, and *F. armena* are desirable kinds.

The bulbs should be potted in autumn in leaf-mould, fibrous loam, and peat in equal parts, and then kept in a cold frame until the flower-buds are well advanced, when they may be housed. Still further variety in bulbs might be



FIG. 518.—GLADIOLUS INSIGNIS.

imparted by Montbretias, Scillas, the scarlet *Schizostylis coccinea*, early-flowering Gladioli, like the charming *G. insignis* (Fig. 518), Watsonias, Zephyranthes, and the dwarf Iris species.

Tuberous plants are almost as numerous as the bulbous ones, and they moreover include some of the best window-plants that can be named for furnishing plenty of flowers. Anemones like *A. coronaria* (both single and double) are easily grown and flowered

by planting them in autumn in well-drained pots or boxes, watering them sparingly until the spring, when the flowers are showing.

After the leaves turn colour the tubers should be gradually rested, shaken out of the soil, dried, and then stored till next autumn.

Tuberous Begonias (Fig. 519) are so well known as window-plants that little need be said in their favour. They

should be potted in spring in equal parts fibry loam, leaf-mould, and sand, providing

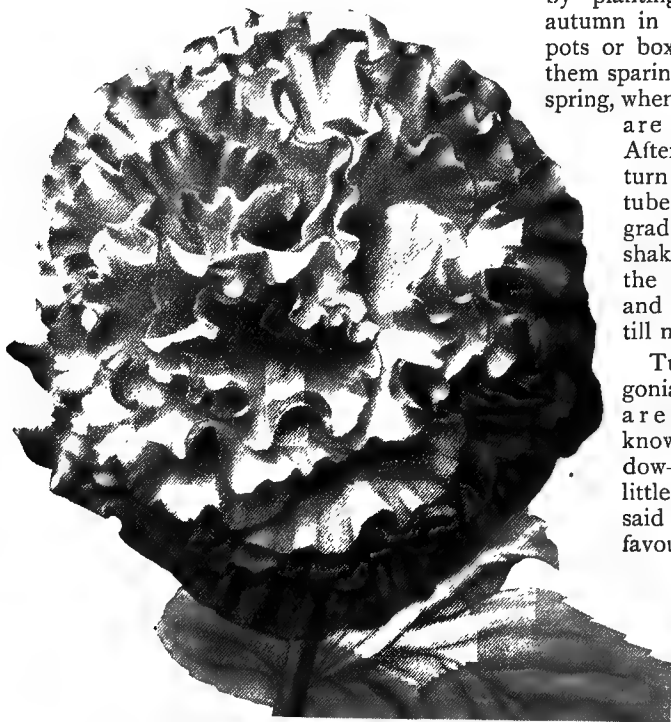


FIG. 519.—BEGONIA MISS GRIFFITH.

efficient drainage, as they are thirsty plants when growing. When the flower-stems appear, the plants should be assisted with weak manure-water; in fact, this may continue periodically until the flowering season is past, when watering generally must be gradually withheld as the ripening process is complete. The tubers should then be stored in a frost-proof cellar, keeping them in the pots until required to start them the next season.

Cyclamens of the more robust kinds should be included in a collection of window-plants, as they are grown very readily, and

are cheap at first cost. *C. Coum*, *C. europæum*, *C. hederæfolium* (*C. repandum*), and *C. Atkinsii* are very desirable sorts. They should be potted up carefully in September, using two parts leaf-mould to one part each of silver-sand and fibrous loam, and leaving the tops of the corms well above the soil. Water carefully until blossoms show, when give weak liquid manure in addition. After flowering, stand them outside in a shady position, and re-pot next September. If carefully used, good corms will last for years. Another useful little pot-plant is *Eranthis hyemalis*, which may be grown by even the most inexperienced of window-gardeners, as it requires neither special soil nor any particular attention.

From time immemorial Pelargoniums (commonly called Geraniums) have been popular. There are now some lovely Zonals that lend themselves to this phase of gardening, Show and Fancy, as well as the soft-hued and varied Ivy-leaved section. The last-named are especially suited for basket-plants, to be described later. All the Pelargoniums do well in a south window, and will blossom most abundantly in their season. The flowers should be removed as soon as they are faded, when others will quickly be produced over a long season. Fuchsias are still amongst the best of plants for window gardeners, and the varieties upon the market are ahead of the old-time kinds which did duty. The Pelargoniums require to be kept on the dry side in winter; but Fuchsias should have a little water in the dull season. For fuller details, see the Chapter "On Bedding Plants."

Musk is always appreciated as a window-plant on account of the grateful perfume it emits. Harrison's Musk should be selected as well as the old-fashioned kind. These are best for partially shaded positions. Musks are moisture-loving subjects. Other sweet-scented plants are the Stocks, which are readily raised from seed.

Asters are largely employed to give bright colour in autumn; but many are pure white and quite Chrysanthemum-like in appearance. The Comet is a singularly beautiful strain, and should always be included. Then there are The Bride and the dwarf-growing Victorias.

Blue flowers are by no means numerous outside bulbous subjects, and therefore a pot or two of Forget-me-Nots (*Myosotis*) should be welcome to many in spring. They should be raised from seed sown in May, when plants thus obtained will blossom early the next season.

There are quite a number of Primulas to select from, and window gardeners will do well to note such kinds as the pretty and floriferous *P. obconica*, though this distinct species (Fig. 520) is objected to by many on account of the irritation of the skin often set up by touching the leaves. This, however,

varies with the individual, those with very sensitive skins naturally being the greatest sufferers. More robust than *obconica* are kinds like *P. sikkimensis*, *P. denticulata* *cashmeriana*, and *P. rosea*, all of which may be grown from



FIG. 520.—PRIMULA OBCONICA.

seed, and are best afforded a shady position and a rich loamy soil. Alpine Auriculas are suitable, and their culture does not entail anything more than care in the matter of watering, and their subsequent removal to a shady border after their period of beauty is past.

Cinerarias are sometimes used for display, but showy though they are they cannot be recommended on account of the objectionable Greenfly. The Common Christmas Rose (*Helleborus niger*) may be potted up for the window in early autumn from the border, and returned thereto in late spring, employing fresh plants each year. Those which have been kept indoors soon recuperate when planted outside.

Allusion has already been made to several of the best known half-hardy annuals; but there are many more, as well as a host of hardy ones, which require nothing beyond a judicious thinning as the seedlings begin to grow. All the best will be found described in the Chapter dealing with "Annuals and Biennials."

Amongst other subjects diversified as to form and colour of flower, some of the best and easiest to grow are: *Deutzia gracilis*, with its graceful habit and pretty white flowers. *Hydrangea hortensis*. *Cytisus racemosus*, an evergreen with bright yellow spikes of flowers; this latter requires to be cut back

after flowering. *Coronilla glauca* is another pretty evergreen, with yellow flowers; the shoots of this should be pinched in spring, and a mixture of loam and peat should be used as compost. The majority of these and similar subjects are best given a sheltered position outdoors in summer. The well-known *Dicentra* (*Dielytra*) *spectabilis* (Fig. 521), with its rosy-pink flowers, must not be omitted from any collection of room plants. It should be

potted up from the open ground in November, and to get the best results fresh batches should be employed each season.

Astilbe (*Spiræa*) *japonica* is another old favourite, requiring practically similar treatment; it likes plenty of moisture when growing. Uncommon but beautiful subjects for windows are *Francoa ra-*



FIG. 521.—DICENTRA (DIELYTRA) SPECTABILIS.

mosa (Bridal Wreath) and *F. appendiculata*. Their long flower-stems are crowded with blossoms in late summer if they receive plenty of water when growing, and a little help from artificial manure when about to blossom. Potting is best done in April.

A list of flowering plants might be extended almost indefinitely, and all that has been aimed at here is to give a selection of well-tried subjects, leaving the individual to experiment further for himself.

Ferns.

The kinds available for use as pot-plants for indoor decoration are fairly numerous, but care must be taken in their selection, or disappointment will ensue. Maidenhair Ferns, beautiful as they undoubtedly are, cannot be recommended as room plants. The genus *Pteris* furnishes many kinds suitable for the purpose under consideration, and some of them are amongst the finest to be found in the large and varied order. *P. cretica albo-lineata* is a

most distinct variety, with a white band centreing each leaflet (Fig. 522). *Pteris quadrita argyrea* (*P. argyrea* of some)



FIG. 522.—*PTERIS CRETICA ALBO-LINEATA*.

is another very decorative variegated Fern, having a broader band of white than that in the species previously noted. *Pteris serrulata* is a favourite species, though very variable. It is quite one of the most robust, and is therefore largely grown for market purposes. The crested forms of it are even more highly esteemed than the typical plant.

To the genus *Asplenium* we are indebted for three or four species right in the front rank of foliage plants for rooms. These are *A. bulbiferum*, *A. b.*

Fabianum, and *A. b. laxum*. These all droop gracefully, and this, together with their habit of bearing young plants upon the fronds, renders them very distinctive. Though looking at its best when grown as a basket-plant, *A. flaccidum* makes a very pretty pot subject for a shady window. *Pellea* (*Platyloma*) *rotundifolia* is a greenhouse species which succeeds well by reason of the leathery texture of its fronds. The most robust of all Ferns for rooms are *Cyrtomium falcatum* and its varieties *Fortunei* and *caryotideum*. Several native Ferns might be used with advantage: *Scolopendrium vulgare* (Common Harts-tongue), *Lomaria Spicant*, *Asplenium Trichomanes*, and *Polypodium vulgare cambricum*. In the Chapter "On Ferns" further enumeration of suitable kinds for rooms will be found, while under "Basket Plants," in the present chapter, is enumerated a number of kinds especially suitable for that phase of culture.

Basket-Plants.

These call for special notice, as when properly used they lend pleasing variety to the plants grown about the house. Ivy-leaved Pelargoniums have much to recommend them; but there are a number of other plants quite as suitable though not so well known. Take the Campanulas; these are a host in

themselves. None are prettier or more effective than *C. isophylla* (blue) and *C. i. alba* (white), though *C. fragilis* runs them close, with its graceful habit and pretty pale blue flowers. *Lysimachia Nummularia* (Creeping Jenny) and its variegated form are also excellent so grown—hardy to a degree, free, and decorative alike as to flowers and foliage. Ivies of sorts, but especially the variegated kinds, are most essential, as they can be utilised for outdoor baskets the year through. Variegated Stonecrops (Sedums), *Zebrina pendula* (more familiarly known as *Tradescantia zebrina*), the common Musk, *Isolepis gracilis*, *Saxifraga sarmentosa*, the time-honoured Kenilworth Ivy (*Linaria Cymbalaria*), whose delicately-beautiful lilac flowers frequently adorn old walls, and *Othonna crassifolia*, a very distinct plant, are some few others which occur readily to the mind. The last is a veritable sun-lover, and must be provided for accordingly, or its yellow blossoms are not likely to be produced with any freedom. Distinct, too, is the half-hardy *Nierembergia gracilis*, whose showy flowers—a combination of white, purple, and yellow—are produced in summer. This plant delights in a light, rich soil. *Tropæolum polyphyllum* is another ideal basket-plant for a sunny aspect; its flowers are yellow. A light, rich soil, and to be kept on the dry side, are the other conditions which conduce to the successful culture of this hardy plant.

As already hinted, there are some species of Ferns which are admirably adapted for hanging-baskets; such are *Asplenium caudatum*, *A. longissimum*, *Davallia retusa*, *Nephrolepis exaltata*, *N. acuta*, *N. pluma*, and *Woodwardia radicans*. Many more are enumerated in the Chapter "On Ferns." None, however, are more beautiful than the species of *Nephrolepis*, which if planted in equal parts fibrous peat, chopped sphagnum, and sand, thrive splendidly. They like plenty of water in summer.

Window-Boxes.

In some few places—crowded cities and towns—these receptacles may be said to constitute the whole of the outside garden. They are, however, so intimately associated with rooms, that it has been thought advisable to treat them as a section of the present chapter. Usually the average window-box does not call for special mention on either the score of its novelty, variety, colour-scheme, or its general effect. There is too great a sameness—highly suggestive of a whole terrace or street having been filled by contract. Why there should be such monotony shown passes comprehension when one considers the plants available for the purpose.

Those who make a speciality of this form of gardening sometimes have two sets of window-boxes, which are readily interchangeable as soon as one gets shabby. The plan has much to commend it, and often enables the amateur to get

better results than are possible when only one box is available, and which the cultivator is forced to empty at each successive season, if he would have something to look at the year through.

For early spring there is nothing better than bulbous plants, which are cheap, easily grown, and may be made exceedingly decorative by a judicious employment of colours. Crocuses, Scillas, Chionodoxas, Snowdrops, and Muscari may be arranged between dwarf, hardy shrubs, either planted in the soil or simply dropped in the box and covered with cocoanut fibre. Other



FIG. [523.—LAURUSTINUS GROWN AS A WINDOW PLANT.

so-called bulbous subjects that may be tried are some of the dwarf species of Iris, all too seldom seen and not the easiest to grow in the outdoor garden proper by reason of the fact that they blossom so very early.

Such dwarf shrubs as some of the variegated Conifers belonging to the genera *Retinospora*, *Thuja*, *Juniperus*, *Cryptomeria*, and the like would impart pleasing colour from October (by which time the majority of bulbs should be planted) through winter, and until the spring flowers are past their best. Other

shrubs belonging to different sections are *Aucuba japonica*, *Mahonia* (*Berberis*) *Aquifolia*, *Euonymus japonicus variegatus*, the pretty *Pernettya mucronata*, and *Skimmia oblata*. These are all excellent town plants, which is an additional recommendation. Nor must the useful hardy Heaths be forgotten. *E. vulgaris* and its varieties, *E. carnea*, and several others make pretty and compact window-box plants, and they will withstand a good clipping each season. Then there are the beautiful Laurustinus (*Viburnum Tinus*), Fig. 523, Laurel, Privet, and many others. This shrubby section is such an important one, and contains so many widely different kinds, that the planter must refer to the Chapter "On Trees and Shrubs" for a more extended list and more details of culture.

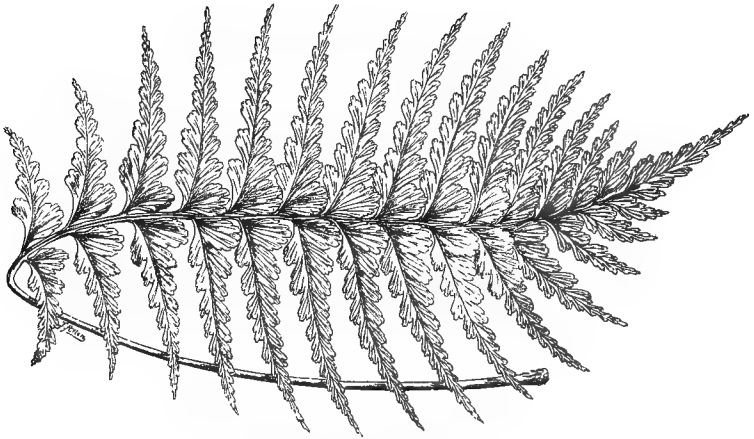
To hide the front of the box some trailing plants might be advantageously used. Many of the Ivies, Periwinkles (*Vinca*), *Gnaphalium lanatum*, Creeping Jenny (*Lysimachia*), Toadflax (*Linaria*), *Convolvulus major*, and Tropæolum Fireball would depend gracefully; or if something pretty and somewhat out of the common were required, Sweet Peas might be sown near the edge of the box—Cupid, for instance—and be allowed to fall over. The taller-growing varieties of Sweet Peas might also be similarly used. Even the few trailers enumerated are capable of giving plenty of variety and affording some pleasing contrasts if but arranged with an eye to colour.

Quite amongst the finest of plants for a sunny window-box are the Petunias. Good bushy plants of really strongly-constituted kinds should be selected and planted in summer, supporting them with neat little birch twigs. Amateurs who have not the necessary accommodation for raising their own plants in spring can purchase stocky specimens from any good nursery. Petunias like plenty of water in summer, and to be fed while in blossom with weak liquid manure. The double varieties are the most effective, and these are increased by cuttings taken in late summer. *Aubrietia deltoidea græca* should oftener be employed, as blue flowers are always appreciated. To the genus *Armeria* (Thrift) belong several capital window subjects if a light, rich soil be provided. They are pretty while in flower, and their foliage is refreshingly green in autumn and spring.

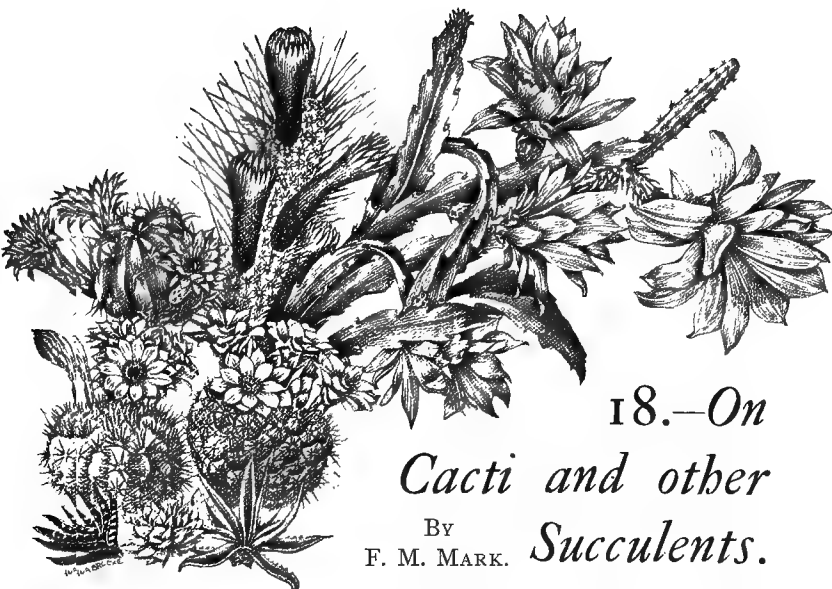
A plant so well known in the borders as *Alyssum saxatile* should need but little recommendation, as its fragrant yellow blossoms are excellent when associated with those of other spring-flowering subjects—Aubrietias or Arabis, to go no further. *Gypsophila repens* will add beauty to any box in which it finds a place; the minute white flowers and graceful habit combine to form a most pleasing whole. *Saxifraga Aizoon*, *S. Wallacei*, and *S. Burseriana* are all white-flowered Saxifrages, but they differ considerably in habit; they are especially valuable on account of their earliness and hardiness. In the rock garden one frequently

sees *Draba* represented, but it is not generally known that *D. nivalis* makes a pretty window-box subject if afforded a sunny position.

Carnations, again, are flowers which are very seldom used for the purpose under discussion; yet for sweetness of perfume and utility there are few to compare with them. Two or three of the more robust border varieties could be very well planted from pots in spring or from the open ground in autumn. These would make nice flowering plants by summer, while the foliage, even in the dullest weather, would look fresh and green, and the plants could be so arranged that they would not interfere with the bulbous subjects. These latter could be planted between the Carnations as well as at the back, in the case of a good-sized box.



ASPENIUM CAUDATUM.



18.—*On*
Cacti and other
BY
F. M. MARK. *Succulents.*

THE chief characteristics of succulent plants are their great diversity and peculiarity of form, and on this account alone they are worthy of cultivation, for they differ so much in appearance from the general run of plants as to afford a complete change to the eye. But besides being peculiar, many are very ornamental and bear handsome flowers, and as such are worthy of being treated as something more than mere curiosities.

CULTURE.—Provided a few essential conditions be observed, there are few plants that are more easily cultivated than succulents, or that require so little attention. The most important condition is that they should be provided with a house to themselves. There are many plants of this class that may be cultivated with a fair amount of success along with others requiring totally different conditions; but the success so obtained is never equal to what can be done when they are grown alone.

The house should be very light, airy, and well drained. The drainage is very important, as for a great part of the year the house will require to be kept dry, and at no time should water be allowed to remain on the floors. For this reason it is advisable that the flooring of the house be above the level of the surrounding ground; it is also better, if space permit, for a division to be made, one part of the structure to be warm (with a temperature of from 55deg. to 65deg.) and the other

cool (from 45deg. to 55deg.); with as much sun-heat in both cases as the plants can get during summer. However, if this plan is not convenient, the majority of succulents may be grown in a temperature ranging from 50deg. to 60deg. in summer, and this may drop as low as 45deg. in winter.

Most of the succulents inhabit tropical countries and grow in dry, arid regions, where they are baked up for a great part of the year, and during the other portion are subjected to torrential rains interspersed with bright sunshine, together with a very warm atmosphere, and this is especially the case with Cacti. It is during this period that they make their growth and flower. During the remainder of the season they are at rest and are undergoing a ripening process. To secure these conditions as near as possible under artificial treatment, the plants should be started into growth in the spring by giving copious waterings, and also syringing overhead during April, May, and June. Towards the end of the last-named month the supply should be gradually reduced, and but little given during the rest of the season, the plants being allowed to become almost dry; while during the winter, unless any of the plants show signs of shrivelling, none at all is required. By reducing the water supply early the plants are well ripened and enabled to pass through our dull, damp winters. Without thorough ripening flowers cannot be obtained. No shade at all is required, but plenty of ventilation should be given during hot weather; and excepting during the growing period the atmosphere of the house should be kept quite dry.

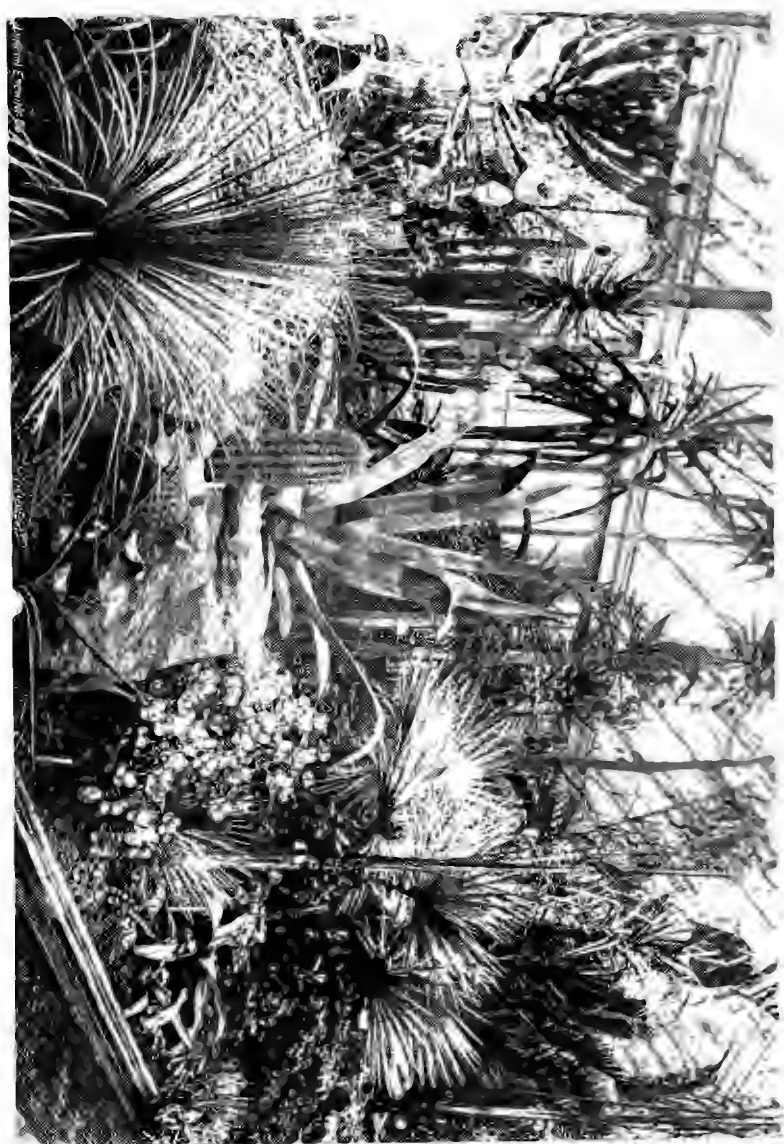
All succulents should be grown in small pots. Even large plants require very little root-room. The soil should in nearly every case consist of good fibrous loam mixed with plenty of sharp silver-sand, broken bricks, and mortar rubbish; and plenty of drainage should be given.

Repotting is not often necessary; in fact, provided the drainage is good, most of the succulents will do for several years in the same pot. When necessary, the operation should be performed in the spring, during April and May.

PROPAGATION is very simple, as there are scarcely any other plants that root so easily from cuttings. Many are easily raised from seed, others throw up suckers, and some may be propagated by leaf-cuttings. When propagated by suckers, it is advisable to let the cut portion dry well before inserting it in soil, which should be nearly dry, and have plenty of sand mixed with it.

INSECTS are often troublesome in spite of the toughness of the plants, especially during the growing period, the worst being Scale, Mealy-bug, Greenfly, and Thrips. For the first two, paraffin and soft-soap may be used, as advised in the Chapter "On Greenhouse Plants"; and for the latter two, syringing

SUCCULENT HOUSE AT KEW GARDENS.



with Fir-tree oil or tobacco-water will answer. Hot water may also be successfully employed, turning the pots on their sides when using the syringe. Water as hot as the hand can bear will not injure the plants.

Having now given a brief outline of the treatment of succulents, we will proceed to consider the chief genera and species as far as space will permit.

In the identification of plants of the various genera, the following "keys," given by W. Watson in his "Cactus Culture for Amateurs," will be found most helpful:

Tribe I.—Calyx-tube produced beyond the Ovary. Stem covered with Tubercles, or Ribs, bearing Spines.

1. MELOCACTUS. Stem globose; flowers in a dense cap-like head, composed of layers of bristly wool and slender spines, amongst which the small flowers are developed. The cap is persistent, and increases annually with the stem.

2. MAMMILLARIA (including ANHALONIUM). Stems short, usually globose, and covered with tubercles, or mammæ, rarely ridged, the apex bearing spiny cushions; flowers mostly in rings round the stem.

3. PELECYPHORA. Stem small, club-shaped; tubercles in spiral rows, and flattened on the top, where are two rows of short scale-like spines.

4. LEUCHTENBERGIA. Stem naked at the base; tubercles on the upper part large, fleshy, elongated, three-angled, bearing at the apex a tuft of long, thin, bristle-like spines.

5. ECHINOCACTUS. Stem short, ridged, spiny; calyx-tube of the flower large, bell-shaped; ovary and fruit scaly.

6. DISOCACTUS. Stem short; calyx-tube thin, the throat filled by the stamens; ovary and fruit smooth.

7. CEREUS. Stem often long and erect, sometimes scandent; branching, ridged, or angular; flowers from the sides of the stem; calyx-tube elongated and regular; stamens free.

8. PHYLLOCACTUS. Stem flattened, jointed, and notched; flowers from the sides, large, having long, thin tubes and a regular arrangement of the petals.

9. EPIPHYLLUM. Stem flattened, jointed; joints short; flowers from the apices of the joints; calyx-tube short; petals irregular, almost bilabiate.

Tribe II.—Calyx-tube not produced beyond the Ovary. Stem branching, jointed.

10. RHIPSALIS. Stem thin and rounded, angular or flattened, bearing tufts of hair when young; flowers small; petals spreading; ovary smooth; fruit a small pea-like berry.

11. OPUNTIA. Stem jointed, joints broad and fleshy, or rounded; spines barbed; flowers large; fruit spinous, large, pear-like.

12. PERESKIA. Stem woody, spiny, branching freely; leaves fleshy, large, persistent; flowers medium in size, in panicles on the ends of the branches.

The above is a key to the genera on the plan of the most recent botanical arrangement, but for horticultural purposes it is necessary that the two genera, *Echinopsis* and *Pilocereus*, should be kept up. They come next to the *Cereus*, and are distinguished as follows:

ECHINOPSIS. Stem as in Echinocactus, but the flowers are produced low down from the side of the stem, and the flower-tube is long and curved.

PILOCEREUS. Stem tall, columnar, bearing long silky hairs as well as spines; flowers in a head on the top of the stem, rarely produced.

Cacti.

These are, without doubt, the most important of all the succulents, and also the most interesting. All have curious forms, and when grown in a collection have a very extraordinary effect. Many also bear handsome flowers of the most brilliant colours; some are scented, only opening their flowers during the night, and others bear highly-coloured berries. Cacti are mostly furnished with spines, which in many cases are also ornamental; but these are dangerous to handle, and it is necessary to wear gloves for the purpose.

CULTURE.—All the previous remarks in this chapter apply to these plants, and when grown well and ripened during summer a good show of blossom can be obtained. Cacti may all be propagated by cuttings of the branches in a warm pit or house. Some (e.g., *Echinocactus* and *Melocactus*), however, do not have branches; but cutting the apex of the plant will cause latent buds to push and grow, or to throw up suckers. Although the plants may be easily propagated from cuttings, some of the delicate kinds, which are apt to rot at the base, are best grafted on the roots of more robust ones (e.g., *Cereus* and *Echinocactus*); while the pendent species of *Epiphyllums* and *Cereus* may be grafted on the tall, erect stems of *Pereskias*, and are thus seen to better advantage. The grafting should be done whilst the plants are growing, and the grafts take readily provided they are properly joined, and not bound too tightly. Soft worsted should be used for binding.

When Cacti are raised from seed, these require to be sown in the spring in shallow pans of loam with plenty of sand incorporated, in a temperature of from 75deg. to 80deg., and must be kept moist at first whilst growing. Seed may be ripened and saved on home-grown plants; but to do this successfully it is necessary to fertilise the flowers artificially, using a soft camel-hair brush. Seedlings generally produce freer growth than plants raised from cuttings, but are slower growing, or, rather, take longer to form a good-sized plant.

Cacti are now divided into several genera, and it will be best to take these in alphabetical order, giving a few of the most desirable and useful species of each.

ANHALONIUM.—This small but rather interesting genus was formerly classed under *Mammillaria*. A distinguishing feature, however, is an absence of spines and the production of the flowers on the young warts, or tubercles. Sorts: *A. Engelmanni* (see *Mammillaria fissurata*). *A. furfuraceum* has pointed tubercles and a dented top; flowers, white or pale pink. *A. prismaticum* is rare; it is very symmetrical, the chief colour being a delicate pearl grey; it has a rosette of tubercles at the top, the centre of which contains short, soft hairs, and from this the flowers

appear; these are about 2in. long, white, with yellow anthers. *A. Williamsii* (Fig. 524) is an attractive plant, with pale rose



FIG. 524.—*ANHALONIUM WILLIAMSII*.

flowers; from its puffed-out appearance it is called the Dumpling Cactus.

CEREUS (Torch Cactus).—Amongst these are the tallest of the Cacti, but in their early stages under cultivation they are very slow growing. Most of the species have straight, erect stems, but there are others which have a procumbent or trailing habit, and many of these may be used as climbers. Both kinds bear handsome flowers, and many are free blossomers, but the trailing kinds are the better, comprising as they do the night-flowering and sweet-scented varieties.

Erect Sorts with Pillar-like Stems: *C. giganteus*, as its name implies, is the giant of the family. In its native habitat it attains to a height of 60ft. In its young state the stems are globular, only attaining their pillar-like appearance after some years. The flowers are produced when about 10ft. high, and they are about 5in. long. *C. caeruleus* is a tall species, with large white flowers and blue stems. *C. peruvianus* is tall, with very spiny stems; the flowers are large, white, tinged with red, opening out flat. *C. repandus* attains a height of about 10ft., and has very beautiful white flowers. *C. Royeni* has ornamental-ridged stems. *C. variabilis* is of a branching habit, with white flowers.

Trailing or Climbing Sorts: These include most of the night-flowering species, which have very beautiful and strongly-scented blossoms. *C. grandiflorus* (Fig. 525) has cylindrical stems and large pure white flowers; it is alike the best-known and the finest of this section, and has been called the Queen of the Night. *C. grandiflorus Maynardii* is a cross between *C. speciosissimus* and *C. grandiflorus*; the petals are cupped, and the flowers are rich red, tinged with orange, and will last several days. *C. Macdonaldiae* has larger flowers than *C. grandiflorus*, but they are not scented. *C. nycticalus* is a fine night blossomer, with very bright yellow and white flowers. *C. triangularis* is well-known by its triangular stem; it is a quick grower, and climbs freely; the flowers are white, from 12in. to 14in. across; the large bright scarlet fruit is also ornamental. *C. eruca* is a quaint creeping species, with stems between 2ft. and 3ft. long, and yellow flowers.

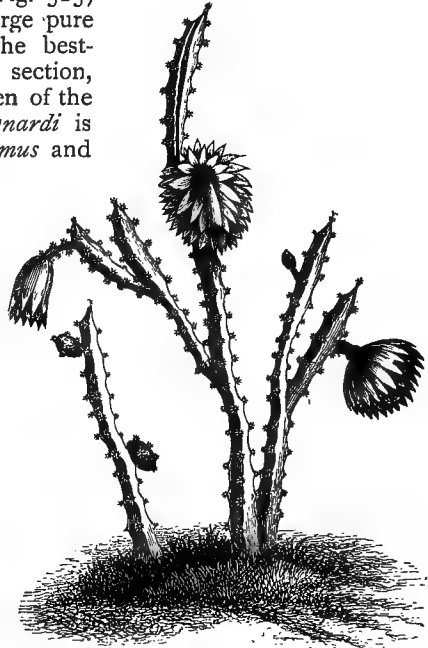


FIG. 525.—*CEREUS GRANDIFLORUS*.

Globular Species: Many of these are of great interest, and from their size are best suited for small houses. *C. cespitosus*



FIG. 526.—*CEREUS CÆSPITOSUS*.

(Fig. 526) attains a height of about 8in.; it has generally a number of side growths which form into clusters; it is grey-green, covered with reddish spines and white wool; the flowers are rose with yellow centres; very suitable for windows. *C. stenoides* is about 4in. in height and 3in. round, much ribbed and covered with stiff white spines; flowers yellow. *C. Fendleri* has pale green stems and is very dwarf; the flowers

are bright purple, and last a long time. *C. Leeanus* is cone-shaped, and about 9in. in height; the flowers are red, and produced several together on the top. *C. multiplex* (Fig. 527) is Pear-shaped, with very deep cut ridges and clusters of spines. Others are *C. paucispinus*, *C. pleiogonus*, *C. polyacanthus*, and *C. aggregatus*.

Besides the above there are a few whose characteristics are rather nondescript, and so are given here by themselves. *C. flagelliformis* has prostrate stems, which are sometimes grafted like Epiphyllums; it is very useful for basket-work; the flowers are bright red. *C.*

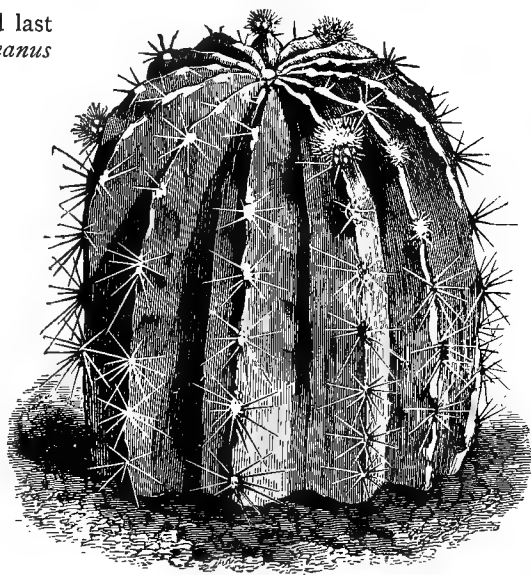


FIG. 527.—*CEREUS MULTIPLEX*.

serpentinus at first has erect stems, but as they grow they fall and trail on the ground unless supported; the flowers are large, purple, and sweet scented. *C. Berlandieri* (Fig. 528), with procumbent stems and purple flowers, *C. leptacanthus*, and *C. procumbens* are also worth growing.

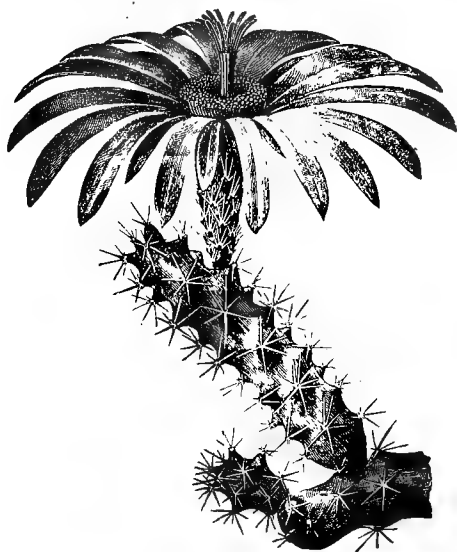


FIG. 528.—*CEREUS BERLANDIERI*.

ECHINOCACTUS (Hedgehog Cactus).—These, like the Melocactuses, are globular, very few producing offsets, and also attain a large size. Many are really handsome, whilst others are rather curious. The flowers are large and brightly coloured—various shades of yellow, white, rose, and purple. Sorts: *E. cylindraceus*

attains a good size and is a free blossomer; it bears yellow flowers and long powerful - hooked spines. *E. concinnus* (Fig. 529) is a rather small globular species, having yellow

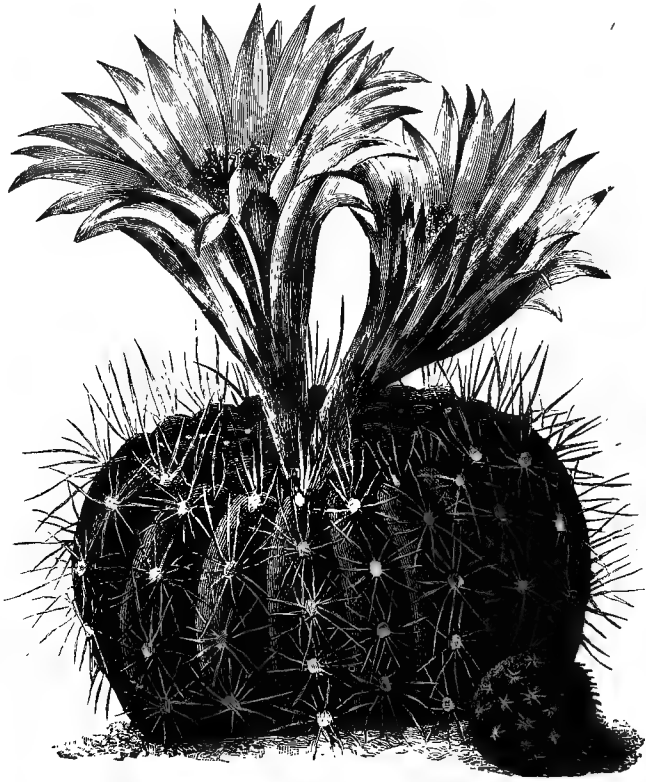


FIG. 529.—ECHINOCACTUS CONCINNUS.

flowers which are often as large as the plant itself, and occasionally several appear together on the same stem. *E. coptonogonus* is wavy-ribbed and globular, while the flowers are rayed white and striped purple. *E. cornigerus* is noted for its strong spines, which are purple; the stem is waxy, ribbed, and grey-green; it is a free blossomer with deep red flowers. *E. crispatus* is very short and neat; the flowers are white, with a purple stripe. *E. Emoryi* is very striking; the hooked spines are of remarkable size, and are borne at the ends of the tubercles; the flowers are red and yellow. *E. myriostigma* (Bishop's Hood) is also remarkable; it has no

spines, the ridges are very deep, regular, and smooth, and it is beautifully dotted with white spots composed of minute hairs (Fig. 530). *E. scopa* has a brush-like appearance, being covered with bristle-like spines, in tufts. The crested form (*crinata*) is most peculiar, much resembling in form a cock's-comb. Other interesting species are: *E. Simpsoni*, *E. turbiniformis* (the Pinwheel), *E. viridescens*, *E. Wislizeni*, *E. Ottonis*, *E. electracanthus*, and *E. horizonthalonis*.

ECHINOPSIS are also warm-house Cacti, but they require to be kept dry in winter. They are globular in form, and are covered with stiff spines. Sorts: *E. cristata* has a globular stem, with deep star ridges; it is a very fine species, possessing large white flowers. *E. Eyriesii* is remarkable for its

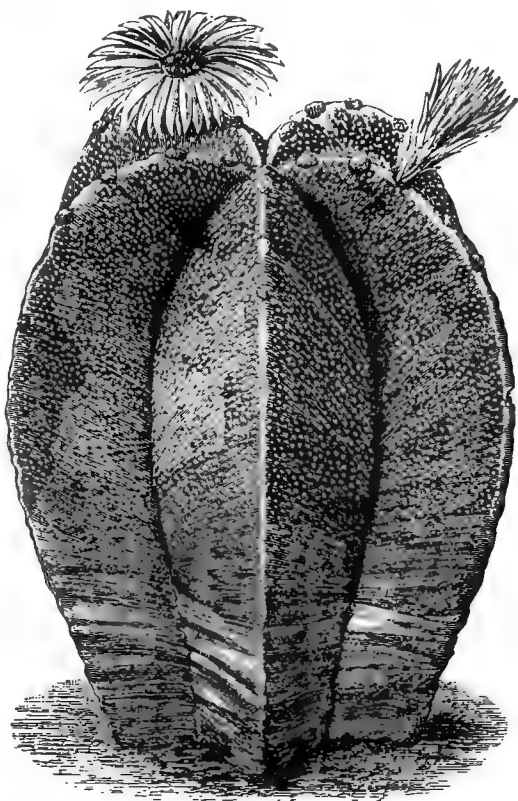


FIG. 530.—ECHINOCACTUS MYRIOSTIGMA.

immense flowers in comparison with the size of the plant, which is small, with sharp ridges, tufts of fine white hairs, and red spines; the flower is pure white and expands at night, and, when in bud, is covered with greyish-black hairs; it also has a very delicate scent. The double form, *E. E. flore-pleno* (Fig. 531), is even more remarkable. *E. Pentlandi* is only 3in. in diameter, but also has a large flower, of a bright red colour; three or four flowers will sometimes open together on one plant. Its variety, *longispinus*, is remarkable on account of its long spines. Other kinds are *E. multiplex*, *E. Mulleri*, and *E. tubiflorus*.

EPIPHYLLUMS.—These Brazilian plants have very fine and highly-coloured flowers, and if brought on in heat are useful for winter decoration. For pot-work they require to be grafted,



FIG. 531.—ECHINOPSIS EYRIESII
FLORE-PLENO.

and the stocks used are *Pereskia aculeata* and *P. Bleo* (these should have stems about 1ft. high); but cuttings are very useful for basket-work on account of their drooping habit. After grafting, which should be done in spring, they should be grown on in warmth longer the first year than would be done if the plants were well established. These plants like more heat than most of the Cacti during winter; further, they cannot bear to be kept quite so dry during that time. If a temperature of about 60deg. is allowed they will open their flowers

in winter; but this temperature should be reduced by 5deg. when the blossoms are well open. *E. Russellianum* (Fig. 532) has small branches about 1in. long; the flowers are red, with narrow petals. *E. truncatum* has branches from 1in. to 3in. long, with rose-coloured flowers and curved petals.

There are many hybrids between these, amongst which the following may receive notice: *E. bicolor*, purple and white; *E. coccineum*, scarlet; *E. Gartneri* (a hybrid between an Epiphyllum and a Cereus), with beautiful scarlet and violet flowers, resembling those of a Cereus; *E. salmoneum*, salmon; and *E. tricolor*, salmon-red and purple.

LEUCHTENBERGIA is a remarkable genus, for, with the exception of the flower, it has rather the appearance of an Agave than a Cactus. The tubercles have the shape of the leaves of that plant. It should be kept in a warm house in winter, getting all the sun possible, and succeeds best in a sunny frame in summer. *L. principis* is the only species. It reaches a height of about 1ft. or a little more, with an erect stem; the leaf-like tubercles

fall away from the base and leave scales. The flower is bright yellow, and appears near the centre.

MAMMILLARIA.—Many species of this genus are very beautiful. They are all dwarf, and the tubercles are surmounted by rosettes of stiff hairs or spines, from the midst of which the flowers come. The blossoms are of various colours—yellow, rose, or white. Many also bear berry-like fruits resembling coral. Sorts: *M. angularis* branches freely, and is bright green with rose-coloured flowers, which, however, are rarely seen under cultivation.

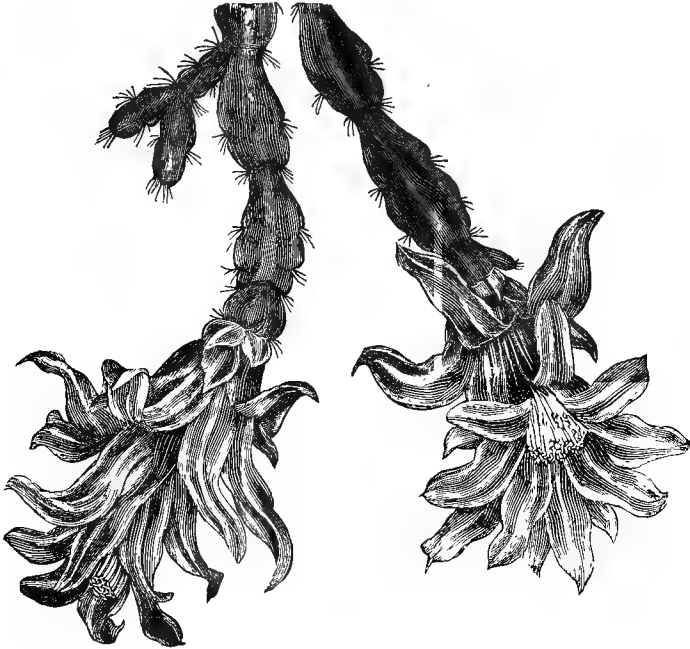


FIG. 532.—EPIPHYLLUM RUSSELLIANUM.

M. bicolor is very common and also distinct, on account of the hair-like white spines borne in clusters on the ends of the tubercles; it is cylindrical and often branches, presenting a curious appearance; the flowers are deep purple. *M. cirrhifera* is very neat in form; it has angular tubercles and yellow, twisted spines; the flowers are rose-coloured and small. *M. dolichocentra* (Fig. 533) is rather variable; it is about 8 in. in height, with small, cone-shaped, smooth mammæ; the flowers are small, but very numerous, and of a pale purple colour; the bright rose-coloured fruits are also pretty. *M. elephantidens* (Fig. 534) is one of the

largest of Mammillarias; it is globular, 6in. or 8in. in diameter, and bright green; the flowers, which are 3in. across, are bright rose and pale purple. *M. fissurata* is very remarkable; it somewhat resembles a top with its thick, short tubercles and long woody root; it is very rare, but is catalogued by Messrs. Cannell and Sons under the name of *Anhalonium fissurata*. *M. gracilis* is pretty and distinct, its numerous stems forming

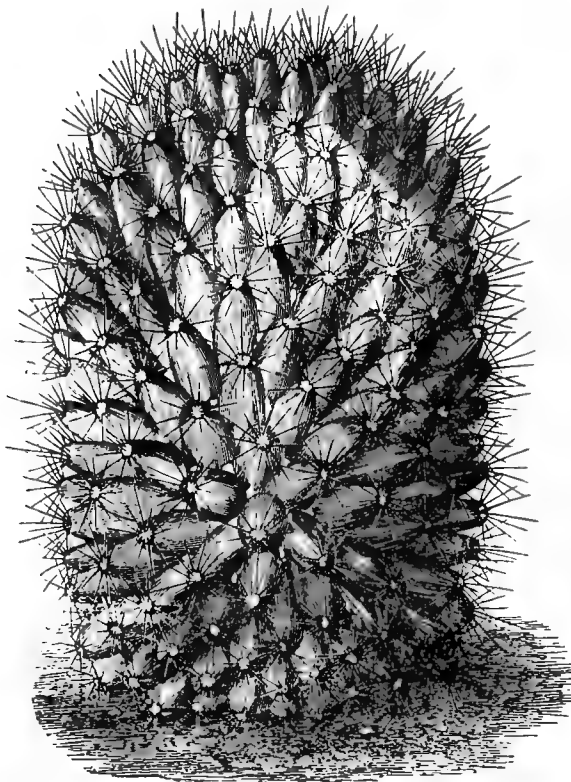


FIG. 533.—MAMMILLARIA DOLICHOCENTRA.

a neat little cushion; it is a profuse blossomer, the flowers being yellow. *M. macromeris* (Fig. 535) more resembles an ornamented button than a plant; it is 1½ in. across and 1 in. high; when old it forms large clusters; the flowers, which appear in the centre, are small, and either white or pink in colour. *M. sanguinea* has a short, thick stem covered with fine red spines, giving it a brush-like appearance. The flowers are bright crimson, and many open together. *M. pusilla* is small and very beautiful; it is 2 in. high, the

dark green tubercles being covered with fine twisted spines and tufts of white wool; flowers yellow, streaked with red. Other species are: *M. dasycantha*, *M. densa*, *M. echinata*, *M. echinus*, *M. elongata*, *M. elegans*, *M. Grahamsii*, *M. missouriensis*, *M. pectinata*, *M. Scheerii*, and *M. Wrightii*.

MELOCACTUS (Melon Cactus) is without doubt one of the most peculiar of all the Cacti, being round and, as its name implies,

resembling the shape of a melon. It is unbranched, and has a soft, woolly, cap-like head at the apex, bearing small tubular-rose-coloured blossoms. *M. communis* (Turk's Cap) (Fig. 536) is most remarkable; it has a globular stem, 2ft. to 3ft. in diameter, and on the top a cap, cylindrical in shape, from 5in. to 12in. in height, covered with red spines, which closely resemble a Turkish fez; the flowers, which are red, are produced on top.

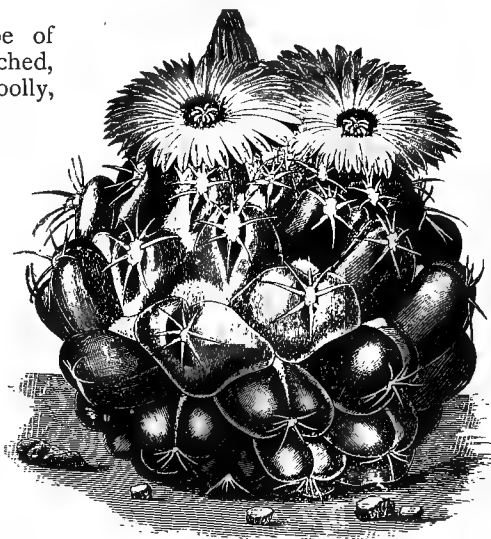


FIG. 534.—MAMMILLARIA ELEPHANTIDENS.

M. depressus, instead of having a cylindrical cap, has a broad

tuft of red spines and wool like a skull-cap. *M. Miquelii* is oval, dark green, and has a cylindrical cap composed of white threads and red bristles.

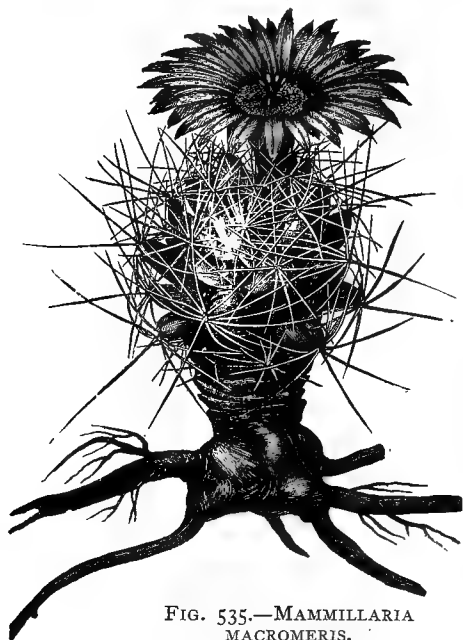


FIG. 535.—MAMMILLARIA MACROMERIS.

OPUNTIA (Indian Fig or Prickly Pear).—This is about the best known and the most extensively grown of all the Cacti, and from one species (*O. cochinellifera*) the cochineal insect is obtained. They bear various coloured flowers — yellow, red, and purple—and can stand a low winter temperature, some being almost hardy. Sorts: *O. arborescens* grows in the form of a tree; the flowers appear on the

ends of the young branches, are from 2in. to 3in. in diameter, and bright purple; the plant will attain a height of from 8ft. to 30ft. *O. basilaris* (Fig. 537) has

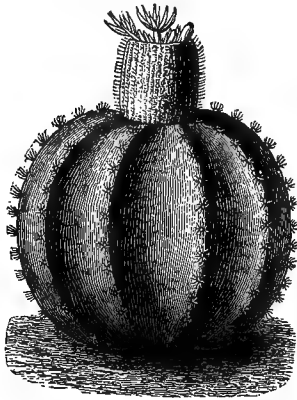


FIG. 536.—MELOCACTUS COMMUNIS.

a very curious habit, the stem being short, and producing a number of flat branches which spread out at the top. *O. brasiliensis* has a straight, slender stem from 10ft. to 30ft. high, having short lateral branches; the flowers are pale yellow. *O. cylindrica* has cylindrical stems and branches; the flowers are scarlet, and very numerous. *O. Ficus-indica* is the Indian Fig, so well known on account of its Pear-shaped fruit; it grows from 8ft. to 12ft. high, and has yellow flowers. *O. Rafinesquii* is a low-spreading species (Fig. 538), with flowers of a bright yellow colour, produced in profusion on the edges of the young joints; the fruit is

Pear-shaped and edible. *O. Tuna* is erect, with flat stems; the flowers are orange-red, borne on the newly ripened joints. Others sorts are *O. aurantiaca*, *O. boliviana*, *O. Emoryi*, *O. Engelmanni*, *O. frutescens*, *O. microdasys*, *O. missouriensis*, and *O. polyacantha*.

PERESKIA (Barbados Gooseberry).—These are chiefly grown to afford stocks for Epiphyllums, &c. However, *P. Bleo* is very decorative, having red blossoms.

PHYLLOCACTUSES are the most ornamental of all the Cacti, and the species are largely grown on that account. They have fine flowers, varying in shades of rose, white, and red. When of a good size, the plants benefit by a top-dressing of rich soil; and during the growing season liquid manure may also be given. Till the end of the summer they will be greatly assisted in ripening if placed against a dry wall, well exposed to the sun. Sorts: *P. Ackermanni* (Fig. 539)

has large handsome flowers of a deep scarlet colour. *P. anguliger* has very deeply-notched branches and a stiff, erect habit; the



FIG. 537.—OPUNTIA BASILARIS.

flowers, which are pure white, have a long curved tube. *P. crenatus* has very large flowers of a pale cream colour, which exhale



FIG. 538.—OPUNTIA RAFINESQUII.

a beautiful fragrance. *P. (Disocactus) biformis* is small, having an affinity to *Epiphyllum*; the notched branches are short and drooping, as also are the flowers; the berry-like fruit is red. *P.*

grandis has very large creamy-white flowers, often 1ft. in length, which open at night, and are strongly scented. *P. latifrons* is a large, quick-growing species, with broad stems and white flowers. *P. phyllanthoides* grows from 2ft. to 3ft. high, and has handsome bright rose-coloured flowers. In addition to the above there are many beautiful hybrids, a few of which may be noted:

P. albus-superbus, *P. aurantiacus superbus*, *P. Cooperi*, *P. grandiflorus*, *P. Haagei*, *P. kermesina magnus*, and *P. roseus grandiflorus*.



FIG. 539.—PHYLLOCACTUS ACKERMANNI.

PILOCEREUS.—This genus is chiefly remarkable for *P. senilis*, the Old Man Cactus (Fig. 540), but there are also several other



FIG. 540.—PILOCEREUS SENILIS.

curious and interesting species. They have erect stems, sometimes branched, and the flowers, which have an unpleasant odour, are produced on top of the matured stems. *P. Houletianus* has glaucous stems, broad ridges, and spines mingled with long cottony - white hairs. The flowers, which are funnel-shaped, are borne in clusters; colour, rose-purple and yellow. Fruit large and bright red. *P. senilis* will reach a height of 25ft. On the upper portion it has a number of long silky white hairs, giving it the appearance of an old man's head: hence the above common name. *P. Brunnowianus*, *P. Celsianus*, and

P. Hoppenstedti, are three sorts also worth growing.

RHIPSALIS.—These are amongst the most peculiar of the Cacti, some having thin willow-like stems, while the stems of others are flattened and leaf-like. Sorts: *R. Cassytha*, *R. Houlettii*, *R. paradoxa*, *R. crispata*, and *R. funalis* (Fig. 541). *R. Cassytha* (Mistletoe Cactus) is of a pendent habit, with numerous branches and branchlets, the latter being no thicker than whipcord; the berries are white, like Mistletoe. *R. commune* has a freely-branching, straggling stem, and white and purple flowers; this plant is very suitable for baskets. *R. crispata* has flat, jointed branches, resembling an Epiphyllum; the flowers are small and white, as are the fruits. *R. funalis* has straggling stems and numerous glaucous, thin branches; the flowers are white. Other kinds are *R. Knightii*, *R. paradoxa*, *R. salicornoides*, *R. myosurus*, *R. penduliflora*, and *R. sarmentacea*.

Many species will succeed well in a rockery under a frame, merely requiring a little protection against our generally damp and foggy climate. Amongst these are: *Cereus Engelmanni*, *C. Fendleri*, *C. gonacanthus*, *C. phæniceus*, *Echinocactus Pentlandi*, *E. Simpsoni*, *Mammillaria vivipara*, *Opuntia humilis*, *O. missouriensis*, *O. Rafinesquii* and var. *arkansana*, and *O. vulgaris*.



FIG. 541.—RHIPSALIS
FUNALIS.

Other Succulents.

AGAVES (American Aloes) are very handsome and ornamental plants, having thick, fleshy leaves and sharp spines. Many attain a large size, and require to be grown in tubs, but there are also smaller species which are more suited to houses of limited dimensions. However, the larger species are very slow growing under cultivation, so that if small specimens are obtained they will not require much room for a long time. There is an erroneous idea in many people's minds that these plants only flower once in a century. Certainly this is so far correct with nearly all the species, inasmuch as they die directly after blossoming; but it is quite wrong to suppose that there is any stated time for their doing so. *A. filifera* and a few others will occasionally survive if the flowers happen to be produced from a lateral instead of a crown bud. The flower-spikes themselves are very handsome, being produced on long stems, which in the large species attain a great height. Propagate by suckers, give thorough drainage, and grow in stiff, yellow loam. Expose to the full sun during summer, and give plenty of water at that season. Large-growing sorts: *A. americana* (Fig. 542) and vars. *picta* and *variegata*, *A. Hookeri*, *A. Maximiliana*, *A. potatorum*, and

A. atrovirens. Small-growing sorts: *A. cuspidata*, *A. ensifera*, *A. horrida*, *A. filifera*, *A. mexicana*, *A. Regelii*, *A. striata*, *A. albicans*, *A. ferox*, and *A. rigida*.

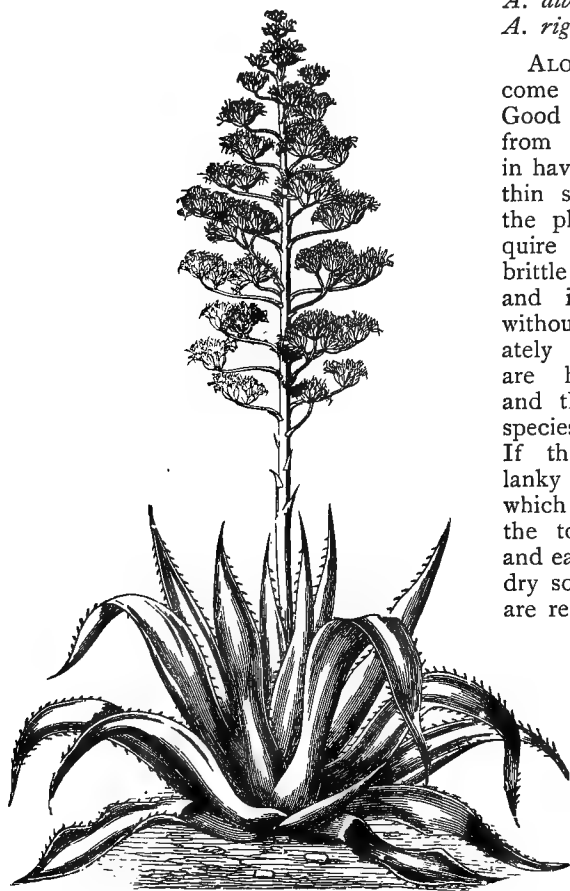


FIG. 542.—AGAVE AMERICANA.

A. platylepis, *A. spicata*, *A. striata*, *A. tricolor*, and *A. variegata*.

COTYLEDONS.—Many of these are handsome plants, and are very easy of culture; they mostly come from South Africa, and are allied to the Crassulas. Sorts: *C. atropurpurea*, *C. carnicolor*, *C. coccinea*, *C. cristata*, *C. glauca*, *C. Peacockii*, *C. stolonifera*, and *C. rotundifolia*. These were formerly known as Echeverias.

CRASSULAS.—These are very ornamental flowering plants, with thick, fleshy leaves; they come from South Africa, and are easily

ALOES.—The true Aloes come from the Cape of Good Hope. They differ from the Agaves chiefly in having long and rather thin stems, which, when the plants are large, require support, in having brittle leaves without fibre, and in flowering freely without dying immediately afterwards. They are handsome subjects, and the flowers of many species are very beautiful. If the plants get too lanky for the house in which they are growing, the top may be cut off and easily rooted in almost dry soil in spring. Aloes are readily propagated by suckers, and also from the leaves. There are a very large number that are well worth growing, amongst which the following may be mentioned: *A. africana*, *A. arborescens*, *A. abyssinica*, *A. casia*, *A. frutescens*, *A. Greenii*, *A. lineata*,





CACTI AND OTHER SUCCULENTS USED AS OUTDOOR BEDDING PLANTS.
Fenge Recreation Ground.

raised from cuttings. Sorts: *C. Bolusii*, *C. ciliata*, *C. coccinea* (Fig. 543), *C. cordata*, *C. falcata*, *C. marginalis*, *C. jasminea*, *C. rosularis*, and *C. versicolor*. *C. coccinea* is a very handsome plant, which is extensively cultivated. Young plants are best grown singly in 4in. or 6in. pots, and benefit by manure during summer.

EUPHORBIAS.—Many of these very much resemble Cacti, but apart from their peculiar appearance are not worth growing, except *E. splendens* and *E. pulcherrima* (*Poinsettia pulcherrima*). Sorts: *E. triangularis*, *E. grandicornis*, *E. Bojerii*, *E. splendens*, and *E. erosa*. *E. splendens* is a climber, with brilliant scarlet flowers, and will blossom nearly all the year. It may be grown either on the roof or on balloons in pots.

FURCRÆAS are handsome plants allied to the Agaves, and require the same treatment. Sorts: *F. cubensis*, *F. elegans*, *F. gigantea*, *F. longæva*, and *F. undulata*.

GASTERIAS are something like Aloes (to which they are allied). Some of them have beautifully coloured leaves, smooth and shiny, but sometimes rough. They also produce spikes of long white pendulous flowers, occasionally rough. Sorts: *G. angustifolia*, *G. brevifolia*, *G. glabra*, *G. spiralis*, *G. pulchra*, *G. nigricans*, *G. sulcata*, and *G. trigona*.

HAWORTHIAS are curious plants, also allied to the Aloes; they have grey flowers. Sorts: *H. atrovirens*, *H. attenuata*, *H. fasciata*, and *H. viscosa*.

MESEMBRYANTHEMUMS (Fig-Marigolds).—Many of these have very fine and highly-coloured flowers. The genus is very large, and all the species have thick, fleshy leaves, which in some cases are very pretty, and in others very curious. They may all be propagated by seeds, and most of them by cuttings. Many are very useful for basket-work, having a creeping habit. Creeping sorts are: *M. attenuatum*, *M. australe*, *M. calycinum*, *M. densum* (Fig. 544), *M. floribundum*, *M. glaucescens*, and *M. striatum*. Annuals: *M. calendulaceum*, *M. californicum*, *M. crystallinum*



FIG. 543.—*CRASSULA COCCINEA*.

(Ice Plant), and *M. pyropæum*. Erect: *M. albidum*, *M. blandum*,
M. candens, *M. coccineum*, *M. Cooberi*, *M. cordifolium*,

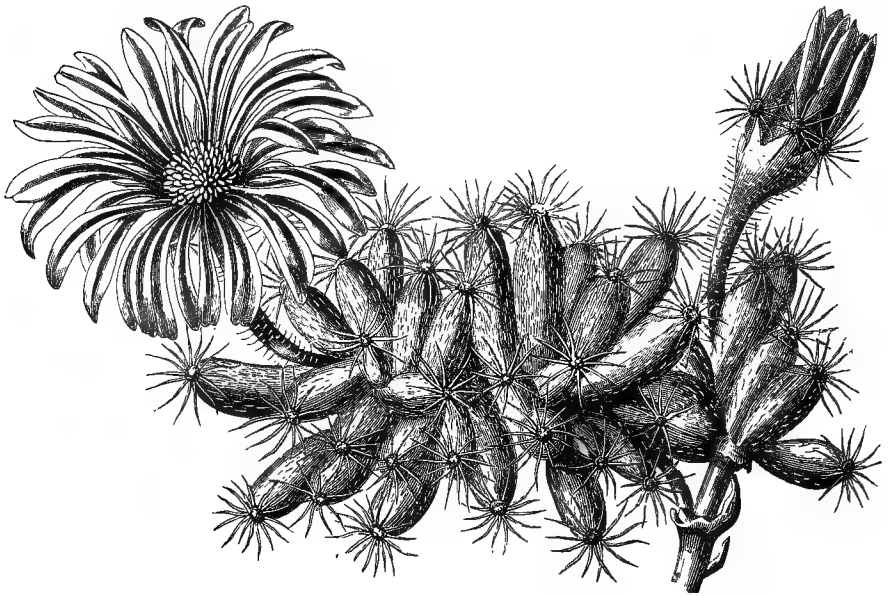


FIG. 544.—MESEMBRYANTHEMUM DENSUM.

M. c. variegatum, *M. formosum*, *M. minutum*, *M. spectabile*,
M. tigrinum (Fig. 545), and *M. violaceum*.

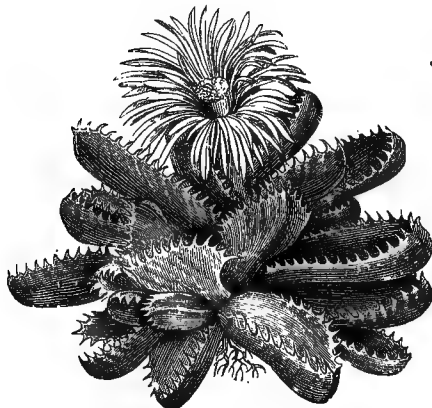


FIG. 545.—MESEMBRYANTHEMUM TIGRINUM.



19.—On Palms, Cycads, and Bamboos.

BY A. GRIESEN.

Palms.

PALMS.—“Those haughty princes of the Vegetable Kingdom,” as Linnæus justly termed them—form one of the most useful orders, not only for decorative purposes, as we understand it here, but also on account of their important economic properties in their native countries, furnishing the daily food of a very considerable portion of the human race. The stems of many of them provide excellent timber, which is very largely used for building purposes, while the leaves are often employed in the making of articles of every-day use. Some species furnish also a valuable wax, which is very much in demand at the present time; and others yield seeds from which a useful oil is extracted. The fruits of many Palms form an excellent article of food—Dates, for example, from *Phoenix dactylifera* (Fig. 546). Palm wine, generally called “toddy,” is another product of the *Palmæ*. We must, however, restrict our attention to the decorative properties of these plants, which, for the embellishment of our greenhouses as well as our apartments, are without rivals.

Very few foliage plants can equal the Palms, although Ferns may in some respects. From the noble appearance of certain species of *Sabal*, *Bismarckia*, *Corypha*, &c., to the fine and delicate forms of others of moderate sizes, such as the charming *Cocos Weddeliana* or *Geonoma gracilis*, all are conspicuously beautiful.

The Palms are all natives of tropical countries, with the exception of a very limited number extending to the limits of the cool regions. They appear at 36deg. N. lat. in America, 44deg. N. lat. in Europe, 34deg. N. lat. in Asia, and 38deg.

S. lat. in the Southern Hemisphere. Several are found under the blue sky of the Riviera; and anyone who has had the pleasure of visiting the Mediterranean regions, from Toulon, along the coast in the direction of Italy, as well as by the side of the Italian coast, will have gained an idea of their valuable decorative properties, and of the fine contrasts that can be obtained when they are cleverly arranged with other plants. At Nice the splendid Promenades des Anglais is planted with some enormous *Phoenix dactylifera*.



FIG. 546.—PHŒNIX DACTYLIFERA.

DECORATIVE USES.—Such varieties as *Cocos Weddeliana*, *Geonoma gracilis*, small Kentias, Arecas, Coryphas, and Euterpes may be very profitably utilised for decorative purposes. They remain in perfect order for a long time when kept in rooms,

and in many cases they will exist where Ferns would soon perish. The only requirements in such cases are that they must

not be placed in too dark a room, and that while they should be only slightly watered, their leaves should be sponged from time to time to prevent the accumulation of dust.

Palms are also an important item in the embellishment of our winter gardens, and when properly treated they sometimes reach enormous sizes. It may be advisable here to say a few words as regards their use in sub-tropical bedding. Matter for regret is that this order is not more largely employed. *Trachycarpus excelsus*, *Chamærops humilis*, and *Phoenix canariensis* are plants forming the most charming contrasts when well grouped, and they may be used as isolated specimens or as central ones in the making of sub-tropical beds, &c. In southern counties, or in proximity to seaside places where the temperature very seldom falls below freezing-point, they may be planted out; and when frost is expected they may be encased in straw until mild weather sets in.

Many of our London parks afford illustrations of a few of the great advantages offered by some of these plants; but in utilising them for such purposes they must be planted in positions protected from the direct north winds, the full south being always preferable, and the soil should be previously prepared in order to make it a trifle lighter.

When Palms, such as species of *Phoenix* or of *Cocos*, which often reach good heights, are employed for landscape work, they should be placed between other plants in order to obtain the most picturesque effect. For isolated specimens, species of *Sabal*, *Latania*, *Chamærops*, &c., are the best. But the acclimatisation of some other Palms is worth trying.

SOILS would not, on first consideration, appear to have a predominant influence on Palms; but it must be observed that the plants are mostly found in a rich soil. We may divide the requisite soils into two distinct classes: the first strong, *i.e.*, not easily dried up, such as loam; and the second the light kinds, rather rich in sand, and which dry up very quickly.

In the culture of Palms in pots, a sort of rational compost has to be prepared, *viz.*, a mixture of the two above-named classes. In some nurseries where Palms are largely grown, the compost is carefully prepared some time before using, and the following composition is a usual mixture: one third of good fibrous loam, one third of leaf-mould, and one third of sand, but this is only employed for established plants which need to be potted up.

For the propagation of Palms a lighter compost is required, through which water can easily percolate, and through which the atmospheric influences, so useful for the germination of any seeds, can penetrate. The proportion of loam must be considerably lower than that mentioned above.

Imported Palms from Southern districts (*e.g.*, Algiers, the Riviera, Italy, or Spain), which were grown in the open and

have reached a certain size, would thrive splendidly in a stronger compost, and this chiefly applies to the well-known *Chamærops* and *Phœnix*, &c., which are so largely grown under those latitudes; but Palms raised in nurseries require, for a certain number of years, a lighter soil than that found in their native places.

In planting out, the nature of the ground must be taken into consideration, and the soil previously prepared according to the kind of plant. Drainage must always be thorough, for the number of species growing in swampy places is very small. In the case of Palms cultivated in pots, drainage is a first necessity, for in many instances, when they are plunged in a tan bed, the bottom hole of the pot would be easily closed.

GENERAL HINTS.—Palms under our latitude are chiefly kept under glass, but they do not seem to require any particular kind of house. Besides the almost hardy species that have been mentioned, we may divide this order into two different groups: those growing freely under greenhouse treatment, and those which require stove- or warm-house treatment. Numerous species will thrive successfully in the greenhouse, *Chamærops*, *Phœnix*, *Seaforthia*, *Kentia*, *Corypha*, &c., which do not require any higher temperature. Those requiring stove temperature form a list too long to be given in full here, but they are found in such genera as *Cocos*, *Caryota*, *Geonoma*, *Sabal*, *Thrinax*, &c. Here, however, we are alluding to the growing of established plants, for raising is quite a different matter. A warm-house becomes in this instance a first necessity, thus enabling the seedlings to be placed in strong heat, facilitating germination.

Palms under glass require to be protected to a certain extent from the direct rays of the sun during the warmer part of our summer. On the Continent, where Palms are extensively cultivated, they are often kept in frames covered with lights on a good hot-bed composed of stable sweepings. This method is a very cheap one for greenhouse kinds, dispensing with the cost of fringing. The frames are raised as the plants grow taller, and the space between them is filled with litter to the level of the lights.

PROPAGATION.—If Palms vary enormously as regard their forms or habits, they also offer us in propagation a rather wide field. Some kinds produce suckers, which may be utilised for reproduction if carefully removed or divided. The suckers must be potted up singly, and kept in a warmer house on a certain amount of bottom-heat to establish them quickly; they must, of course, be protected from the sun, and careful attention must be given to the watering.

Palms are generally propagated from seeds, which have to be collected in their native countries. With few exceptions the seeds do not retain their germinative properties very long, and should be sown when fresh, usually towards the beginning of the year.

They are usually placed in rather shallow pans or boxes, and in some large establishments are often placed on a layer of cocoanut fibre. The best method is to use well-drained pans or boxes, filled up with a very light compost, rich in sand, and placed on a strong bottom-heat until germination is noticeable. Seeds are also often stratified to make them germinate quicker. (See Chapter "On Plant Propagation.") A temperature of 70deg. is preferable to give them a good start, and when they begin to show their primordial leaves they may be pricked off and potted up singly or several in a pot, according to the future development of the plants. The small seedlings have still to be kept in a close temperature to enable them to recover from the change. If they cannot be potted up at once they may grow weakly. To prevent this they should be kept in a more moderate heat, or air be given. Shade is a first necessity in case of bright weather.

Water must be generously applied, chiefly on warm days, for the young plants will greatly benefit by the warm and moist atmosphere. We do not allude to direct watering only, but also to syringing, which will not only facilitate their growth, but also keep them clean and free from Thrips, Red Spider, and other pests.

Palms are rather susceptible at their roots when in a young state. In repotting care must be taken not to use too large a pot. It is much simpler and more profitable to a young plant to give it an annual shift if wanted than to put it in a large pot at once, for the roots will soon be blocked up in a mass of compost which will inevitably become sour by the constant watering. With regard to specimens of a certain size which are growing a trifle slower, it is not necessary to repot them very often so long as they remain in good health; a top-dressing of rich soil is quite sufficient.

The best time for potting up Palms is the early spring, but in the case of young seedlings this may be done at any time. The best guide is the state of their roots. A young plant must not be allowed to be pot-bound unless required for table decoration, as our small *Cocos Weddeliana* and many others often are.

When Palms are grown for room decoration, as in nurseries, it is advisable to confine them in as small pots as possible; for large pots are often objected to by the decorator, and when the roots have to be so restricted liquid manure must be applied about twice a week; this imparts a deep green colour to the leaves.

PESTS.—Though Palms are not so susceptible to insect and other attacks as are many soft-wooded plants, still, Thrips, Scale of different sorts, Red Spider, and Mealy-bug are sometimes troublesome, and are often induced by the dry atmosphere in which the plants have been kept. Syringing

in warm weather is the most powerful preventive to many of those pests. Fumigations will soon kill the Thrips, and careful spongings will remove the other pests, though spraying with a weak solution of kerosene emulsion is best for the Scale. The spraying should be repeated in about ten or twelve days. Cultivated Palms are liable to have their foliage attacked by a fungus known as *Pestalozzia phœnicis*, a relative of the Grey Blight of Tea Plants. The leaves are covered with small greyish blotches, which soon increase in size and number. Spraying with sulphide of potassium—1oz. to 3gals. of water—might be tried; while in bad attacks the foliage had better be destroyed by burning.

SELECTION OF KINDS.—It is estimated that the number of species of Palms known at the present time exceeds 1100, but only a certain number of them have so far found place in our houses. The fine collection at Kew comprises more than 400 species. Our enumeration must be confined to species in general cultivation, omitting those of only botanical value. The best known genera in gardens are: *Areca*, *Astrocaryum*, *Attalea*, *Calamus*, *Caryota*, *Chamædorea*, *Cocos*, *Geonoma*, *Hyphæna*, *Licuala*, *Livistona*, and *Phœnix*. The nomenclature is based on the Kew classification.

ACANTHOPHCENIX.—This small genus is only represented in cultivation by two or three species, natives of Mauritius and the Bourbon Islands. They are in some respects closely allied to *Areca*, and very decorative. Their leaves are pinnate, and their petioles are armed with spines, which form a characteristic of *Areca*. They require stove treatment, a good supply of water, and a light soil. *A. crinita* (*A. Herbstii*, *Areca crinita*, and *Calamus dealbatus*) has curved leaves of a rather pale green, and with their under-parts of a whitish colour; this species often presents a shiny, yellowish appearance. *A. rubra* is quite distinct from the above on account of its longer leaves, which in their young state are of a reddish colour, and when fully developed change to a splendid deep green; the spines are not so numerous as on *A. crinita*.

ACANTHORHIZA.—Another small genus which only a few years ago was included with the *Chamærops* and *Thrinax*, and which differs from *Trithrinax* by its aerial roots, which very often are taken for spines. This genus is only represented in cultivation by two or three species which are very decorative. A sandy compost suits them admirably. *A. aculeata* (*A. stauracantha* and *Chamærops stauracantha*) is a well-known greenhouse plant, widely cultivated, and used with great success for outdoor ornamentation, chiefly in the southern counties; its numerous roots when fully developed change into spines; the leaves, which are palmate, are divided into segments of a deep

green on the surface and white below. *A. Warscewiczii* differs from the preceding species in its large stems and long petioles (sometimes 3ft.) protected by a mass of white fibres; the leaves are very wide, and are divided into segments of a dark grey above and whitish below.

ARECA.—Some of the species of this very valuable genus have been classified under other generic names as *Acantho-phoenix*, *Euterpe*, *Hyophorbe*, *Kentia*, &c. However, the remaining ones are very ornamental stove Palms, widely distributed in tropical regions. Arecas are distinguished by their branching spadix as well as by the double spathe covering the flowers, which are unisexual on the same spike; the female flowers possess six small stamens and the male ones a six-cleft perianth. The plants require a light sandy soil in their young state; when fully developed a heavier compost must be used. The only way to propagate them is by seeds. Their qualities are well known, and they are extremely useful for room decoration. *A. Catechu* is a very handsome and decorative stove species. In its young state it forms a very useful sort for indoor decoration. The leaves are pinnate, vary in length from 3ft. to 6ft., and have leaflets which often reach 18in.; the petioles are mostly broadly sheathed at the base. This species possesses some valuable economical properties, furnishing the Betel Nut, so largely used in India. *A. glandiformis* (Fig. 547) is a showy stove Palm of rather bold aspect, and extremely decorative in its early state; its leaves are pinnatisect, varying in length from 8ft. to 12ft. when fully developed. This species often reaches 30ft. high or more.



FIG. 547.—ARECA GLANDIFORMIS.

ASTROCARYUM.—This genus includes some very attractive heat-loving plants which mostly attain a great height. It is to a certain extent allied to *Cocos*, producing generally prickly stems with pinnate leaves of a fine green colour on the upper

surface. The flowers, however, are unisexual, and are found on simply branched spikes; the males occupy the upper part while the female flowers are found on the lower. *Astrocaryums* require a strong compost and an abundant supply of water; they are chiefly propagated by seeds and seldom by suckers. *A. acaule* is a peculiar stemless species producing a great number of leaves, varying from 3ft. to 8ft. long, which are pinnate and spreading, with narrow pinnæ disposed in clusters and pendent; the plant is very well protected by a multitude of black spines. *A. filare* is a very distinct plant with erect leaves, narrowly cuneate, and with two divergent lobes; the petioles are covered with white scurf on the upper as well as the under portions. *A. Malybo* (*A. argenteum*) is known as one of the best of the Silver Palm section; the leaves are arching, rather wedge-shaped, distinctly plicate, bright green on their upper surface, while the under part and all the stalks are covered with a whitish scurf, which imparts the silvery appearance. *A. Muru Muru* is an attractive Palm, with a stem rarely exceeding 15ft. in height, and armed with strong reflexed black spines sometimes exceeding 6in.; the leaves are pinnate, and the leaflets lanceolate, of a dark green above and silvery-white beneath. *A. rostratum* is an interesting species, rather slow-growing, producing a slender stem densely armed with long black spines; its irregular pinnate leaves vary in length from 3ft. to 8ft., and the pinnæ from 12in. to 20in.; the petioles, which are also armed with numerous black spines, are broadly sheathing at the base, of a deep green on the upper surface and somewhat white beneath.

ATTALEA.—A very decorative and distinct stove genus belonging to the tropical American flora. The pinnæ are arranged vertically instead of horizontally, and the leaves spring from the base in an almost perpendicular direction. The plants are quite unarmed. Attaleas thrive admirably in a mixture of equal parts peat and loam, and require a good supply of water. This genus does not seem to be known as it ought to be, considering its decorative value. *A. amygdalina* (*A. nucifera*) is one of the best species of the genus, and thrives very well in a greenhouse during the summer; it produces a slender stem, with pinnate leaves varying from 2ft. to 6ft. in length. The pinnæ often attain 18in. in length, and are of a rich deep green. *A. Cohune*, like the preceding, ought to be more frequently seen, for at all stages it is a very handsome plant; the leaves are erect, alternate and pinnate, and are provided with a large number of beautiful dark green pinnæ, varying from 12in. to 18in. long. *A. funifera* (Piassaba Palm) is very valuable on account of its economical and decorative properties; it produces a kind of fibre largely used in America for rope-making, and is sometimes used in

England for brooms; the leaves are of a beautiful uniform dark green colour.

BACTRIS is another genus not very well known in cultivation. It is well represented by the number of its species, which are very decorative. They have slender stems armed with enormous spines. The leaves are pinnatisect, and the segments mostly linear and entire. The stems of some kinds in the young state are used for making walking-sticks. Some of the species are easily grown in a rich compost, but others present certain cultural difficulties. Propagation is effected by suckers, when they can be obtained. Bactrises in general are only decorative in their young state. *B. baculifera* has leaves varying from 2ft. to 6ft. in length, pinnate and bifid at the apex. The pinnæ are dark green on the upper surface and a paler shade below. The petioles are sheathing and armed with dark spines, often exceeding 1in. in length. *B. pallidispina* (*B. flavispina*) is very elegant in its early state, with its pinnate leaves, bifid at the apex. The pinnæ, which attain 12in., are clustered, and of a fine deep green colour. The petioles are sheathing at the base, and densely clothed with yellowish spines.

BACULARIA.—A genus represented by only a couple of stove species, which are classified amongst the smallest Palms. Their stems are slender, very seldom exceeding the thickness of a man's thumb. They require exactly similar treatment to Arecas. *B. monostachya* (*Areca monostachya*) is an elegant Palm, extremely valuable on account of its small size and decorative properties. It produces slender stems with sheathing petioles. The leaves, which often reach 12in. long, are pinnate and pendent, bifid at their apex. The pinnæ vary in length and shape, and are of a dark green colour.

BORASSUS.—A very small but charming genus of stove-plants, represented by two species; these may easily be recognised by their peculiar unisexual flowers, which are produced by distinct plants. The males are found on dense-branching catkins, and the females on simple ones. The fruit is three-seeded. The leaves are fan-shaped, and the petioles are spiny, while the stem is completely unarmed. Borassus grow very freely in a substantial compost, and are propagated by seeds, for the germination of which a great amount of bottom-heat is required. *B. aethiopicum* is a very ornamental species, rather rare in cultivation, and is remarkable for a kind of swelling in its stem, mostly near the middle; the leaves are nearly circular and plaited, and are supported by stout petioles varying from 6ft. to 7ft. in length; this species also possesses valuable economical properties, its stem furnishing the "toddy," while mats and hats are made with the leaves. *B. flabellifer* is an Asiatic species, possessing similar properties to the preceding; the leaves are mostly circular and plaited

like a partially open fan provided with a great number of ribs, all radiating from the centre. It is of a rather slow growth.

BRAHEA.—A very small genus composed of dwarf Palms, represented in cultivation by only a few species, which thrive in the greenhouse during the summer months. The leaves are fan-shaped, and the flowers are hermaphrodite and green. Braheas require a rich fibrous compost and abundant saturation through their growing period. *B. dulcis* is a rare and slow-growing species, possessing a stout stem, with petioles partly protected at their base by a network of brown fibre, clothed with woolly tomentum, and armed all along the edges with a multitude of spines; the leaves are nearly circular, plaited, and shining green.



FIG. 548.—*CALAMUS CILIARIS*.

CALAMUS.—A very interesting genus represented by many species. *Dæmonorops*, which formerly was united to *Calamus*, is now separated. Calamuses have their flowers densely clustered upon branching spikes, every branch having a separate spathe which is not long enough to enclose it. For the characteristics of the 'other division, see "Dæmonorops." Calamuses are all of slender growth, some of them climbing very high in their native countries, while others rarely exceed 20ft. The species in general are very decorative in their young state, and may be

used for table decoration. They are also very handsome in the stove. A rich soil composed of loam and vegetable mould in equal quantities is required, as well as a copious supply of water. Propagation can easily be effected by suckers, which grow pretty freely from the base. *C. accedens* is an elegant, slender-growing species, rather rare, and dwarf in stature, which ought to be more largely grown. It produces long, arching, deep green, pinnate leaves, the pinnæ being long, rather narrow, and somewhat closely set. The petioles are provided with slender black spines. *C. adspersus* is a

curious slender species, with a stem not much larger than a large wheat-straw; the petioles vary from 6in. to 9in. in length, sheath at the base, and are armed with long, slender, black spines; the leaves are pinnate; the pinnæ vary in length from 6in. to 8in., are narrow, and of a deep green colour. *C. asperimus* is a noble species, reaching a considerable size; it throws up a quantity of suckers, forming a handsome mass, which may also be utilised for propagation. The leaves vary in length from 3ft. to 9ft., and are pinnate; the pinnæ, which vary from 1ft. to 2ft. long, are of a light green colour, and are provided on their upper side with two rows of spines; the petioles also are clothed with long black spines. *C. ciliaris* (Fig. 548) is one of the small-growing kinds, and the plume-like habit of the foliage renders it a handsome subject for table decoration. It produces an erect and slender stem, and bright green leaves covered with a quantity of soft hairs; the petioles are sheathing at the base. *C. flagellum* is a very distinct species, climbing to a great height; the stem is slender; the leaves are from 6ft. to 9ft. in length, and are pinnate; the pinnæ are pendent, vary in length from 8in. to 12in., and are of a dark green colour, their surface being provided with two rows of white hair-like spines; the petioles are sheathing, and armed with a great number of white spines, rather swollen at their base. *C. Rotang* is a handsome species in its young state, but reaches in its native country a height of several hundred feet, and is a fast climber; the stem is slender, with pinnate leaves varying from 3ft. to 4ft. in length; the pinnæ also vary in length from 6in. to 12in., are deep green in colour, and are provided on their upper surface with two rows of hair-like spines; the petioles as well as the stem are armed with stout reversed spines. *C. tenuis* (*C. Royleanus*), a very elegant species, produces pinnate and arching leaves, bearing a quantity of narrow dark green pinnæ, which, like the sheathing petioles, are armed with a small number of spines. *C. viminalis* is a distinct species, throwing up in its young state its whip-like, spiny spikes of flowers; it produces a slender stem, with sheathing petioles, which are armed with long flat white spines; the leaves vary in length from 1ft. to 2ft., and furnish a prodigious number of bright green pinnæ, which often reach 6in. long, and are rather narrow.

CALYPTROGYNE.—A handsome but small genus, closely allied to *Geonoma*. It comprises about half-a-dozen species, requiring stove treatment. For culture see "*Geonoma*." *C. Ghiesbreghtiana* (*Geonoma Ghiesbreghtiana*, *G. magnifica*, and *G. Verschaffeltii*) is a rather dwarf-growing species, without any noticeable stem; its pinnate leaves vary from 2ft. to 5ft. in length; the pinnæ are mostly opposite, seldom alternate, having an interval between them, and are of a bright green on the upper surface and

paler below. *C. spicigera* is another elegant kind, possessing a stout stem and irregular pinnate rich green leaves, varying from 2ft. to 3ft. in length, and deeply bifid at apex; the petioles

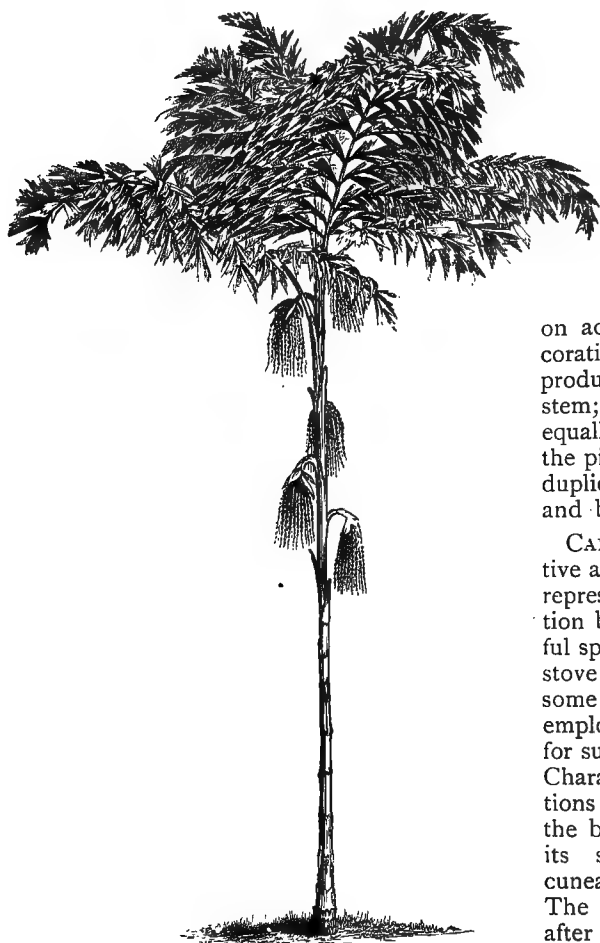


FIG. 549.—CARYOTA MITIS.

are short and sheathing at the base, mostly flat on their upper side and rounded below.

C. Swartzii (*Calyptronoma Swartzii*) is another handsome plant in its early stage, and is valuable

on account of its decorative properties; it produces a smooth stem; the leaves are equally pinnatisect, and the pinnæ are deeply reduplicate at the base and bifid at the top.

CARYOTA.—A decorative and valuable genus, represented in cultivation by a dozen beautiful species, all requiring stove treatment; but some of them can be employed in summer for sub-tropical gardens. Characteristic distinctions of this genus are the bipinnate leaves of its species and the cuneate cross-pinnæ. The species only flower after they have reached their full size, and when the flowers appear at the base of the stem

very often the plant dies off, except when suckers have grown before. *C. urens* is often used for outdoor decoration during the summer months. Caryotas require a rich soil, composed of equal parts loam and vegetable mould, and good drainage, for in their growing period they delight in a good supply of water.

Propagation may be effected by suckers, but seeds are to be preferred. Caryotas also possess some economic value, yielding a kind of "toddy," which is very rich in sugar. *C. Cumingii* is a valuable species on account of its moderate size, rarely exceeding 10ft., and producing a slender stem; the leaves are deep green and rather spreading, varying from 4ft. to 6ft. in length, and 3ft. in breadth. The pinnules are sub-falcate, obliquely cuneate, and of a rich green on both sides. This plant is extremely pretty when it is bearing its red berries. *C. furfuracea* is a species possessing a great similarity to *C. urens*, but of a more compact habit, producing bipinnate leaves, with pinnæ varying in size as well as in shape, and the petioles are covered with a rusty tomentum; it is a very decorative sort, and is regarded by botanists as synonymous with *C. mitis*. *C. sobolifera* has, since the issue of the last edition of the "Hand-List of Tender Monocotyledons Cultivated at Kew," also been regarded as a synonym of *C. mitis*. It has a very elegant habit, resembling, in the form of the leaves, *C. urens*; these are bipinnate (Fig. 549), and the pinnæ are of a light green colour. The petioles are, in their early state, covered with a short black scaly tomentum. *C. Rumphiana* is a very distinct and elegant species, producing a rather stout stem, with bipinnate and spreading leaves varying from 3in. to 8in. in length. The pinnules are sessile, are inclined to be coriaceous, vary in length from 3in. to 6in., and are of a deep green colour. *C. urens* is supposed to be the largest-growing species of the genus. It is extremely decorative, producing a somewhat stout stem which furnishes a valuable sago; it also yields a great quantity of palm wine. The leaves are bipinnate and spreading, reaching sometimes as much as 12ft. The pinnules are obliquely cuneate and sub-coriaceous, varying from 6in. to 10in. in length and 4in. in breadth; they are dark green and shiny.

CERATOLOBUS.—A genus very closely allied to *Calamus*, and composed of only a few slender-growing species, which are very elegant. They are all stove-loving plants, and require similar treatment to *Calamus*. Amongst the three species known in cultivation, *C. glaucescens* is the best. This is a pretty Palm which is often used for table decoration. It somewhat resembles a *Calamus* in habit, producing pinnate leaves which vary from 1ft. to 2ft. in length, with cuneate pinnæ, which lengthen out into a tail with a point, are of a deep green on the upper surface, and grey below; the petioles are armed with spines, and are somewhat sheathing.

CEROXYLON.—A small genus, only represented in cultivation by one typical species, *C. andicola*, the others being classed under *Juania* and *Diplothemium*. It is a greenhouse Palm, which could be utilised with great success for sub-tropical

gardening, but care must be taken to protect it from direct sun as well as from winds. It requires a compost of equal parts loam and peat, and is increased very easily by seeds. *C. andicola* is a tall-growing species, which will thrive very well in an ordinary greenhouse, but grows rapidly in a stove, producing pinnate leaves, varying from 10ft. to 12ft. in length, supported by erect petioles, which are inclined to be ferruginous at the base and slightly arching at the apex. The pinnæ, which

often reach 2ft. in length, are acuminate; their upper surface is deep green and the under-part silvery-white.

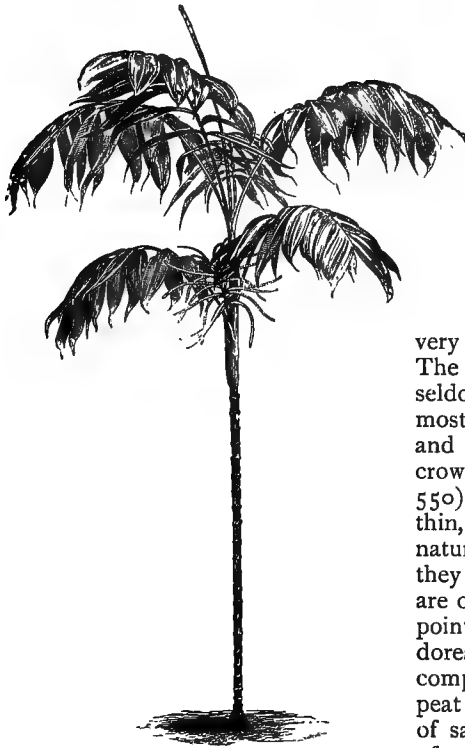


FIG. 550.—CHAMÆDOREA
SARTORII.

CHAMÆDOREA. — A very valuable and large genus of stove plants, extensively grown on account of their ornamental properties. It is represented in cultivation by many beautiful species; their moderate size (all being slender, small-growing plants) renders them very useful for indoor decoration. The leaves are pinnate or very seldom entire; the flowers are mostly produced on long spikes, and appear generally below the crown of leaves (as shown in Fig. 550). The stems, which are rather thin, are quite unarmed. If the natural conditions under which they grow in their native countries are observed, shading is an essential point for the welfare of Chamædoreas. They delight in a spongy compost of equal parts fibrous peat and loam, with a small quantity of sand, and need a good supply of moisture. They are increased by seeds.

C. Arenbergiana (*C. latifrons* and *C. latifolia*) is a handsome species, producing a slender stem, with pinnate and arching leaves varying in length from 2ft. to 3ft.; the pinnæ, which often reach 12in. in length and $\frac{1}{3}$ in. in width, are of a beautiful green. *C. brevifrons* is quite a different species, of rather dwarf habit, with a slender stem; the leaves are pinnate and arching, and vary from 12in. to 18in. in length; the pinnæ are sessile, tapering at their extremity, and of a deep green colour.

C. desmoncooides (*C. scandens*) is a very pretty species in its early state, and when it reaches a certain size begins to climb. This has several times caused mistakes, from which has originated the above synonym. It produces pinnate leaves, which vary from 2ft. to 3ft. long, and the pinnæ very often reach 1ft. in length, and are pendent and dark green in colour. *C. elatior* is a fast-growing climber, useful for the decoration of large stoves. It is

the tallest species of the genus. The leaves, which are of a splendid green shade, are pinnate, with rather broad leaflets. *C. elegans* (*C. Helleriana* and *Kunthia Deppeana*) is a species of very elegant habit, possessing a somewhat stout stem with pinnate leaves, which vary from 2ft. to 4ft. in length, and are nicely pendent; the pinnæ, which also vary in length from 6in. to 9in., are deep green, and the petioles



FIG. 551.—CHAMÆDOREA GRAMINIFOLIA.

are sheathing at the base. *C. Ernesti-Augusti* (*C. simplicifrons*) is a charming species, chiefly during its flowering period, the flowers, which are of a scarlet colour, making a fine contrast with the leaves; the stem is relatively small, and the leaves are broader than those of any other species, and of a rich deep green; they vary from 18in. to 2ft., and are not less than 1ft. in breadth. *C. geonomæformis* (*Nunnezharia geonomæformis*) is

another handsome dwarf-growing species, producing entire leaves, bifid at the apex, varying from 6in. to 8in. in length, and they are of a dark green colour.

C. glaucifolia is one of the most decorative of the genus, producing a slender stem with long and pinnate leaves; their narrow, plume-like pinnæ are long and slender, of a very rich green, suffused with a glaucous hue. *C. graminifolia* (Fig. 551) is a very graceful species on account of its elegant habit; the plant in general has the appearance of a plume of feathers, and possesses a quite distinct reed-like stem; the leaves, which vary from 2ft. to 4ft. in length, are pinnate, beautifully arched, and of a dark glaucous green, with upward pinnæ. *C. macrospadix* is one of the largest-growing kinds, and is a very handsome species, producing a rather stout stem, with pinnate leaves, prettily curved, and reaching 4ft. in length; the pinnæ vary from 12in. to 18in. by 2in. broad, and are of a deep green. *C. Martiana* (*C. atrovirens*) is quite a distinct species, of very useful dwarf habit, producing numerous little dichotomous stems. It could be utilised with success for room decoration. The leaves are pinnate and spreading; the pinnæ, which are pendent, vary from 6in. to 9in. long, and are of a rich green. *C. microphylla* is a pretty and rare species of elegant habit, producing some branching flower-spikes from under the crown of leaves; in its earliest state it has a dark green slender stem, with pinnate and arched leaves varying from 5in. to 10in. in length; the pinnæ are ovate-caudate, reaching 4in. long, and are a very deep green. *C. oblongata* (*C. lunata*) is a very valuable species for room and table decoration, possessing a rather stout stem, with long pinnate leaves of a dark green; the pinnæ are more or less lunate. *C. Sartorii* (*C. mexicana* and *Morenia oblongata conferta*) is an excellent species, and the illustration (Fig. 550) gives a good idea of its beauty; it, however, possesses a certain analogy with *C. elegans*, although it produces longer leaves, having broader pinnæ, and carrying a denser crown of leaves. *C. tenella* is a very distinct species, known as one of the most diminutive species of the genus—in fact, of the whole Natural Order. It produces some ebracteate and ebracteolate spikes, bearing yellow flowers; the leaves, which do not exceed 5in. in length and 3in. in width, have short petioles of a spreading habit, and are convex and bifid for a part of their length; the nerves vary from eight to nine pairs. *C. Tepejiloti* is a species worth growing on account of its graceful habit, but unhappily it is rather rare in cultivation; it produces a slender stem, with pinnate leaves, and pendent pinnæ of a shiny dark green; the whole plant seldom exceeds 10ft. in height. *C. Warszewiczii* is another elegant sort, having a slender stem, with long, pinnate, light green leaves, beautifully curved; the pinnæ are somewhat broad, sessile, and tapering to a point; the terminal pinnæ are broad and bifid. *C. Wendlandii* is a useful

species on account of its valuable decorative properties; it has a slender stem, with pinnate leaves; the pinnae, which reach 1ft. in length by 2in. or 3in. in breadth, are sessile at the base, acuminate at the apex, and of a shiny green colour.

CHAMÆROPS.—This small genus is only represented in cultivation by a few typical species, which are eminently decorative and thrive extremely well in greenhouses. The genus can be termed European, considering it reaches the sunny coasts of the Riviera, and the species can be successfully utilised for sub-tropical decoration. They are chiefly compact in growth, with fan-shaped leaves; the petioles, which are clothed

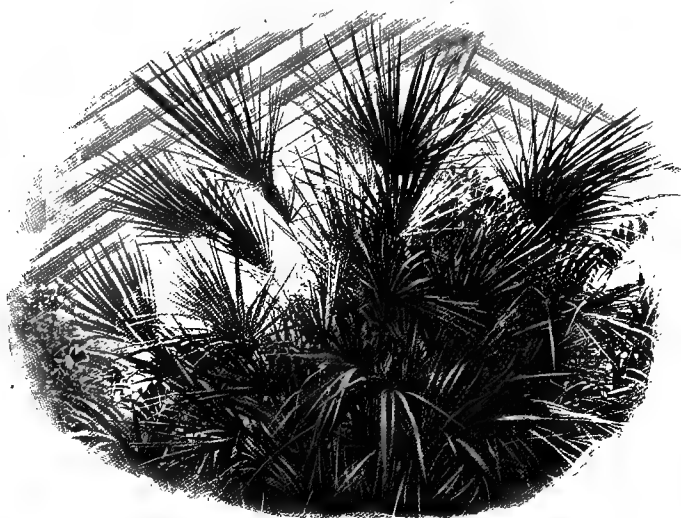


FIG. 552.—CHAMÆROPS HUMILIS ELEGANS.

with prickles, are inclosed amongst layers of coarse fibrous matter; the flowers vary, being sometimes perfect, and at other times having separate sexes. Chamærops require a rich soil, composed chiefly of fibrous loam with a small portion of vegetable mould and sand. Drainage must also be well attended to, as they require a liberal supply of water during their growth. They are often propagated by suckers, which are thrown up in large quantities, or by seeds.

C. humilis is a valuable and highly decorative European species, very largely grown. It presents a very attractive sight as an isolated plant in sub-tropical gardens. The stem, which is straight, is covered with rough fibres, and also by the base of

the old petioles. The leaves are glaucous on both sides, and are divided into narrow segments; the petioles, which vary from 3ft. to 4ft. in length, are provided at the edges with strong spines. When tall specimens are required all suckers have to be removed: if not the plants would assume rather a bushy aspect. This species can be easily propagated by suckers provided with roots. *C. h. elegans* (Fig. 552) is a very beautiful variety for indoor decoration. *C. h. macrocarpa* is a very strong-growing variety.



FIG. 553.—CHRYSALIDOCARPUS LUTESCENS.

The stem is rather stout, and the leaves vary in colour from grey to green, shaded with blue. In its early state it forms a very handsome plant for various decorative purposes. Several other varieties of *C. humilis* are known in cultivation, but they are all more or less closely allied.

CHRYSALIDOCARPUS. — A monotypic genus allied to *Areca*, under which the following plant is classified by nearly every grower. For culture see "Areca." *C. lutescens* (Fig.

553) (*Areca lutescens*, *Hyophorbe Commersoniana*, and *H. indica*) is a very elegant and decorative species, but rare in cultivation. It has a cylindrical caudex, smooth and swollen at the base, 4in. to 6in. in diameter, and over 30ft. in height. The beautiful leaves are pinnate and arching, with numerous lanceolate pinnæ of a rich green on both sides.

Cocos.—This genus is remarkable and valuable on account of economic properties and decorative qualities, *C. nucifera* bearing the well-known cocoanut as well as furnishing some other valuable commercial products. The Cocoses are all extremely elegant in habit, and are mostly stove plants, requiring a certain amount of shade. They thrive very well in a compost of equal parts loam, peat, and sand, with a liberal supply of water during the growing period. Propagation is effected by seeds, which require a strong bottom-heat to germinate. Cocoses sometimes reach majestic proportions, and are quite free from

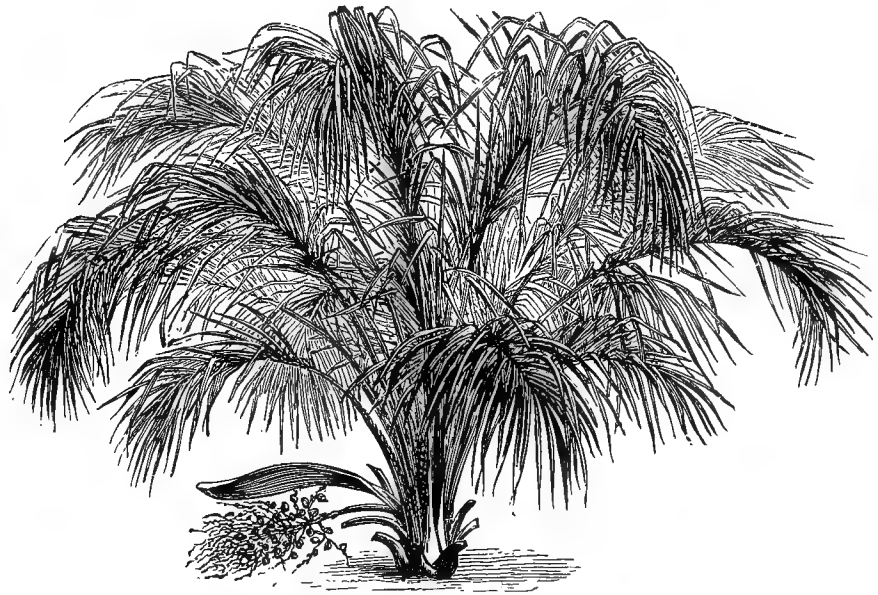


FIG. 554.—COCOS AUSTRALIS.

spines, their stems being smooth and ringed, and their leaves pinnatisect with linear segments.

C. australis is a distinct species, rather low-growing but very ornamental (Fig. 554). The stems in old plants are columnar and erect, reaching 20ft. to 30ft. in height; the leaves are pinnate, with a great number of linear glaucous pinnæ. *C. campestris* (*Syagrus campestris*) is a very valuable decorative species, distinct on account of its glaucous tint and elegant habit. It produces a stem with a stout base and thick, broad, and sheathing petioles, which have their edges covered with some brownish fibres, and is one of the rare armed species

possessing a few spines on their petioles. The leaves are pinnate and spreading, often reaching 6ft. It seems to do extremely well in a greenhouse or as a sub-tropical plant during the summer. *C. flexuosa* is a species attaining considerable size,

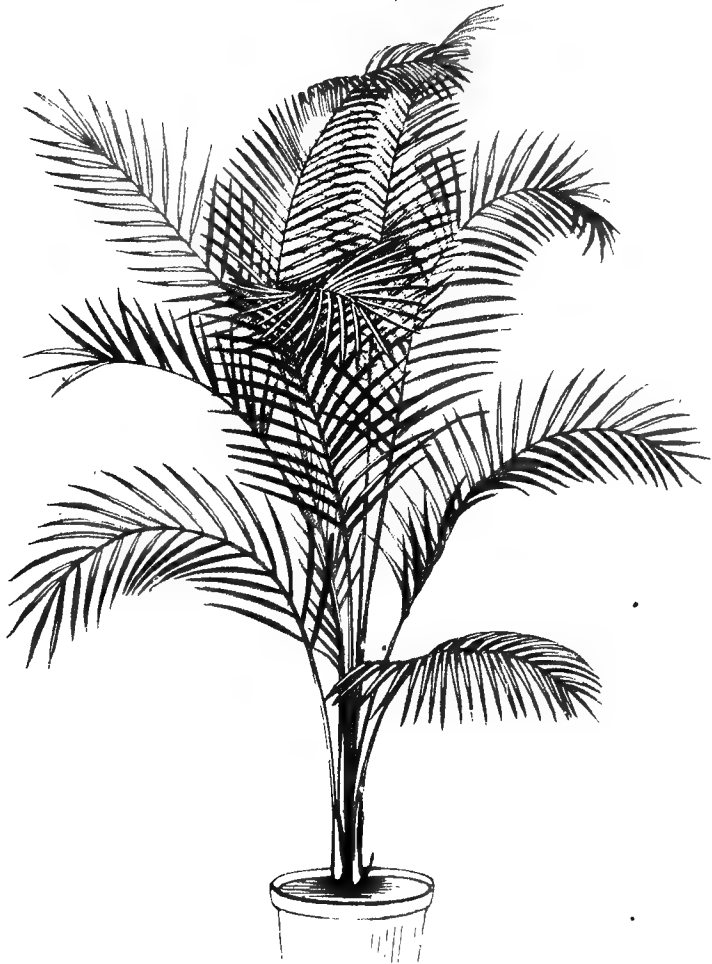


FIG. 555.—COCOS WEDDELIANA.

and of very elegant stature. The stem, which is rather stout at its base, is straight; the leaves reach sometimes 10ft. to 15ft. in length, and are partly erect and arching at the extremity; the pinnæ are very numerous and often reach 2ft. in length.

C. nucifera (Cocoanut), apart from its economic properties, is only of limited value, and it is known to present some cultural difficulties. In the tropics it is extremely common, producing an erect stem varying, according to age, from 6ft. to 50ft. in height. The leaves are pinnate and vary from 6ft. to 18ft. in length, with long, narrow, and pendent pinnæ of a bright glossy green. *C. plumosa* is a highly decorative species, producing a most charming contrast while in blossom. Afterwards the flowers are replaced by numerous orange-coloured nuts. The stem, which is rather stout, is straight and columnar, and reaches 50ft. in height; the leaves are pinnate and vary from 3ft. to 12ft. in length; the pinnæ are clustered together in bunches from 1ft. to 2ft. long, and are of a deep green colour on the upper surface and glaucous below. *C. Romanzoffiana* is a useful species in its young state for many decorative purposes, and ought to be more cultivated. It possesses some long and elegantly-arched plume-like leaves; the pinnæ are long, pendent, and deep green. *C. schizophylla* is decidedly worth growing on account of its highly decorative properties. It produces long and graceful arched leaves, varying from 6ft. to 10ft. in height; the pinnæ reach 2ft. in length, and are very narrow; the petioles are gaily bordered with red edges, which are also protected with stout red spines. *C. Weddelliana* (*Glazivola elegantissima*) is certainly the most elegant and useful Palm which has ever been introduced into Europe (Fig. 555). It is not necessary to describe its ornamental properties, as it ought to be known by everyone. The stem is slender, and is covered with a quantity of black netted fibres; the leaves, which are gracefully arched, vary from 1ft. to 4ft. in length; the pinnæ are long and narrow, rather pendent, deep green on the upper surface and glaucous below.

CORYPHA.—A small genus of stove plants, all very decorative, producing large fan-shaped leaves. The stems, or trunks, are very stout, tall, cylindrical, and almost unarmed. They are crowned with the largest of fan-leaves, and the petioles are armed with sharp spines. Coryphas are not fast growers. They thrive very well in a strong heat, and in a compost of two parts fibrous loam and one part of peat and sand. Drainage must be carefully attended to, as water ought to be liberally applied, through the growing period. Small plants seem to stand very rough treatment, and make the best of room plants.

C. Gebanga is a rather slow-growing species, producing some valuable leaves used by the natives of Java for thatching and basket-making; a kind of sago is also obtained from the stem. The glaucous, fan-shaped leaves are fully divided into narrow segments, and the petioles are very stout. *C. Taliara* is another species furnishing useful leaves, of which fans and umbrellas are made. It possesses a stout cylindrical stem, varying from 20ft.

to 30ft. in height; the petioles have all along their edges a great number of small spines; the leaves are deep green, fan-shaped, and plaited. *C. umbraculifera* (Talipot Palm), with its beautiful leaves, which are used in the same way as the species previously described, is also a very slow grower, but reaches in its native place sometimes over 100ft. high. The petioles are protected at their edges by a quantity of small brown spines, and the leaves, which are fairly large, are fan-shaped and plaited, forming a circle about 12ft. across.

DÆMONOROPS.—A genus closely allied to *Calamus*, under which the species are often classified; they are all very elegant stove Palms, and their only distinction from *Calamus* exists in the spikes, on which the flowers are scattered; they require the same treatment as *Calamus*. *D. Draco* (*Calamus Draco*) is a rather distinct species and of a strong constitution, and ought to be more largely grown; the leaves are beautifully arched and pinnate, varying from 4ft. to 6ft. in length; the pinnæ are narrow, pendent, deep green, and vary from 12in. to 18in. in length; the petioles are sheathing at their base, and are protected with long black spines. *D. hystrix* (*Calamus hystrix*) is a species possessing a very great similarity to *C. melanochætes*, but is undoubtedly more decorative; it is very dwarf, with pinnate leaves and spiny petioles. *D. Jenkinsianus* (*Calamus Jenkinsianus*) is a well-known species, with gracefully arched and pinnate leaves, varying from 2ft. to 6ft. in length; the pinnæ, which reach 10in. or 12in., are of a beautiful dark green; the petioles are sheathing at the base and protected with long, flat spines. *D. Lewisianus* (*Calamus Lewisianus*) is unfortunately rather rare; it is characterised in its young state by its erect and pinnate leaves, varying from 2ft. to 6ft. long; the pinnæ are pendent, deep green, and vary from 6in. to 12in.; the petioles are white, with the exception of the base, which is of a blackish-brown, and are extremely well protected with long black and flat spines. *D. melanochætes* (*Calamus melanochætes*) is a distinct and ornamental plant of a very dark green colour, producing pinnate leaves with long, narrow, and pendent pinnæ; the petioles are sheathing at the base and well protected by some long and sharp spines, which are rather stout at the base. *D. palembanicus* (*Calamus palembanicus*) is quite different from the other species; the petioles are mostly erect, protected at their back by some stout spines; the leaves are pinnate, with narrow drooping leaflets of a cinnamon-brown shade in their early state, changing to deep green when fully developed. *D. plumosus* is an elegant plant, producing some valuable plume-like, pinnate, dark green leaves, varying from 2ft. to 5ft. in length; the pinnæ reach 1ft., and are very narrow; the petioles are also covered with stout dark spines, which are whitish at the base. Very handsome for indoor or table decoration.



INTERIOR OF PALM HOUSE, KEW.

DESMONCUS.—A very ornamental genus of stove plants, distinguished by the flowers appearing in the axils of the leaves, which are prickly and pinnate, with long slender stems. All the species are very handsome, and useful for dinner-table decoration, &c. They thrive when treated like *Calamus*. *D. granatensis* is an interesting species with terete petioles and spineless leaves, with the exception of the top, where a pair of lanceolate divergent pinnæ are seated; the whole plant is of a lovely green colour; it may be placed in the greenhouse during the summer. *D. mexicanus* is a climbing species, and may be utilised for pillar decoration; in its early state it is a most charming plant, possessing a slender stem, with pinnate leaves varying from 20in. to 24in. long; the dark green pinnæ often reach 6in. in length; the petioles and the rachis are armed with long black spines.

DICTYOSPERMA.—A genus closely allied to *Areca*, and composed of stove plants. The flowers, which are unisexual, are often found in groups of three (one female between two males); the leaves are pinnate, and the leaflets have their sides reflexed before unfolding; the species require exactly the same treatment as *Areca*, and are propagated by seeds. *D. album* (*Areca album*) is an ornamental species, extremely useful in its early stages for table decoration; it possesses a slender stem; the leaves are pinnate, and vary from 4ft. to 8ft. in length; the petioles are covered with a fine white tomentum; the pinnæ, which are of a rich green on both sides, reach 2ft., and the whole plant is quite unarmed. *furfuraceum* and *rubrum* are both varieties of this species, and their names easily explain their distinction. *D. aureum* (*Areca aureum*) is a handsome species of rather erect habit, producing graceful pinnate leaves with long, pendent, dark green pinnæ, and quite distinct on account of the yellow colour acquired by the petioles when grown in a cooler place.

DIPLOTHEMIUM.—A small genus of noble Palms which can, if grown in an intermediate house, be utilised for sub-tropical gardening. They are nearly stemless, or sometimes develop a small ringed stem. The leaves are pinnate, with linear segments of a silvery colour underneath. The plants grow admirably in a strong compost—two parts of loam and one part of peat and sand—and are propagated by seeds. *D. caudescens* (*Ceroxylon niveum*) may be described as one of the prettiest of the whole order; it seems to be quite stemless in cultivation, but is decorative from its early state. The leaves are pinnate, and vary from 2ft. to 6ft. in length; the pinnæ are clustered, and sometimes attain a length of 2ft.; their surface is of a shiny green, and they have a silvery appearance. *D. maritimum* is closely allied to the preceding, but remains smaller; its pinnate leaves have more of an ovate outline; the pinnæ are also of a deep green on the upper surface and rather grey underneath.

ELAËIS.—A small genus represented by only two typical species; these are, however, very remarkable on account of their valuable economic properties, for they furnish the well-known palm-oil of commerce; they are also classed amongst our decorative Palms. Elaëis are distinct by their bright red fruits; the leaves are pinnatisect, and are borne on strong prickly stalks. Like all tropical Palms, the plants require stove treatment. They are sometimes increased by suckers, but the most successful method of propagation is by seeds. *E. guineensis* is the African species which is so well known for the production of oil. It is an intermediate sort, the stem of which reaches sometimes 30ft. in height, and supports a beautiful crown of pinnate leaves, varying from 15ft. in length, and deep green in colour; in its early state it may be usefully employed for decorative purposes. *E. melanococca*, from Tropical America, possesses in some respects the same properties as its African relative, producing also a large quantity of oil. It is rather smaller in habit compared with the preceding.

EUTERPE.—A genus composed of extremely elegant tall-growing stove Palms, represented in cultivation by eight or nine species. The stems are always clean and naked straight up to the leaves, which are pinnatisect, with narrow, linear-lanceolate segments of a light green colour. Euterpes require a considerable amount of heat as well as a rich loamy soil. Some of the species are largely cultivated on account of their beauty when young. Propagated by seeds. *E. edulis* reaches from 40ft. to 60ft. in height, and has a cylindrical stem, or trunk, supporting a bunch of lanceolate and acuminate leaves. The rachis and nerves are scaly beneath. *E. montana* is another Palm of economic value, the terminal bud as well as the soft inner part of the stem being used as a fresh vegetable. The stem varies in height from 40ft. to 60ft. The petioles are scaly beneath, and the leaves are lanceolate, spreading, and attenuated. *E. oleracea* (Cabbage Palm) has an extremely hard trunk, reaching in some cases over 120ft. in height. The leaves are lanceolate-linear, acuminate, and glabrescent; a handsome species in its early state.

GEONOMA.—A very large genus, characterised by the dwarf habit of its species, which are all more or less stove-loving ones. They are to a certain extent allied to *Chamadorea*, but do not possess such good decorative properties. The flowers, which are monœcious, are borne on simple or branched spikes. The leaves are entire or somewhat pinnately divided, and of a light shining green in most cases. Geonomas require a rather spongy soil, composed of two parts of fibrous peat and one of loam, and a liberal supply of water. In some cases they may be placed in pots partly plunged in water which is slightly increased in heat,

when they will thrive splendidly. All are extremely elegant in their early state. They are sometimes propagated by suckers, but fresh seeds are always preferable.

G. binervia is a handsome species, having a slender stem, with pinnate and pendent leaves varying from 2ft. to 4ft. in length; the pinnæ, which vary from 6in. to 12in., are dark green; the petioles are quite distinct on account of the network in which they are enveloped. In *G. congesta*, an elegant sort with a stem of moderate size, the petioles are sheathing at the base, and bear leaves varying from 1ft. to 2ft. long, entire or with a bifid apex, and sometimes divided into wide segments. *G. elegans* produces a slender reed-like stem with sheathing petioles; the leaves, which are of a bright pink when young, change to a deep green when developed; they seldom exceed 1ft. in length, and have some terminal pinnæ. *G. ferruginea* is another slender-stemmed variety, with beautifully arched petioles supporting arched leaves; the pinnæ vary from 1ft. to 2ft. in length, and from 6in. to 8in. in width. *G. gracilis*, an elegant plant of rather dwarf habit, is in some respects similar to the handsome *Cocos Weddelliana*, but has some pinnate and arched leaves, with long deep green pinnæ; it is a useful plant for table decoration.

G. macrostachys is a graceful plant, producing a slender stem; the petioles, which are sheathing at the base, are of a bright brown colour, and covered with a scaly tomentum; the leaves are mostly divided into wide segments. This species throws up suckers in large numbers, by which means it may be increased. *G. magnifica* is another handsome species, producing a rather stout stem, with sheathing and blackish petioles; the leaves are plaited, vary from 2ft. to 3ft. in length, and have unequal pinnæ. *G. Martiana*, and the species known as *G. Seemanni*, have nearly the same characteristics. *G. Martiana* is a highly decorative species, producing some beautiful leaves, which, when developed, are of a deep metallic green; the stem is stout, and the petioles are sheathing at the base; the leaves are reddish-crimson in their young state, vary from 1ft. to 2ft. long, and are narrow at the base. Both are well worth growing, *G. Porteana*, a handsome species, has a rather smooth and slender stem, with pinnate leaves varying in length from 1ft. to 2ft., beautifully arched, and with sessile pinnæ; it is rather rare in cultivation, and ought to be more largely grown. *G. procumbens* has often been acknowledged as the most beautiful of the genus on account of its noble habit; the stem is stout; the leaves are pendent, pinnate, and vary from 2ft. to 4ft. in length, with pendent pinnæ of a deep green colour. *G. undata* is a strong-growing and very decorative species; its stout stem is sometimes 12in. in circumference; the petioles, which are sheathing, are covered with a rough fibrous tissue at the base; the leaves are arching and irregularly pinnate, and the pinnæ are plaited and of

a deep green colour. Many other species are in cultivation, but the preceding are the best.

HEDYSCEPE.—This monotypic genus, which has been for so many years combined with *Areca*, is represented by a very handsome, rather fast-growing stove Palm, *H. canterburyana* (*Kentia canterburyana*), requiring exactly the same treatment as *Areca*. It comes from Lord Howe's Island, attains some



FIG. 556.—HEDYSCEPE CANTERBURYANA.

20ft. to 30ft. in height, and has a stout stem which, as well as the petioles, is unarmed. The leaves are pinnate, robust, and of a rich green colour. This species is actually grown by thousands on account of its valuable decorative properties (Fig. 556).

HOWEA is only represented by two typical stove species of extreme beauty, natives of Lord Howe's Island. They have been for many years classified under *Kentia* (which *see* for culture), which they much resemble in habit; they are largely cultivated for the trade. *H. Belmoreana* (*Grisebachia Belmoreana* and *Kentia Belmoreana*) is a very attractive plant, commonly called by the natives the "Curly-leaved Palm"; the stem, which attains some 35ft. in height, supports a splendid head of leaves which vary from 6ft. to 8ft. long, with a quantity of acuminate segments;

the leaflets have a distinctly curly appearance. *H. Forsteriana* (*Kentia Forsteriana*), the Thatch Palm, is a highly decorative Palm of rather robust habit; it seems to be very closely allied to the preceding, the principal distinction being in the leaf segments, which mostly hang, while in the other species they are inclined to turn upwards.

HYOPHORBE.—A genus of stove plants, only represented in cultivation by two or three typical species, all of which possess some decorative properties, and are decidedly worth growing. The flowers, which are disposed in spikes, are pure white, and their berries, which resemble Olives, are one-seeded. The leaves are terminal and pinnate, and the stems are unarmed. They thrive in a compost of equal parts loam and peat, and need a good supply of water. *H. amaricaulis* (*Areca speciosa*) is rather stout and robust in habit; the stem as well as the petioles are very thick, of a deep maroon colour; the pinnate leaves are erect in their early state, and spreading when fully developed; the pinnæ are stout, broad, and acuminate. *H. Verschaffeltii* (*Areca Verschaffeltii*) is a beautiful plant. A curious distinction is that the sheath of the leaves forms a kind of triangular, columnar stem; the pinnate leaves vary from 4ft. to 6ft. long, are nearly erect, and splendidly arching at the top; and the pinnæ are linear-lanceolate and acuminate.

HYPHÆNE.—Amongst the plants composing this genus only one seems to be in cultivation (*H. thebaica*, the Gingerbread Palm), and that a stove one, with unarmed stem of moderate size; it is simple in its young state, or dichotomously branched when fully developed. The leaves are terminal, with sword-shaped acute or bifid segments; and the flowers are diœcious, the males being in twos and the females always solitary. It presents a certain amount of cultural difficulties.

IRIARTEA.—This small genus of stove Palms is extremely distinct in habit. The stems are supported by a number of cone-like aerial roots. The leaves are pinnate, with trapezoid pinnæ. These plants are somewhat rare in collections, and no doubt that is due to their being grown in too dry a place. They succeed fairly well when their pots are partly plunged in water, and they require a sandy compost. *I. deltoidea* (*I. robusta*), the species best known in cultivation, is very attractive; it is entirely spineless, with pinnate leaves and broad sessile pinnæ, erose at the apex; the petioles are round and sheathing at the base.

JUBÆA.—Another striking monotypic genus, represented by a very useful species (*J. spectabilis*) for sub-tropical gardening, and growing splendidly under greenhouse treatment. The flowers, which are deep yellow, are disposed in branching spikes, and enclosed in a double spathe. When fully developed, this species forms one of the noblest Palms amongst our greenhouse kinds.

It produces a stout and cylindrical stem, bearing a beautiful crown of leaves, which are pinnate, spreading, and vary from 6ft. to 12ft. in length; the pinnæ often measure 18in. long, rising in pairs from almost the same place, and standing out in quite different positions; the petioles, which are covered with a mass of brown fibres, are rather thick at the base. This plant also possesses a valuable economic property. From its sap is obtained a kind of syrup, which, after being boiled, forms "Palm honey." Jubæas require a rich compost of two parts loam and one part each of peat or leaf-mould and sand. Propagated by seeds.

KENTIA.—A very old and well-known genus, which was for many years combined with *Areca*. Now it has not only been separated from *Areca*, but much subdivided, being reduced to half-a-dozen, amongst which only three are known in cultivation. Others formerly included here are now classified under *Cyphosperma*, *Hedyscepe*, *Hydriastele*, *Howea*, *Kentiopsis*, *Rhopalostylis*, *Veitchia*, &c. The flowers of Kentias are disposed on branched spikes. The leaves are terminal, and regularly pinnatisect; the segments are linear-lanceolate. Kentias require a rich and sandy compost of equal parts of loam, peat, and sand, and also a liberal supply of water as well as a saturated atmosphere. They may be easily propagated by seeds. *K. australis* is well worth growing, being extremely decorative in its young state; it is of slender habit, and has long pinnate leaves of a shiny dark green. *K. costata*, a very ornamental species in its young state, reaches in its native country a height of 80ft. to 90ft.; the leaves, which are pinnatisect, have a great number of linear-lanceolate segments; the spadix is branched.

KENTIOPSIS.—A small genus, composed chiefly of species removed from the preceding genus. All are extremely valuable for their decorative properties, and require exactly the same treatment as Kentias. *K. divaricata* (*Kentia gracilis*) is a beautiful species, quite distinct, reaching in its native country 30ft. in height, and very useful in its young state for table decoration; the leaves are pinnate, and the alternate leaflets are leathery and of a fine red colour when young. *K. macrocarpa* (*Kentia Lindeni*) is a very handsome plant of strong constitution and extremely ornamental; it has a stout, smooth stem, with red petioles; the leaves are pinnate, ovate, and of a deep olive-crimson in their young state; the pinnæ, which are rather distant, are oblong and lanceolate; the fruits are fairly large. *K. olivæformis* is also in cultivation.

LATANIA.—A genus represented in cultivation by a few stove species, which are all extremely decorative and may successfully be removed during the summer months into the greenhouse. The stems, which are marked with circular scars, bear at their extremity a splendid crown of fan-shaped leaves. The flowers are unisexual, and males and females are produced on different

plants. *Latania*s require a substantial compost of two-thirds loam and one-third peat and sand. Water must be applied generously during the growing period. Propagated by seeds. *L. Commersonii* (*L. rubra*), a noble and distinct species, has a smooth and slender stem; the petioles are also smooth, long, and of a beautiful deep red; the cuneate and recurved leaves are of a shiny green, and the segments are ornamented by reddish edges or bands. *L. Loddigesii* (*L. glaucophylla*) is a tall and handsome species, very seldom showing its stem in cultivation except when the plant has fully developed its leaves; the petioles, which vary from 3ft. to 8ft. in length, are rather stout, of a glaucous green; the palmate, shining-green leaves have a glaucous hue, and vary from 2ft. to 4ft.; the segments are very broad. *L. Verschaffeltii* (*L. aurea*) is another beautiful species; its rather stout stem is of moderate height; the petioles are also stout, erect, and of a glaucous hue at the base, reaching 3ft. to 4ft. high, and bearing large palmate leaves, which are divided into numerous narrow segments of a fine green colour on both sides.

LICUALA.—A quite distinct genus, composed of handsome fan-leaved plants of rather compact habit, requiring very moist stove treatment and general culture like *Geonomas*. The flower-spikes, which are branching, have a quantity of incomplete spathes, and the leaves are terminal, with prickly stalks. The species thrive in a compost of two parts peat and one part sandy loam, and they are easily propagated by seeds. Only a few are in cultivation. *L. elegans* is a handsome species but rather slow-growing. The petioles are 2ft. to 3ft. long, and bear some fine fan-shaped leaves, which are in most cases split down to the petiole. The segments are plaited, vary from 12in. to 18in. in length, and are bright green. *L. grandis* (*Pritchardia grandis*) is quite a distinct variety, producing a stem which often reaches 10in. in circumference, and from 4ft. to 6ft. in height, covered with a pretty crown of bright green leaves. The petioles vary from 2ft. to 3ft. in length and are slender and spiny. This species flowers freely when it attains the size mentioned. *L. peltata* is another elegant species, with digitate, fan-shaped, dark green leaves; these are divided into segments straight down to the petioles, which are somewhat prickly on the margins. *L. spinosa* (*L. horrida*), which was previously regarded as synonymous with *L. Rumphii*, is now classed as a typical species. *L. Rumphii* is also a distinct sort. It is a quite characteristic species on account of its enormous spines, which protect the stout petioles. The leaves are large, deep green, and fan-shaped. An extremely decorative stove plant. *L. Jeannencyi* is a very elegant Palm, with fan-shaped, much-divided fronds reaching right to the base.

LIVISTONA.—A remarkable and useful genus on account of the decorative properties of its species, most of which are

grown in large quantities for the trade. Some of them, *e.g.*, *L. australis* and *L. chinensis*, are excellent for sub-tropical gardening. The leaves, which are terminal, are fan-shaped, divided into many segments, and supported by stout petioles mostly enclosed at their base in a mass of netted fibres.



FIG. 557.—LIVISTONA AUSTRALIS.

The stem in some species is stout, and reaches enormous heights. The flower-spikes, which are branched, are thrown out from between the leaves, and the flowers are perfect. *Livistonas* thrive splendidly in a strong compost of two parts loam and one of peat and sand. Water must be abundantly supplied through the growing period. They are easily propagated by seeds. *L. altissima* is a very tall Palm when fully developed, forming a rather stout stem, or trunk, but it is very handsome in its early state; the leaves, which, as well as the segments, are very large, are of a shiny green, and are supported by petioles varying from 2ft. to 6ft. long, which are enclosed at their base in a brown network, and are also armed on each side with stout spines. *L. australis* (*Corypha australis*) is a well-known species, grown in large quantities; it has a somewhat stout stem and petioles, which latter are deep brown, and are enclosed in a fibrous network;

the leaves, which are nearly circular, are also divided into narrow segments of a beautiful green colour; it is an excellent species for general use (Fig. 557). *L. chinensis* (*Latania borbonica* and *Livistona mauritiana*) is another well-known species, and is largely used for sub-tropical gardening in the Southern countries. Its constitution is pretty strong. The stem is somewhat stout, and the petioles, which vary from 4ft. to 5ft. long, are flat above, rounded below, have small spines along their edges, and are protected at the base by a brown fibrous tissue. *L. Hoogendorpii* seems to be rather rare in cultivation, but on account of its decorative habit it ought to be more largely grown; its blackish-brown



FIG. 558.—LIVISTONA HOOGEN-DORPII.

petioles are enclosed at their base in a reddish-fibrous tissue, and provided at the edges with stout and sharp spines; the leaves, which form a complete circle, are of a rich deep green colour and deeply divided (Fig. 558). *L. humilis* (*L. inermis* and *L. Leichardtii*) is very handsome when young; when fully developed it has a stout stem surmounted by a large crown of leaves. It is very useful for greenhouse or sub-tropical gardening during the summer months. The petioles



FIG. 559.—LIVISTONA ROTUNDIFOLIA.

are armed at their edges with numerous spines; the leaves are large, spreading, and deeply divided into narrow segments of a dark green colour. *L. Jenkinsiana* is a handsome sort for the greenhouse, seldom exceeding 10ft. in height. The petioles vary from 2ft. to 9ft. in length, are rather keeled below, and flat on the upper side, the edges being protected by stout, sharp spines. The leaves are fan-shaped, varying from 2ft. to 4ft. across, and the margin is divided into broad segments of a rich deep green colour. *L. rotundifolia* is a pretty and useful stove species, extremely ornamental in its young state. The stem sometimes reaches 40ft. or 50ft. in height; the petioles vary from 6ft. to 7ft. in length, and are protected by sharp spiny teeth; the leaves are nearly round (Fig. 559), and vary from 3ft. to 5ft. in diameter.

LODOICEA.—This very distinct monotypic genus is represented by an interesting stove species (*L. sechellarum*), somewhat rare in cultivation and known as Coco de Mer and Double Cocoanut; it reaches a height of from 50ft. to 100ft., and it has a somewhat cylindrical stem, or trunk, sometimes 1ft. in diameter, which supports a beautiful crown of large fan-shaped leaves, some 20ft. long, and from 5ft. to 6ft. wide. The chief requirements for its successful cultivation are a rich compost of mostly loam, leaf-mould, and sand, good drainage, and an abundant supply of heat and moisture. The seeds are some of the biggest known, and they sometimes weigh about 40lb.; they require a very strong heat for germination. This Palm seems to do fairly well when the pot is partly plunged into water at a temperature varying between 80deg. and 85deg., as it is grown in the Royal Gardens, Kew.

MAXIMILIANA.—This small genus is very similar to *Cocos*, to which it seems to be closely allied, and contains some of the noblest Palms known. The stems, or trunks, are slender and smooth; the flower-spikes are branched and covered with a woody spathe; the leaves are large and pinnate, with narrow segments. All the species are beautiful, but only two or three are cultivated. They require exactly the same treatment as *Cocos*. *M. Martiana* (*M. regia*) is a decorative plant in its early state, and may be utilised both for the stove and for house decoration. The caudex is erect and unarmed; the leaves are pinnate, and reach, when fully developed, from 30ft. to 40ft. in length; the pinnæ are often 2ft. long, but are rather narrow, pendent, and of a deep green colour. *M. caribea*, another species in cultivation, is very similar to the above.

NEPHROSPERMA.—This monotypic genus is represented by an extremely elegant and distinct stove species which has been for many years classified under *Oncosperma*. It is a very useful plant in its young state for all kinds of indoor decoration; it

requires a good fibrous compost and a liberal supply of water. *N. Van-Houtteana* (*Oncosperma Van-Houtteana* and *Areca nobilis*) may always be recognised by its spiny petioles, which are rather short and of a brick-red colour, bearing pinnate leaves gracefully arched; the pendent pinnæ are of a bright green. In its native country this Palm reaches a height of from 20ft. to 40ft.

ONCOSPERMA, a very distinct genus composed of stove species bearing spiny stolons; they are very closely allied to *Acantho-phenix*, but the latter has an erect and single stem. *Oncospermas* are only represented in cultivation by two or three species, which are, however, extremely decorative. The stems are slender and spiny; the leaves are terminal and equally pinnatisect; the foot-stalks are sheathing and very spiny. These plants require a light compost of two parts good peat and one each of loam and sand, and enjoy copious supplies of water. Propagated by seeds, and often by suckers. *O. fasciculata* is a beautiful stove plant, with pinnate leaves of a deep green; the pinnæ are rather pendent and long, and the petioles are sheathing and covered with slender dark spines. *O. filamentosa* (*Areca tigillaria*) is a pretty species in its young state, but reaches in its native country 40ft. to 50ft. in height; the leaves are pinnate, and vary from 10ft. to 12ft. long; the pinnæ are very numerous, narrow, and drooping.

OREODOXA.—Another small but handsome genus of Palms, represented in cultivation by three or four elegant unarmed stove species with long pinnate leaves; the petioles are broadly clasping, and the stems are slender and ringed; the flowers are white, small, and monœcious, and the fruits are ovoid or oblong-ovoid. *Oreodoxas* may be employed with success for



FIG. 560.—OREODOXA SANCONA.

greenhouse and sub-tropical gardening during the summer months but care must be taken to protect them from rough winds, &c. They thrive in a compost of loam, peat, and sand in equal parts. *O. granatensis* is not very well known, but is extremely useful,

especially in its young state; it has a smooth stem, with pinnate leaves and long, narrow, somewhat drooping segments. *O. oleracea* is another elegant species, also known by its production of a kind of sago obtained from its stem, which is slender, rather swollen at the base, and freckled with blackish-brown; the leaves, which are pinnate, vary from 4ft. to 6ft. long, and are beautifully arched; the segments are bright green, and 1ft. to 2ft. in length. *O. regia* is a beautiful slender-growing species, with pinnate leaves varying from 3ft. to 6ft. in length; the pinnæ are of a shiny green colour, 6in. to 12in. long, and about .1in. in breadth. *O. Sancona* is a valuable plant for indoor décoration (Fig. 560), and it may be used as a substitute for Cocos and others; it also seems to be an easily-grown species, and is very distinct when young by reason of its reddish leaf-stalks.

PHŒNIX.—A genus well represented in cultivation. Its species are very valuable, not only for their useful decorative properties, but also for the economic value of some of them. They are chiefly greenhouse plants, only a few requiring stove treatment. They are extremely useful for sub-tropical gardening and for all decorative purposes. The stems, or trunks, vary a great deal,



FIG. 561.—PHŒNIX CANARIENSIS.

being sometimes rather erect while other species appear to be nearly stemless. When erect the stems are marked with the scars of the old leaves. The leaves are terminal and spreading, with elongate-lanceolate segments. The flowers are found on long spikes, which rise from amongst the leaves. The fruits are fleshy and one-seeded, those of *P. dactylifera* (Dates) being very familiar to us. Phoenix can easily be propagated by

seeds, but this is an extremely slow process. Many of the nurserymen used at one time to grow them from seed, but now prefer to import the plants from Southern countries, such as places along the Riviera, where they are grown in the open in enormous quantities to supply all the Northern towns. When raised from seeds the young plants require a rather light compost, but in the case of imported or old-established specimens



FIG. 562.—PHŒNIX RECLINATA.

loam and sand will be sufficient. A liberal supply of water is necessary.

P. acaulis is a valuable species for decorative purposes, of rather compact habit, having a small thick stem, surmounted by a fine crown of pinnate and spreading leaves, varying from 1ft. to 3ft.; the pinnæ are narrow and stout at the base, the lower ones being transformed into stout spines. *P. canariensis* (*P. tenuis* and *P. jubæ*) is extensively grown in the nurseries in the Mediterranean regions, and is decidedly the most useful species for

decorative purposes; it may be described as a *P. dactylifera*, only of slenderer habit (Fig. 561). *P. dactylifera* (true Date Palm) grows very freely under greenhouse treatment, and can be used with success for indoor decoration when young; the leaves are pinnate, long, and of a deep green; the pinnæ are linear-lanceolate, and stand out nearly straight; it reaches in its native country a height varying from 100ft. to 120ft. *P. farinifera* is another compact species of elegant stature, with pinnate leaves varying from 3ft. to 4ft. long, and ovate acuminate pinnæ 6in. long, the lower ones being transformed into stout spines. *P. humilis* is the smallest species of the genus, possessing bulbous stems only 1ft. long; the leaves vary from 2ft. to 3ft., with conduplicate pinnules, the lower ones being often transformed



FIG. 563.—PHŒNIX RUPICOLA.

into short and sharp spines; it is very useful for decorative purposes; there are also half-a-dozen varieties of *P. humilis*, all closely allied to the typical one. *P. reclinata* (*P. zanzibarensis*) is a large and free-growing species of robust constitution, which could be used with success for sub-tropical gardening; when the plant attains a certain number of years it produces a stout stem, bearing elegant pinnate leaves; the spreading pinnæ are of a triangular shape (Fig. 562). *P. rupicola* is a very remarkable species and the noblest of the genus, but unfortunately still rare in cultivation; the leaves are pinnate and spreading, with narrow pinnæ reaching about 6in. in length, the lower ones being transformed into sharp spines (Fig. 563). *P. sylvestris* possesses a great similarity to *P. dactylifera*, producing greyish-green leaves varying from 7ft. to 12ft. long, with a multitude of alternate and opposite pinnæ, which often reach 18in. in length; it is one of the most robust Palms, and can be utilised for sub-tropical gardening during the whole of the summer (Fig. 564).

PHYTELEPHAS.—A genus of compact plants, very ornamental in their young state, and thriving fairly well in a greenhouse throughout the summer, but requiring stove heat during the winter. Only two species seem to be cultivated at the present time. *P. macrocarpa* is well known for its fruits, which furnish a kind of ivory used for making numerous small ornaments. The Phytelphas are unarmed, and comparatively robust. The leaves

are terminal and pinnatisect, with a quantity of segments, the upper ones being opposite and the lower ones alternate—this is one of the most distinct characters of the genus. The plants thrive splendidly in a rich compost of two parts good loam and

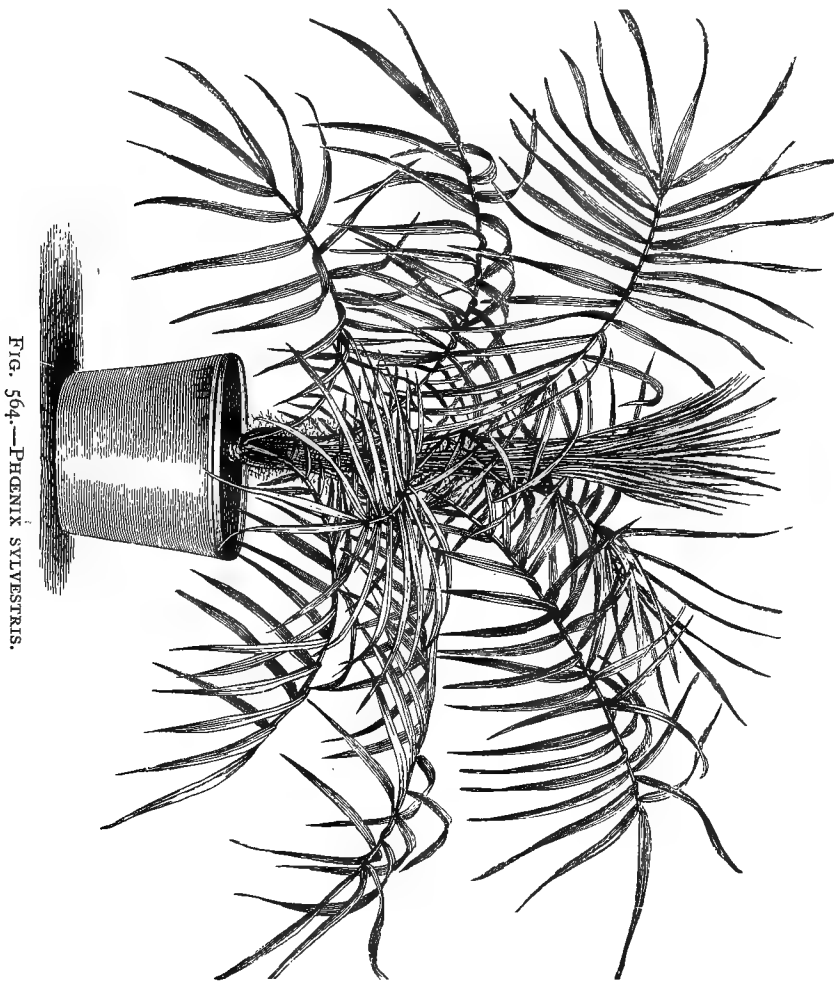


FIG. 564.—PHOENIX SYLVESTRIS.

one of peat and sand, and require an abundant supply of water during the growing period. Propagated by seeds. *P. macrocarpa* produces the vegetable ivory of commerce; it forms a somewhat creeping stem, with beautifully arched rich deep green leaves, varying from 15ft. to 20ft. in length, with rather long pinnæ, and

is well worth growing. *P. microcarpa* is a quite distinct stemless species, producing very small fruits; the lanceolate leaves sometimes reach 24ft., and are provided with a great number of pinnæ.

PINANGA.—These plants are practically closely allied to the old *Seaforthia* tribe, but now form a quite distinct genus. They are seldom met with in collections. The species produce long and slender stems with a fine and elegant effect; the leaves are terminal, unequally cut or pinnatisect, or sometimes simply bifid at the apex. The plants can be used with success in their young state for table decoration. They thrive under stove treatment in a compost of loam, peat, and sand in equal quantities. A generous supply of water is also required. Propagated by seeds. *P. maculata* is an elegant species, but unfortunately rather rare in cultivation; it has a smooth slender stem, with pinnate leaves and broad and sessile pinnæ of a shiny green, their surface being sometimes spotted with olive-green macules. *P. patula* is a beautiful compact plant with an erect and smooth stem somewhat swollen at the base; the leaves, which are unequally pinnate and sheathing at the base, vary from 4ft. to 5ft. in length. *P. Veitchii* is one of the best species of the genus, highly decorative, but rather rare in cultivation; the leaves are oblong and truncate, deeply two-lobed at the apex, mottled green on the upper surface, and a rich claret colour below. Many others could be mentioned, but the above are the best species.

PLECTOCOMIA.—A genus composed of stove plants of climbing habits and possessing a certain resemblance to *Calamus*. All the species are extremely decorative in their young state, and do not present any cultural difficulties. They require a compost of equal parts loam and peat, and are successfully propagated by suckers, which are easily obtained. The leaves are large and pinnate, and produce at their extremities long tails provided with a sharp set of stout spines. *P. assamica* is a handsome species, producing splendid arched leaves rather broad and deeply bifid in their early state; the upper surface is dark green, whilst the under part is covered with a fine powdery white, which gives to the species quite a characteristic appearance. *P. elongata* is a very tall climbing species, producing a stout stem at the base; the young leaves are broad, deeply bifid, and of a deep green, and when fully developed often attain 20ft. in length; the petioles are protected with long and sharp spines. *P. himalayana* forms a quite distinct variety, extremely elegant in its young state, producing some ample leaves with alternate, linear-lanceolate pinnules; the margins are shortly toothed, and the pinnule-bearing part of the petioles is protected by stout prickles.

PRITCHARDIA.—A genus composed of handsome, unarmed, stove Palms, with large and terminal leaves and narrow segments, bifid

at the apex and induplicate, and with concave petioles. *Pritchardias* require light soil, composed chiefly of peat and sand, with a small portion of loam; and a good supply of water is necessary through the growing period. Increased by seeds, which require a strong heat to germinate. *P. macrocarpa* is a species producing large leaves, divided into numerous linear-lanceolate segments; it is allied to *P. Martii*, and is a highly ornamental robust Palm, well worth growing. *P. Martii* forms a handsome stove Palm, but seems to be the most delicate of the genus as far as culture is concerned; it produces flabelliform and plaited leaves of a deep



FIG. 565.—PRITCHARDIA VUYLSTEKIANA.

green; the petioles are quite smooth and unarmed, and are partly enclosed at the base in brown fibres; the seeds are extremely small compared with *P. pacifica*, to which it has a great similarity. *P. pacifica*, an unarmed species, is rather robust and easily grown compared with the others; it is also the most decorative plant for the stove; the petioles are quite distinct, and are covered with a white scaly tomentum, partly enclosed at the base in brown fibres, and bearing large, flabellate, bright green leaves. *P. Vuylstekiana* is another decorative species of rather

compact habits, in its young state producing large deep green leaves, supported by a short petioles; the stem is somewhat stout (Fig. 565).

RAPHIA.—A stove genus, decorative when well grown, but unfortunately presenting a certain amount of cultural difficulties. The stems, or trunks, vary a great deal; the petioles are cylindrical or convex at

the base, and flat above, supporting some long and terminate leaves with linear-lanceolate segments. Raphias can be grown as mentioned for Geonomas, by partly plunging the pots in the water of

the tank, which must in this instance be kept on the warm side. *R. pedunculata* (*R. Ruffia*) is a distinct species, producing pinnate leaves

varying from 2ft. to 6ft. in length, with shining green pinnæ 10in. to 12in. long; the petioles are unarmed, and partly protected by coarse fibres. *R. tædigera* is the most ornamental species of the genus, being handsome in every respect, chiefly in its young state; the stem remains of a moderate size, but the leaves are sometimes enormous, varying

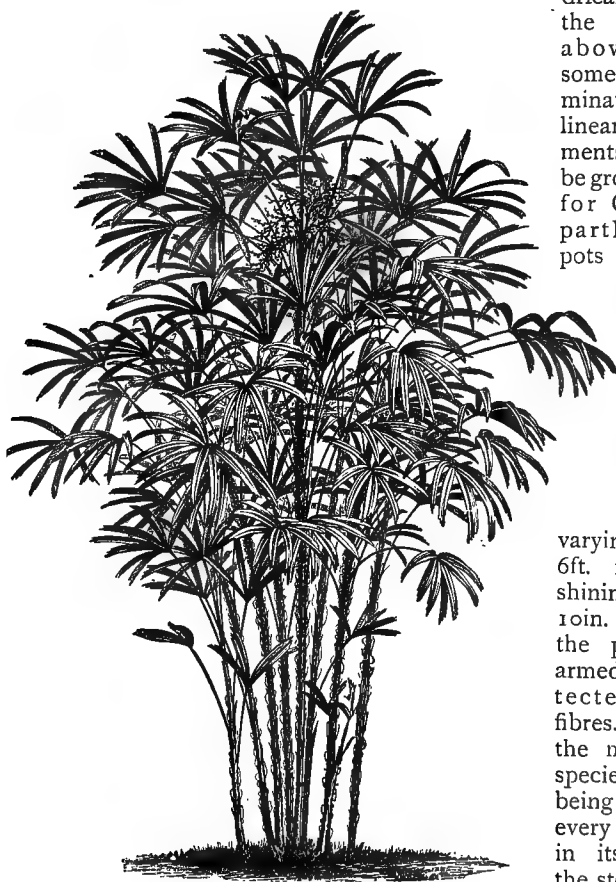


FIG. 566.—RHAPIS FLABELLIFORMIS.

from 40ft. to 50ft. in height, and forming a splendid plume-like crown. *R. vinifera* (Bamboo or Wine Palm) is also a moderate-sized tree, producing leaves varying from 6ft. to 7ft. in length, with spiny leaflets.

RHAPIS.—A genus represented in cultivation by three or four typical slender-growing plants, which form a very ornamental greenhouse group, with fan-shaped leaves, deeply cut into numerous segments. Rhaps are very robust, and grow nearly everywhere. They produce a great quantity of suckers, which may be successfully utilised for reproduction; these only require to be detached with care, just retaining a few roots. In the case of young suckers a light soil must be used, but for established plants a strong compost, as recommended for *Chamærops*, must be employed. *R. flabelliformis* (*R. aspera*) is certainly the best species of the genus, and may be employed for decorative purposes at any time. In its early state it forms an attractive and robust table-decoration plant, on account of its persistent and petioled leaves, divided into five or seven segments. The stem rarely exceeds, in cultivation, $1\frac{1}{2}$ in. in diameter. It is a good plant for subtropical gardening (Fig. 566). There is also a variegated form. *R. humilis* (*R. Sirotsik*) is closely allied to *R. flabelliformis*, but produces larger leaves, with more pendent segments, which increase its beauty. It may be used with great success for table decoration, &c.

RHOPALOSTYLIS.—A handsome but small genus, very well known by growers, and for many years classified under *Areca*. The two elegant species in cultivation belong to the unarmed greenhouse Palms; they produce terminal leaves, with numerous narrow segments, and very short petioles. They require exactly the same treatment as *Arecas*. *R. Baueri* (*Areca Baueri* and *Seaforthia robusta*) is very well known and largely cultivated; it has elegant pinnate leaves, from 6ft. to 12ft. long, the pinnæ varying from 18in. to 2ft.; it often reaches a height of 20ft. in our houses, but when young forms one of the finest plants for table decoration (Fig. 567).



FIG. 567.—RHOPALOSTYLIS BAUERI.

R. sapida (*Areca sapida* and *Kentia sapida*) is another elegant Palm, of more compact habit than the preceding, producing some splendid pinnate leaves 4ft. to 6ft. long; the pinnæ are very narrow, linear-lanceolate, and clothed with minute scales. This plant is also very useful for table decoration.

SABAL.—A genus of noble fan-leaved stove and greenhouse Palms, some of which are often utilised in sub-tropical gardening. In their young state they are very decorative, and often reach enormous sizes both in houses and when planted out (as they are in some Southern counties). Sabals in general are extremely robust, and should be more largely grown on account of their valuable properties. They require a rich but light compost, such as a good fibrous loamy soil. Suckers are sometimes thrown up, and may be utilised for reproduction, but seeds are to be preferred. *S. Adansoni* is to a certain extent half-hardy, of rather dwarf habit, and a slow grower; it is a handsome decorative variety, and may be employed for sub-tropical gardening with great success. The flabelliform leaves are supported by petioles varying from 2ft. to 3ft. in length; the leaves are deep green on the upper surface and silvery below; the stem, which is extremely short, is partly buried in the ground. *S. Blackburniana* is another valuable species for sub-tropical gardening, and when young forms a useful plant for indoor decoration. The leaves attain large dimensions; they are somewhat flabellate, and divided into narrow pendent segments of a light green; the petioles are sheathing and smooth, and partly covered at their base by rough fibrous matter. *S. mauriticeforme* (*Trithrinax mauriticeforme*) is a very large-leaved stove Palm, reaching 20ft. in diameter; the leaves are glaucous below, and are borne on petioles varying from 7ft. to 8ft. long; the trunk often becomes 1ft. in thickness and 6ft. to 8ft. high. *S. Palmetto* (*Chamærops Palmetto*) is a useful greenhouse Palm, producing an erect stem 20ft. to 40ft. in height, with smooth and concave petioles supporting leaves 5ft. to 8ft. long; it can be employed with great success for various decorative purposes. *S. umbraculifera* bears a great similarity to *S. Blackburniana*, and is a very robust greenhouse species; the stem, or trunk, often reaches from 6ft. to 8ft. in height, and the petioles support some very dark green leaves.

SCHEELEA.—A genus composed of unarmed stove plants, very similar to *Attalea*. They may be utilised with success for decoration in their young state. The leaves are terminal and pinnatisect, and the segments are disposed in series or aggregate. The plants require a compost of peat and loam in equal parts, and are easily propagated by seeds. *S. excelsa* is a species reaching from 40ft. to 50ft. in height, with channelled petioles and enormous elliptical



TEMPERATE HOUSE AT KEW.

pinnatifid leaves 15ft. to 24ft. long; the numerous leaflets are linear and glaucous below. *S. unguis*, the most beautiful plant of the whole genus, appears in its early age to be without stem; its erect leaves are 2ft. to 6ft. long, and the broad pinnæ often reach the base of the petiole, which is sheathing and partly covered along the edges with brown fibres; the leaves and petioles are of a splendid deep green. A useful species for various decorative purposes.

THRINAX.—Another genus composed of stove plants, some of which may be employed for greenhouse decoration during the summer months. Thrinax are of dwarf habit and unarmed, and have fan-shaped leaves with induplicate and bifid segments; the petioles are slender and biconvex. Many of the species are extremely ornamental, and are worthy of wider cultivation. In their young state they require a light compost of equal parts peat, loam, and sand; but for strong, established specimens sandy loam is preferable. Propagation by fresh imported seeds. *T. argentea* is a distinct species, producing a stem 12ft. to 15ft. high; the leaves, which are shorter than the petioles, are of a silvery silky colour below; the divisions are combined at the base. *T. barbadosensis* is a very decorative species, producing some enormous glabrous leaves, with lanceolate, acuminate segments; the petioles are clothed with white scales like felt, and all along the edges with black, hooked spines; it often reaches 20ft. in height. *T. excelsa* is a rather tall-growing species, producing leaves 4ft. to 5ft. long, pale green on the upper surface and glaucous below; the divisions are about 2ft. in length, and partly united; the stem is often from 7ft. to 10ft. in height. *T. multiflora* (*T. graminifolia*) deserves to be grown in every collection; it attains a good size with age. The stem is slender, and, as well as the petioles (which are 4ft. to 6ft. long), is partly covered at the base with a woody, fibrous matter; the leaves are somewhat flabellate, with united segments. Extremely decorative in its young state as well as when full grown. *T. parviflora* is the most attractive amongst the dwarf species, producing sometimes with age a stem varying from 8ft. to 10ft. high; the slender petioles vary from 18in. to 24in. in length, and are thinly covered at the base with a kind of fibre; the leaves are palmate and glabrate, green below. *T. pumilio* is another species of rather dwarf habit, producing a very short stem, with erect and slender petioles supporting some large palmate leaves, bright green on both sides, and divided for about half their length into very narrow segments. *T. radiata* (*T. elegans*; *T. gracilis*) is a slender species, quite distinct in appearance, producing a stem somewhat swollen at the base, with quite smooth petioles, which are partly covered at the base with a kind of fibrous matter; the leaves are palmate, green, and glabrous below, and partly divided into graceful pendent segments; this

plant may be employed with great success for table decoration, &c. (Fig. 568).



FIG. 568.—*THRINAX RADIATA*.

TRACHYCARPUS.—A genus composed of only two or three greenhouse or half-hardy plants which were previously classified under *Chamærops*. They are very much used in sub-tropical gardening on account of their robust constitution. The leaves are terminal, deeply divided into narrow segments, and have biconvex petioles. *Trachycarpus* do not present any cultural

difficulties. They only require a strong compost of two parts strong loam and one part leaf-mould and sand; water must be applied generously during the growing period. They are sometimes increased by means of division of suckers, or by seeds. *T. excelsus* (*T. Fortunei* and *Chamærops excelsa*) is a handsome Palm for sub-tropical gardening, and may be utilised for various decorative purposes, such as halls or windows during the winter, where no other Palms could exist. The stem often reaches 20ft. in height, and is somewhat stout at the base; the petioles are partly enclosed at their base in a fibrous matter, and support fan-shaped leaves, deeply divided into deep green segments (Fig. 569). *T. Martiana* (*T. khasyanus* and *Chamærops Martianus*) is another valuable greenhouse species, also useful in sub-tropical gardening; it has a slender stem, and petioles 20in. to 30in. long, provided with small spines, and covered with a kind of fugacious tomentum; the leaves are palmate, with bifid segments. This variety often reaches 24ft. to 26ft. high.

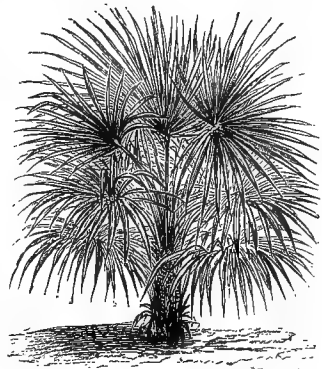


FIG. 569.—*TRACHYCARPUS EXCELSUS*.

TRITHRINAX.—This genus is also only represented by two or three stove species, producing fan-like leaves deeply divided into long segments, and petioles very well armed with spines, and partly enclosed in rough fibres. *Trithrinax* are rather low-growing Palms, and are very valuable amongst ornamental-leaved plants. They require about the same treatment as *Thrinax*, and are propagated by seeds. *T. acanthocoma* is a very prickly species, producing a rather small stem covered with a persistent netted sheath, and protected by numerous stout and reflexed spines; the leaves are large and flabelliform, being deeply divided into numerous linear and bifid segments. *T. brasiliensis* is an elegant dwarf-growing Palm, with a slender stem 6ft. to 10ft. high; the petioles, 2ft. to 5ft. long, are quite smooth, terminated by a circle of short spines, and support some large flabelliform leaves, which are divided into narrow segments of a shiny green, and glaucous when young.

VEITCHIA.—A genus represented in cultivation by two or three species which were previously classified under *Kentia*. They are rather rare, and seem to be better adapted for collections than for ornamental purposes. *Veitchias* produce terminal and equally pinnatisect leaves, with linear and acuminate pinnæ, and require exactly the same treatment as *Kentias*. *V. Johannis*

(*Kentia Johannis*) is a handsome species (Fig. 570), having terminal leaves, with minutely-toothed pinnæ; the midrib finishes in a small curve with an oblique and truncate apex; in its young state the petiole or rachis is of a deep blood colour, and is sometimes clothed with grey. *V. Storckii* (*Kentia Storckii* and *K. elegans*) attains in its native country 40ft. in

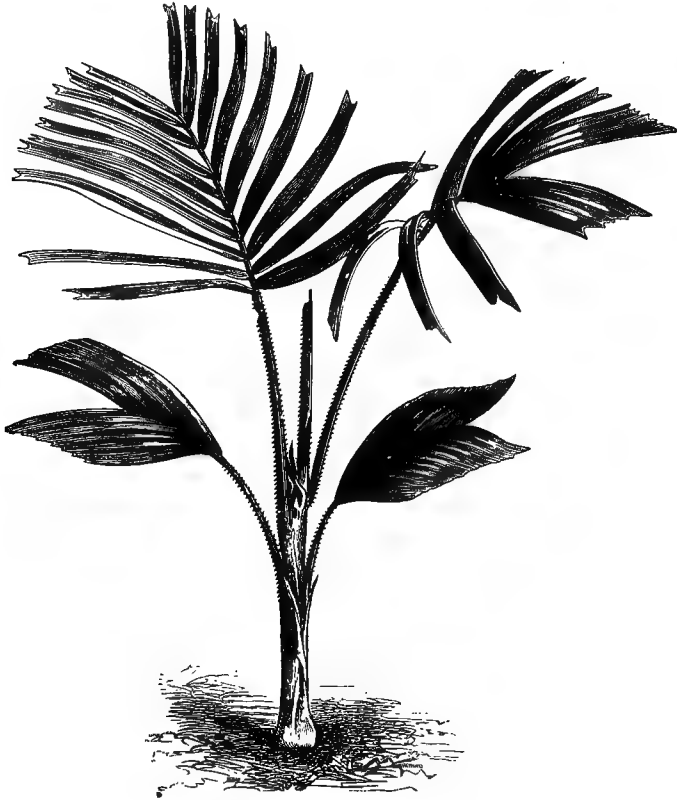


FIG. 570.—*VEITCHIA JOHANNIS*.

height; it produces a hard and smooth stem, dark brown below and a lighter shade above; the leaves have coriaceous pinnæ, glabrous on both sides.

VERSCHAFFELTIA.—This genus of Palms is represented by an elegant stove plant resembling in its early state a *Phenacophorum*, and thrives very well in a compost of two parts peat and one part loam and sand. It also requires a high temperature and a constantly-saturated atmosphere, and is propagated by seeds.

V. splendida (*Regelia magnifica*, *R. majestica*, and *R. princeps*) deserves to be more largely grown on account of its decorative properties (Fig. 571). It possesses a slender stem, supported on an inverted cone of roots. The petioles, which are sheathing, are, like the stem, clothed with sharp black spines. The leaves, which vary from 4ft. to 7ft. long, are cuneate-obovate, and of a bright green. This plant often attains in its native country a height of 8oft.

WALLICHIA.—A genus represented in cultivation by only three typical species, which are all stove plants possessing a certain amount of similarity to *Caryota*, but they do not reach such enormous heights. All are extremely decorative and very easily grown. Wallichias require a strong soil, as well as an abundant supply of water through the growing period.

They may be utilised for greenhouse decoration during the summer months. Propagated by suckers provided with roots, or by seeds. *W. caryotoides* (Fig. 572) is a very ornamental species, flowering pretty freely, and producing a few alternate and petiolate leaves 3ft. to 8ft. long, with sessile leaflets often 18in. long, the lower ones mostly opposite, and the upper ones alternate; all are more or less wedge-shaped, green on the upper surface and whitish beneath.

W. densiflora is another decorative, stemless species, rarely exceeding 12ft. in height; its pinnate leaves have numerous pinnæ, the lower one being binately fascicled and whitish beneath, the rest solitary or toothed; it is a very attractive plant.



FIG. 571.—VERSCHAFFELTIA SPLENDIDA.

WELFIA. — A genus embracing only two stove unarmed Palms, producing terminal and pinnatisect leaves, on flat and short petioles.



FIG. 572.—WALLICHIA CARYOTOIDES.

mould, and sand, and is increased very easily

by seeds. Only one species is in cultivation. *W. regia* is a most beautiful species, reaching in its native country 60ft. in height; it is of rather slender habit, and may be employed for table-decoration when young, the leaves being then gaily coloured with a bronzy tint; when fully developed they change to a bright green, and are divided into numerous pinnæ. This plant requires a substantial soil composed of rich loam, vegetable

Cycads.

The majority of the species of the order *Cycadacæ* are extremely curious on account of their vegetation, and are decidedly ornamental plants for both stove and dwelling-house decoration; they may also be employed for sub-tropical gardening, as is the case with the graceful *Cycas revoluta*, which will remain throughout the summer in a protected situation. *Cycadacæ* form a small section of Palm-like plants which are supposed to be closely allied to the *Coniferæ*. Their stems are mostly erect or

unbranched, always marked with leaf-scars, and support a splendid crown of pinnate leaves. Amongst the most striking and valuable genera of this order are *Ceratozamia*, *Cycas*, *Dioon*, *Encephalartos*, *Macrozamia*, *Stangeria*, and *Zamia*.

IMPORTATION.—Cycads taken in a general way are oftener imported than raised. With “collected” stems care must be taken that the plants are in a perfect state of rest, and that they have not suffered during the journey. On their arrival the trunks or stems must be potted up in as small pots as possible, using a rather light soil compared with that which the plants require when established. The pots should then be partly plunged in a bed of cocoanut fibre or tan, with a very strong bottom-heat. Water must be applied to the roots with great care, but copious syringings may be given. When the plants begin to grow, sufficient room must be given to each to enable it to develop its graceful crown.

PROPAGATION AND CULTURE.—These plants may be propagated by various means. Seeds are the best method, but they may also be successfully increased by suckers, which are sometimes thrown up freely. The suckers, however, have to be treated with the same amount of care regarding compost, drainage, water, &c., as imported pieces. It is advisable to separate suckers during the resting period, as then they will not be affected by the operation. Old stems, cut into pieces and placed on a strong bottom-heat, will often give rise to “eyes,” which, when well treated, will in time form other plants. The seeds are fairly hard, and should be sown in well-drained pans, with a very light compost, and placed in powerful bottom-heat, with any amount of saturation until germinated, and then all the healthy growing seedlings should be potted up singly. In the case of newly-imported stems, which just begin to send forth their new crowns, or suckers, and newly potted-up seedlings, shading must be observed; but when the plants are perfectly established they delight in an almost direct light.

CERATOZAMIA.—This genus is represented in cultivation by three or four species closely allied to *Zamia*. The only recorded distinction is the thickened apices of the scales of the male and female cones being bicornute instead of hornless. The stems, or trunks, are rather short, with pinnate leaves and articulated leaflets. *Ceratozamia*s require stove treatment, a rich soil composed of good loam and leaf-mould, and a constant saturated atmosphere chiefly throughout the growing period. During their resting time water must be applied with great care. *C. fusco-viridis* is a very handsome plant, having a trunk provided with broadish scales and beautiful broadly pinnate leaves, 3ft. to 4ft. long, and arching. The pinnæ are 6in. to 7in. long, and of a deep green; when young the leaves are of a bronze colour, but change to a

beautiful olive-green. *C. Kusteriana*, a dwarf species, produces a considerable amount of suckers, which may be utilised for propagation; its pinnate and spreading leaves are 2ft. to 4ft. long, and have semi-lunate pinnæ. *C. mexicana* is a decorative species, having a stout stem with armed petioles, bearing some beautiful leaves 4ft. in length, with dark green pinnæ. *C. Miqueliana* is another decorative species, with a slender stem and elegant pinnate, spreading leaves; the pinnæ are of coriaceous habit, 6in. to 12in. in length, and dark green.

CYCAS.—A well-known genus, comprising stove and greenhouse plants, some of which may be used with success in sub-tropical gardening. Cycas have cylindrical stems, mostly unbranched, and terminated by a beautiful crown of pinnate leaves. For culture and propagation *see* under "Ceratozamia." *C. circinalis*, one of the prettiest species of the genus, produces a stout and cylindrical stem, rather slender in the case of male specimens; the leaves are 6ft. to 12ft. long, and have shiny green pinnæ, often reaching 12in. *C. media* is rather tall, with a stout, tall, cylindrical stem bearing elliptic-lanceolate leaves, with a considerable number of pinnæ, which are transformed into spines at the base of the leaves; it deserves general cultivation. *C. Normanbyana* somewhat resembles *C. circinalis*; its oblong-ovate leaves have a quantity of pinnæ, and the compressed petioles are covered at their base with furfuraceous down. *C. revoluta* is one of the most robust and oldest species in cultivation, and is useful for sub-tropical gardening; in its young state the stem is simple, but with age it becomes branched, and is terminated by a graceful crown of leaves. *C. Ruminiana* is very well known, and is of beautiful habit; its moderately stout stem bears erect spreading leaves, with rich shiny green pinnæ. *C. Rumphii* is another handsome slender species, with petioles protected by two rows of small spines; the leaves are 4ft. to 6ft. long, and have linear-lanceolate pale green pinnæ.

DIOON.—A very small genus, only one species (*D. edule*) being known in cultivation. It is valuable for the economical properties of its large fruits. The stem is of moderate size, and supports a fine crown of glaucous green pinnate leaves, 3ft. to 6ft. long, and having their base covered with hairy matter. This species is an extremely ornamental plant, which requires a good sandy loam. During the summer it may be removed into a greenhouse, but requires stove treatment throughout the winter. Increased by seeds only.

ENCEPHALARTOS.—One of the largest genera of the order, and belonging to the South African flora. It is composed of beautiful plants for conservatories or greenhouses, and some of the species may be used for sub-tropical gardening during the summer months.

They have tall, cylindrical stems, and pinnate, terminal, armed leaves. A similar compost to that used for *Dioon* suits the *Encephalartos*. When in active growth they require an abundant supply of water overhead as well as at the roots, but when at rest it must be applied with the greatest care. Propagated by seeds. *E. Altensteinii* is a very useful species, with a stout stem and petioles swollen at the base; the leaves often reach 6ft. long, and have oblong acuminate pinnæ armed with long sharp spines (Fig. 573). *E. brachyphyllus* is distinct on account of its short

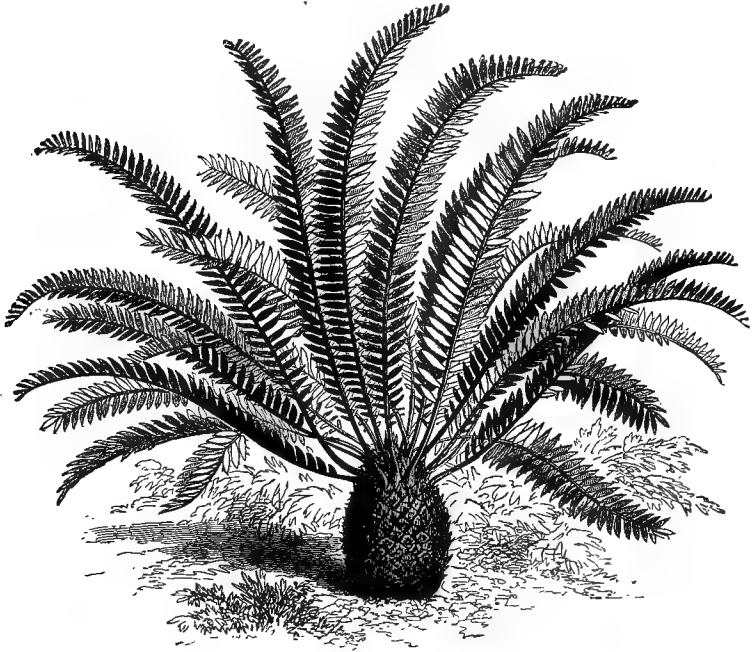


FIG. 573.—ENCEPHALARTOS ALTENSTEINI.

leaves, which are spreading, with erect pinnæ, rather wide and rigid, light green above and paler below; the petioles are mostly tomentose. *E. caffra* produces a stem often reaching 20ft. high, with elegant spreading recurved leaves of very stiff habit; the pinnæ are linear-lanceolate, 4in. to 6in. long. *E. horridus* is a striking species; the rather stout trunk bears remarkable bluish-green leaves, varying from 4ft. to 6ft. long, erect, and twisted back sharply at the extremity; the pinnæ are armed with sharp spines. *E. lanuginosus* is a beautiful spineless variety, of a splendid deep green; its trunk is 6ft. to 8ft. high, and

is surmounted by a noble crown of erect leaves with lanceolate pinnæ often 6in. long. *E. villosus* is an ornamental plant, having a rather stout stem clothed with woolly scales, and densely tomentose petioles; the leaves are 2ft. to 4ft. long, and have a quantity of spiny, toothed pinnæ. Amongst other cultivated species may be mentioned *E. Sedmanni*, *E. M^r Kenii*, *E. plumosus*, and *E. Verschaffelti*.

MACROZAMIA.—This genus is restricted to temperate and tropical Australia. The following cultivated species thrive successfully in a greenhouse during the summer, but require stove treatment during the winter. Macrozamia's are very similar to Cycas, with the exception of the pinnæ, which are destitute of midrib, and are marked with parallel veins. A compost of two parts sandy loam and one part peat answers very well. Propagated by seeds only. *M. Fraseri*, one of the most distinct species of the genus, is highly decorative, producing a very stout trunk, with pendulous and pinnate leaves often reaching 8ft. in length; the pinnæ are linear, somewhat swollen at the base, very deep green on the upper surface, and of a lighter shade beneath. *M. Mackenzii* is another handsome plant, with leaves ovate in outline, producing a quantity of pairs of narrow deep green segments. The petioles are partly covered at their base with loose floccose wool. *M. Perowskiana* (*M. Denisonii* and *M. Macleayi*) gives promise of being a tall kind, but is extremely slow in growth; in strong specimens the trunk is slender, but in young plants it is rather stout and short, and the dark green leaves form a most charming crown. *M. plumosa* is a very distinct and elegant plant, which ought to be more largely grown. The small ovate stem is covered with woolly scales; the petioles are flattened, and the twisted leaves are clothed with numerous narrow leaflets. *M. spiralis*, a beautiful and decorative variety, chiefly in its young state, produces pinnate leaves, 1ft. to 3ft. long, with linear pinnæ of a bright shiny green, but whitish at basè. The forms *M. corallipes* and *M. cylindracea* do not seem to be distinct from this. Amongst other cultivated species, *M. Miquelli* and *M. Hopei* may be mentioned.

STANGERIA.—A monotypic African genus, represented by a most beautiful stove-plant, bearing a great resemblance to some Ferns. It requires a compost of equal parts peat and loam with a small addition of sand, as well as good drainage. Water must be applied abundantly during the growing period. *S. paradoxa* possesses a subterranean cylindrical stem, which very seldom exceeds 1ft. long. The petioles are covered at their base by a woolly matter, and support some splendid pinnate leaves, with oblong, lanceolate pinnæ. Two sub-varieties are also found in cultivation under the names of *Katzeri* and *schizodon*, but they differ very slightly from the type.

ZAMIA.—This is really the largest and the richest genus of the whole order, some twenty or thirty species being in cultivation; all are extremely decorative, and require stove or greenhouse treatment. They are somewhat closely allied to *Encephalartos*; however, they form a well-marked genus. *Zamias* require a compost of equal parts loam and sandy peat, and are shade-loving plants. A copious supply of water is needed throughout the growing period; but when the plants are at rest they do not require much. They may easily be increased by suckers or by offsets, which are sent up pretty freely. *Z. furfuracea* is a handsome species, with a cylindrical trunk and prickly petioles; the leaves are divided into leaflets, which are opposite or alternate, and vary in number from fifteen to thirty on each side. *Z. integrifolia* is a very distinct species, which ought to be largely grown, as it is the most robust species of the genus, thriving fairly well in a greenhouse; it produces a slender stem with pinnate leaves and oblong pinnæ. *Z. picta* is another distinct species deserving to be more extensively grown; it has been classed as a variety of *Z. muricata*, to which it is far superior. The trunk is of a glabrous colour, with stout and pubescent petioles, and the leaflets are splendidly spotted with white. *Z. Skinneri* has a stem varying from 1ft. to 3ft. in height, with black and prickly petioles; the leaves, which often reach 3ft., are pinnate and spreading, and the bright green pinnæ are somewhat armed towards their apex. Many other varieties are in cultivation, but the above list includes the best.

Bamboos and their Allies.

Amongst the numerous genera of this distinct and characteristic order *Gramineæ*, Bamboos and their allies form the best tropical representatives. Some of them are eminently ornamental, varying in size from the noble and majestic *Dendrocabamus*, which in the Tropics form impenetrable forests, to some of the dwarf *Arundinarias* and Bamboos, and all are worthy of a place in every well-regulated conservatory or greenhouse.

Unfortunately Bamboos are not generally known by horticulturists. They are, however, most decidedly plants of the future, and, taken in a general way, are highly decorative, fairly free-growers, and able to stand an amount of rough treatment that would mean death to tenderer plants. Furthermore, they can adapt themselves to all manner of situations. Many have proved quite hardy in favourable localities, and thus can be employed in landscape work; but it is our present purpose to treat of those that are most suitable for indoor cultivation.

CULTURE. — Bamboos, &c., like all other plants, give the greatest satisfaction when they receive the best possible treatment. In the present case we will divide them into two groups,

comprising (1) the tall and (2) the dwarf species. The former do best when planted out in beds of rich turfy loam, with good drainage, and succeed very well if partially shaded by other large plants. The dwarf group may be successfully grown in pots, and ought to be more largely cultivated for the trade. During their growing period they require moisture in abundance, and in the spring a repotting or top-dressing of fresh soil is advisable. In the case of well-established plants the soil could be mixed with well-rotted cow-manure, which is very beneficial to them. When growth is first noticeable among established plants in the early spring they will have to undergo a thinning process, removing the oldest growths, and thus making room for the new ones, which always push up at such a time. Water must also be applied with care during the winter months—just enough should be given to prevent the soil from becoming dry.

PROPAGATION is readily effected by division of the roots, in the early part of the spring just when the plants are commencing to grow. The divisions should be inserted in small pots in a light sandy soil and kept in a warm pit until growth is noticeable. Potting must be repeated until the plants are large enough for sale as dwarf species or to plant out for large sized ones.

In addition to our well known Bamboos, there are several other closely allied genera possessing the same properties, viz., *Arundinaria*, *Arundo*, *Dendrocalamus*, and *Phyllostachys*.



FIG. 574.—ARUNDINARIA
FALCATA.

ARUNDINARIA. — This genus, which was formerly classified under *Bambusa*, is represented in cultivation by about ten distinct species which are nearly hardy, and several of them are Himalayan. They are very valuable for sub-tropical gardening, and when isolated they form some splendid tufts. They may be grown rapidly under greenhouse treatment, and must be kept rather on the dry side throughout the winter. *A. falcata* (*Bambusa gracilis*) is a very decorative plant (Fig. 574) and useful for the conservatory; it produces a very slender and branching stem

with very light green leaves; it varies in height from 3ft. to 6ft., and requires a rich soil as well as an abundance of moisture. *A. Fortunei* (*Bambusa Fortunei*) and its varieties, *variegata* and *argentea vittata*, are pretty plants, about 2ft. in

height, and are suitable for pot cultivation in the conservatory or greenhouse, growing in tufts, and having variegated leaves. *A. Metake* (*Bambusa japonica*) is of rather dwarf and branched habit, forming a handsome specimen, 4ft. to 6ft. in height, extremely free flowering, and produces persistent lanceolate deep green leaves; it is very useful for sub-tropical gardening. *A. Simonii* (*Bambusa Simonii*), a very rapid growing conservatory plant, attains a height of about 10ft., and produces long narrow leaflets, some of which are green and others often white.

ARUNDO.—Another very ornamental group, very closely allied to *Bambusa*, and composed of half-hardy plants, which become quite hardy in the southern counties or in close proximity to the sea. Arundos are excellent for sub-tropical gardening, and may be employed with great success in landscape work. They do not present any cultural difficulties, only seeming to prefer a rather moist soil. Propagation is effected by seeds or by divisions of the crown. *A. conspicua* is a valuable species, being nearly hardy; still, it is best grown in the conservatory. It produces long curving green leaves, and bears large ornamental panicles of flowers; its height varies from 3ft. to 10ft., and it forms an excellent plant for sub-tropical gardening. *A. Donax* is another handsome plant, producing large glaucous leaves, which are very ornamental, and bearing numerous spikelets of flowers; it varies in height from 8ft. to 10ft., and may successfully be employed for various landscape works, being extremely robust and a free grower. *A. D. variegata* is very largely grown on account of its decorative properties; it produces long leaves, striped with green and white. Unfortunately it is rather difficult to propagate. The best plan is to cut off the stems and place them in water in a warm pit, when they will break at the joints, and form small plants, which can be removed and potted. This variety seldom exceed 3ft. in height. *A. mauritanica* is closely allied to *A. Donax*, reaching sometimes a height of 18ft.; unhappily, this species is little known, and seems as if it will remain so for a long period; it forms a handsome plant for the greenhouse.

BAMBUSA.—Under this very familiar genus many others have been several times classed, and it is in most cases extremely difficult to recognise any of their representatives. But the true *Bambusa* form some valuable decorative plants for greenhouse ornamentation or for sub-tropical gardening. They are partly half hardy, requiring a position more or less protected from sharp, cold winds, &c., but are quite hardy in the South. *Bambusas*, like their relatives, are very easily cultivated; they delight in a fresh moist soil during the growing period, and in winter water must be given with care. Propagation is effected by divisions when the plant has just started growth.

B. arundinacea is the well-known old Bamboo of India, one of the earliest species introduced. It has a stout stem, 5ft. to 6ft. high, bearing large bright green leaves. The whole plant presents a very graceful and feathery appearance. In Southern latitudes it can be utilised for sub-tropical gardening, but under our climate it is preferable to give it stove treatment. *B. nana* (*B. glauca*, *B. viridis-glaucescens*, and



FIG. 575.—BAMBUSA NANA.

B. epacrifolia) is a fine, strong-growing plant (Fig. 575), 6ft. to 8ft. high, with beautiful glaucous-green leaves; it succeeds very well under stove treatment, but will also do very well in the conservatory. *B. vulgaris* (*B. striata*) is another beautiful species of

graceful habit and with slender stems, usually 6ft. to 12ft. high, but sometimes under favourable conditions reaching 20ft.; it has a purple stem striped with yellow, and will do well in pots in the greenhouse.

DENDROCALAMUS.—Another genus comprising several tropical species of very noble habit. Some of them attain enormous sizes, and can only be grown in very large houses. *D. giganteus* forms forests in India and Malaya. *Dendrocalamus* require

a good soil, stove treatment, and an abundant supply of water during their growing period. Amongst other species which are sometimes seen in cultivation may be mentioned: *D. membranaceus*, *D. sikkimensis*, and *D. strictus*.

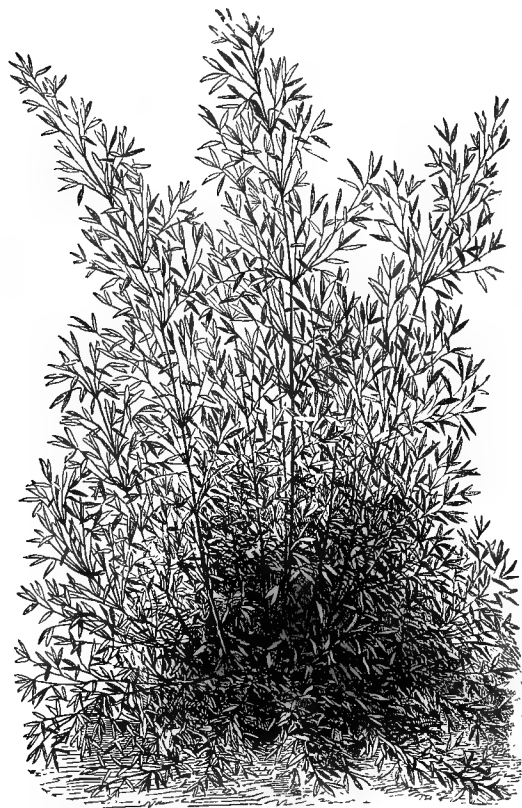


FIG. 576.—PHYLLOSTACHYS AUREA.

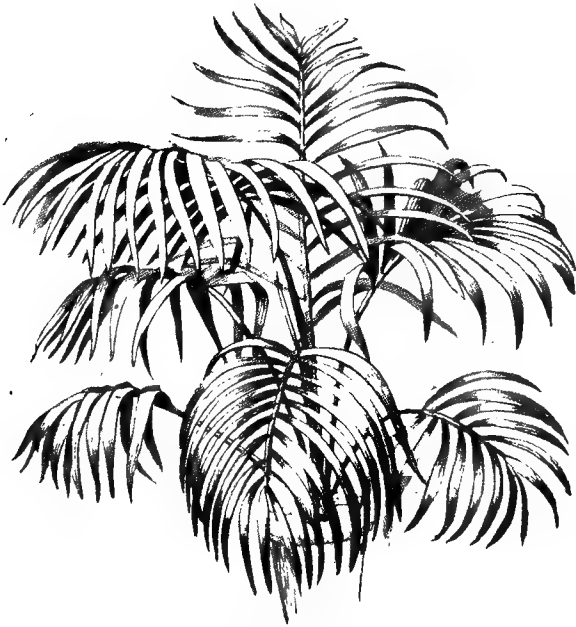
PHYLLOSTACHYS.

— This small genus is only represented in cultivation by a few ornamental Bamboo like plants, with a fairly robust constitution. Their culture and propagation is exactly the same as for Bamboos. *P. aurea* (*Bambusa aurea*), the Golden Bamboo, is a very beautiful little stove plant (Fig. 576), with rather

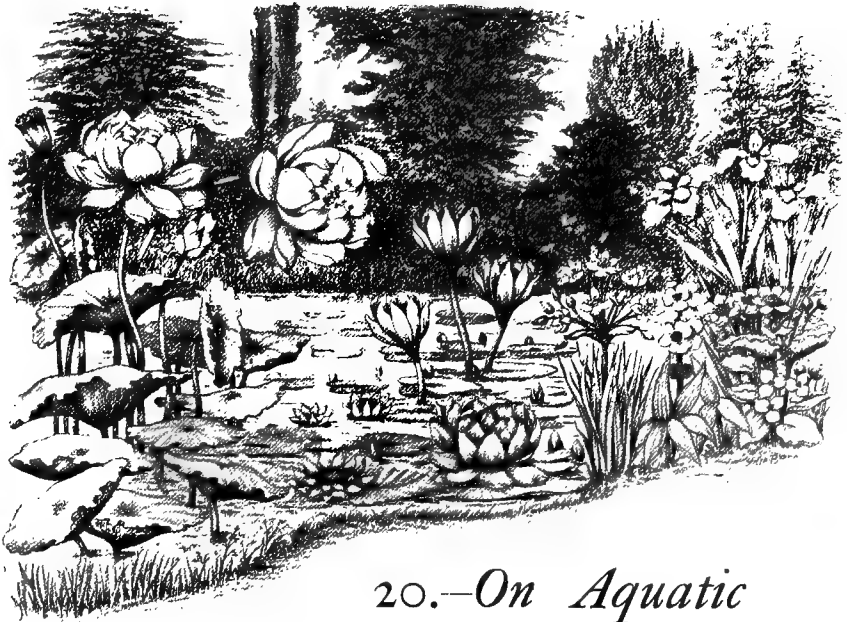
thin stems, growing in tufts, of 6ft. to 8ft. high; the leaves are light green when young, but change to a golden colour later. *P. bambusoides* bears a great similarity to the Bamboos; its unarmed, quite smooth, reed-like culms are 8ft. to 12ft. long; it is highly decorative. *P. nigra* (*Bambusa nigra*) is an

interesting and valuable plant, also closely allied to the Bamboos ; it usually varies in height from 4ft. to 5ft., but will sometimes reach 20ft. or more under cultivation. *P. violascens* (*Bambusa violacea*) is a pretty and remarkable plant, having leaves green above and bluish underneath ; the stems also, which are much branched, are a deep violet, or sometimes almost black ; it does well in the conservatory.

The species and varieties which have been found to succeed outside in this country are fully dealt with in the Chapter "On Trees and Shrubs."



HOWEA BELMOREANA.



20.—On *Aquatic* *Plants.*

BY W. G. BAKER
(*Oxford Botanic Garden*).

JUDGING from the increased interest taken during recent years in the cultivation of Aquatic Plants, and the paucity of reliable information respecting them that is readily available to the majority of horticultural readers, it is hoped that the particulars referring to them in the following pages will in some degree serve the purpose that has occasioned their appearance. Every contribution that has for its object the desire to familiarise the many interesting and picturesque plants which are included in this chapter cannot but serve a useful purpose, for it is certain that the more a general knowledge of them increases, the more popular will they become, and the greater will be the encouragement for expert growers of them to secure and distribute new and improved forms of some of the genera. Just in proportion to the care that is bestowed on the various requirements of the plants, and the careful consideration given to the disposition of a desirable selection of them, will be the measure of success that may be fairly anticipated.

The subject with which we are dealing, so far as space will permit, will embrace observations on the treatment of outdoor ponds and tanks, as well as those of the latter constructed under glass for the cultivation of tropical Aquatic Plants, and the most desirable kinds that may be advantageously associated with them will be mentioned. In both cases there will be considerations as to the space and means available for their cultivation; and it may be stated that considerable gratification may be obtained from very simple and restricted contrivances that may be quite sufficient for the requirements of a limited number of them. As an example, barrels cut in halves may be employed in which to grow many Aquatic Plants. These may be sunk in the ground to within a few inches of their tops, or so grouped as to be faced with rustic work, which would also act as a shield to their exteriors from the rays of the sun. Large earthenware pans may also be used; but it must be borne in mind that whenever such vessels are used, precautions must be taken to protect them from exposure to severe frost that would cause them to burst. Notwithstanding this drawback to their use, in many instances they would serve the purpose of at least helping the amateur to



FIG. 577.—*BUTOMUS*
UMBELLATUS.

acquire a more intimate knowledge of the particular kinds chosen for what may be only regarded as an interesting experiment in their cultivation. As an example, it will suffice to mention that of a plant remarkable for its uncommon prettiness, and yet one that is seldom met with in similar surroundings. We refer to the wild Flowering Rush *Butomus umbellatus* (Fig. 577), which we once saw flourishing in a delightful fashion in an upright, glazed earthenware vessel at the foot of a fern rockery in a confined town garden. This plant, Gerarde wrote, "is, of all others, the fairest and most pleasant to behold, and serveth very well for the decking and trimming up of houses, because of the beautie and braverie thereof"; and it cannot be denied that the *Butomus* is amongst the most elegant of our hardy Aquatics. This instance is mentioned for the purpose of showing what may be accomplished with very limited resources in respect of the cultivation of other representatives of this interesting class of plants. The simplicity

of a contrivance that is satisfactory in its employment is often its chief recommendation, more especially when it admits of extended application.

From a successful employment of simple contrivances encouragement may be derived for engaging in more enterprising efforts with respect to growing some of the choicer or rarer kinds that need but a limited space in which to develop their full beauty. This plan would likewise be of occasional service for the accommodation of reserves or duplicates, or for any of the smaller plants that may be required to be kept under close observation. Enough has been said to show that at least something may be done in the way of successfully growing a few of these plants without the aid of any very elaborate appliances.

In numerous instances there may be already means at hand, in the form of tanks which have been constructed for the storage of water, that could be at once utilised for the reception of some of the many beautiful hardy *Nymphæas* now so readily obtainable; but it should be remembered that, excepting when the tank is of large dimensions, those of a neat habit will be preferable for this purpose to vigorous-growing kinds. The planting and arranging of them are largely discretionary, the use of tubs or boxes for the former being a matter of convenience; but in their arrangement, as far as practicable the alternating of dark and light shades of colour may be generally depended on to produce a pleasing effect during their season of flowering. These observations are intended to apply to tanks that are already in existence: the construction of new ones will be dealt with further on in this chapter.

Hardy Plants.

The possession of ponds or lakes is the great desideratum for exemplifying the admirable effects that can be produced by these plants when their cultivation is as skilfully undertaken as is the case with many other things. It is to the initial step that may be attributed the measure of success that often rewards the efforts made in attaining its accomplishment; so is it in respect to what could aptly be termed an ideal water-garden. A natural taste combined with a practical knowledge is essential in carrying out the details of this kind of work, which should be done in accordance with a carefully-designed plan. It is here that the advantage of consulting an expert in this department of horticulture is of primary importance, and it is indeed within his province to direct the scheme throughout to a successful issue. Even when everything has been carefully done that seems to be necessary to ensure establishing *Nymphæas* in large ponds or

lakes, they are not then entirely free from casual mishaps. For instance, in a season of long-continued drought the water may sink to an abnormally low depth, and in receding from the plants leave their crowns exposed above its surface to endure an uncongenial element and its consequences. We recall one case where, after several of the choicer kinds had become fairly established, they were discovered unexpectedly removed from their allotted stations and floating promiscuously in the lake, which depredation had been the work of some mischievous swans.

Interest is now evidently being more generally taken in acquiring some of the rarer kinds of *Nymphæas* in places having facilities for growing them, and where the commonly-

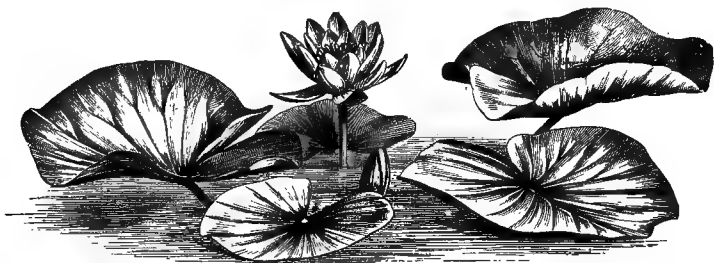


FIG. 578.—*NYMPHÆA ALBA*.

known white *N. alba* (Fig. 578) has hitherto been perhaps the sole representative of the genus. It must not be imagined, however, that the new introductions, notwithstanding their varied charms, will ever be likely to entirely usurp the places of this old native favourite. Where the familiar white Water Lilies abound they present, during their season of flowering, as delightful a spectacle as it is possible to imagine in connection with rural scenery, more particularly in sheltered places. Beyond where steamboats churn the river stream, these are to be found helping materially to impart to their surroundings the appearance of reposeful seclusion that is so great a charm to frequenters of the riverside. There are not a few to whom some of these scenes are familiar, and who have felt delight in viewing closely the floating flowers expanding their broad and spotless petals to the sun.

To careless minds they seem to roam
 Abroad upon the river;
 In all their movements chained to home,
 Fast rooted there for ever.

Such scenes are emphatically worthy of the pains of preserving, and in the not very distant future it may be considered desirable to undertake the protection of these Aquatic Flowers—born of the river and on the river borne.

Water, whether in the shape of a lake, pond, river, or stream, has always formed an important feature in landscape gardening, but up till the past few years the cultivation of hardy Aquatics has been a branch of horticulture very much neglected; in fact, there are numerous instances where scarcely any regular attention has been bestowed on the embellishment of the surface or sides of lakes or ponds, by establishing the choicer kinds of Aquatics that are so suitably adapted for this purpose, and which impart to them so much additional interest and pleasure. There are, however, indications that the merits of water gardening, with its charming and beautiful effects, are better appreciated, and in many leading establishments the cultivation of Aquatics is being deservedly made a special feature. Doubtless, this has to a great extent been brought about by the introduction of the many beautiful hybrid Water Lilies raised by the skilful operations of M. Latour-Marliac, to whose successful labours we are so greatly indebted for many exquisitely-coloured novelties. In these lovely hybrids we get great variation in size, shape, and colour of the flowers, and their loveliness is considerably enhanced by the freedom with which they are produced and the delightful fragrance of many of them. Some of these hybrids are also as hardy and as vigorous in habit as our own well-known common Water Lily (*Nymphaea alba*), and the conditions under which the native plant is found to flourish best are those in which these likewise may be expected to succeed equally well. The new hybrid Water Lilies raised by M. Marliac have been referred to in terms of high appreciation as forming an important and welcome addition to collections of Aquatic Plants. They are already rather numerous, and will doubtless be supplemented by more from the same raiser as well as from others; and this anticipation gives rise to the opinion that only such new productions as are distinct, or superior to those already in cultivation, should be selected for distribution, for a multiplicity of varieties possessing a too close resemblance to others is to be deprecated.

In gardens where a natural lake or pond exists, provided it has an ample supply of water and an efficient outlet to prevent stagnation, a water garden might be formed, which, when judiciously planted, would become permanently interesting and pretty, and in addition to providing a new feature, would impart additional beauty to the surroundings. It is not unusual to see a stagnant pond overgrown with rank vegetation that yearly adds to the decomposing mass of vegetable matter in its bed, and the effluvia arising therefrom cannot be expected to form a very pleasing feature in any garden, yet there would probably be no great difficulty in converting a pond of this description into one of enduring prettiness.

The margins and banks of streams afford excellent opportunities for establishing without much difficulty many plants that, in the

course of time, would impart a pleasing effect to what might previously have been bare, uninteresting, or otherwise covered with indigenous coarse-growing vegetation.

There is nothing in connection with horticulture that is more fascinating, or that presents more beauty, or, on the other hand, affords greater pleasure for the amount of care bestowed on it than a water garden, no matter of whatever dimensions, when natural and tasteful effects are produced in planting it, and the conditions are favourable to the requirements of Aquatics and the numerous plants which can be suitably associated with them. Water Plants are exquisite; there is so much in their surroundings that is absorbing and delightful. They are usually of the easiest possible culture, and when once well established, will practically take care of themselves, provided a limit be kept on the more vigorous-growing sorts to prevent them from overgrowing those of slenderer and less sturdy growth. A garden of this description would be quite as much an acquisition in a small establishment as in a large one, although the area to be dealt with would only admit of one being planned on a much smaller scale for the reception of some of the numerous small-growing Aquatics and other plants.

WEEDS, &c.—Weeds will occasionally obtrude themselves, and these must be removed as soon as they put in an appearance, for if allowed to become established, which they quickly do, some difficulty may be eventually experienced in eradicating them, and then not before they have either crippled the growth, or perhaps entirely destroyed other plants. In tanks, and also in ponds where there is but a slight current of water, various forms of confervoid algæ—green, thread-like vegetation, members of a low order of the Vegetable Kingdom—will sometimes make their appearance, more especially during warm weather; these, upon rising to the surface of the water, should at once be removed, or they will form dense masses, detrimental to the growth of other plants. If the Water Lilies are well furnished with foliage the algæ would be less troublesome to deal with, and the introduction of a stock of fish would also prove very serviceable in keeping the same in check.

For the removal of dead leaves, weeds, or any accumulation of floating refuse, as well as to give the necessary attention to any plants requiring it in tanks or small areas of water, a strong, light plank or ladder might be used of sufficient length to take a secure bearing at the ends; but in large ponds, where this is impracticable, wading-boots have to be resorted to.

INSECT PESTS, RATS, &c.—Aquatics, more especially those with floating leaves, are generally fairly free from injurious attacks of insect pests, although sometimes they become affected with green or black Aphis. These can, however, generally be removed with

the aid of a syringe or hose-spray; but the most effectual remedy is a natural one—a good heavy shower of rain, which also imparts to the plants an additional brightness. In some cases it may be desirable to use an insecticide, and should this be resorted to a solution of tobacco-juice will be found to answer the purpose effectually, without causing the least injury to the plants. Water-rats will sometimes become troublesome, if allowed to be undisturbed in their visits, by destroying the buds and flowers of Water Lilies, but they may generally be captured by means of tempting baits without very much difficulty. Waterfowl might play havoc with small plants if unguarded, but, as previously mentioned, it is most desirable that these should be grown in reserved quarters until sufficiently strong to plant out where they are liable to this contingency.

MAKING PONDS.—In selecting a site for an artificial piece of water it should be borne in mind that water naturally seeks its bed in low-lying ground; therefore, in the construction of a pond, it is very important that this particular should be observed wherever the conditions are favourable for doing so, or an unreal effect will otherwise be produced. The outline should be carefully considered, and formal or unnatural shapes should be avoided, as these would, to a cultivated taste, present a too artificial appearance. The sides should be represented by projections and irregular curves, avoiding the introduction of straight lines, which are invariably objectionable, and seldom occur in a natural formation. Artificial work as far as possible should be carefully concealed below the intended water-level line, or provision made for concealing it with vegetation when planting operations are in progress. If the soil is of a clayey nature and retentive of water where it is designed to form a pond, this work will be very much simplified; but should it be of a porous nature, then tempered clay will have to be introduced and puddling resorted to to prevent waste of water when the work is completed. When the soil has been excavated as deeply as may be desired—say to a minimum depth of about $3\frac{1}{2}$ ft. in the middle or deepest part, gradually diminishing to about $1\frac{1}{2}$ ft. at the margin, the sides sloping outwardly—the surface of the excavation should be made as firm as possible, and regularly finished off, ready for the puddling process. To effect this, clay should be beaten and worked into a thoroughly tenacious nature wherever most convenient to do so, and when it is fit for use the bottom and sides of the pond should be evenly covered throughout with it to a thickness of 9 in. to 12 in. This will require to be well rammed and beaten as the work proceeds, so that it may be thoroughly united, and so prevent the water from percolating through it. This work should be done expeditiously, and as soon as it is completed the water should be gradually admitted. Of course, cement concrete

might be used for lining the interiors of small ponds, but in the case of larger ones this would be a rather expensive process in comparison to puddling with clay. After the puddling operation is completed, the deepest part in the pond would be from $2\frac{1}{2}$ ft. to 3ft., and this would form the most suitable position for depositing the necessary mounds of soil for the reception of Nuphars and the more vigorous-growing Nymphæas that may be selected, the margin being suited to the requirements of those plants that only require shallow water in which to grow.

WATER-SUPPLY.—In supplying an artificial pond with water, it is very important that the source from which it is obtained should be considered, as Aquatics, and more especially the choicer kinds of hardy Nymphæas, do not flourish satisfactorily in continually running water of a low temperature, as by a continuous current entering the pond, and this observation applies particularly to the *odorata* group. Therefore, for the benefit of the plants, every provision possible should be made to ensure as high and as constant a temperature as possible, more especially during the time that the plants are in active growth. A pond situated in a sheltered, sunny position provides the best aspect, especially so for those of tender habit, and it would conduce to a greater prolongation of their flowering period. Where a sufficient, constant, and steady supply can be laid on from an extraneous lake, river, or stream, it will be of great advantage to do so, this being more beneficial to the health of the plants than that supplied direct from a natural spring or drawn from a low-level in the earth. The water obtained from the last-named sources is of too chilly a nature to favour a luxuriant growth, whereas the former would obviously best meet the plants' requirements, it being aerated and, consequently, of a higher temperature. The inrush of any considerable quantity of water should also be avoided, as the disturbance caused thereby is calculated to be detrimental to their well doing. All that is really required is a sufficient supply of water to prevent stagnation, and, when this is well regulated, successful culture will be in a great measure assured. Means should also be taken to prevent the level of the water from fluctuating to any appreciable extent by constructing an outlet at the intended water-level line, which will suffice for carrying off a similar quantity of water to that which enters the pond.

ROCKERY.—Where an opportunity is afforded of forming a small pond in connection with a well-made rockery, provided one does not already exist, it will, if properly constructed and judiciously planted, form an additional charm to that always interesting and attractive feature in a garden. In its formation an irregular outline should be observed, as this would be conducive to its



HYBRID WATER-LILIES AT GUNNERSBURY HOUSE, ACTON.
The Residence of Leopold de Rothschild, Esq.

presenting a natural, and therefore more pleasing, appearance when completed. In making the pond the ground should be excavated to the depth of about 3ft., afterwards covering the interior throughout with a gin. course of brick, stone, or well-made concrete. The surface should be smoothly finished off with about an inch in thickness of good cement, so as to ensure it being perfectly watertight. This would when finished afford a depth of from 2ft. to $2\frac{1}{2}$ ft., which would be sufficient for the accommodation of Aquatics suitable for introducing into a pond of this description. The margin should be constructed so as to appear as a part of the rockery, and by the careful concealment of all artificial work its effect would be the more satisfactory. Permanent beds formed of brick or stone, about 2ft. 6in. square and 12in. deep, might be built in the pond at equal distances apart, in which to plant Water Lilies; and around the inside against the wall other beds might be constructed for the reception of some of the smaller-growing ornamental Aquatics. Water is frequently associated with a rock-garden in some shape or form, and where it is adjacently present would form the source from which a supply might be obtained; but providing this is not the case, or the supply be inadequate, it will be necessary to introduce it through water-pipes from another source, the inlet being masked by rockwork, presenting a natural appearance. At the lowest end of the pond the overflow might be allowed to escape in such a manner that in its course it would permeate the ground, and so afford a favourable situation for planting some of the many choice bog-loving plants.

TANKS.—In gardens of limited space brick, stone, or concrete tanks about $2\frac{1}{2}$ ft. in depth might be constructed, and these, if built entirely in the ground with the walls gradually sloping outwardly at the top, will minimise the risk of their being damaged during a long spell of severe frosty weather. The thickness of the walls would largely depend on the size of the tank, but for those from 25ft. to 30ft. in diameter, walls of the same thickness as recommended for the pond in the rock-garden would be sufficiently strong, and the beds for the reception of the plants might be of a corresponding size to those described in that instance. As previously stated, a sunny position should be selected, and the site and formation of a tank of this description should be carefully considered in connection with the surroundings. In its construction a natural effect should be aimed at as far as possible, so that it will not present a too formal appearance. For example, a suitable position in the flower-garden might be available for the purpose, and if a border of some ornamental, compact, dwarf-growing plants were formed around the outside, or a little low rockwork substituted as an edging, upon which plants adapted for such a position might be grown, this would greatly add to its effect.

A supply of water might be laid on by means of pipes, to which a valve should be fitted, so that the volume of water entering the tank may be regulated. The higher the mean temperature at which the water can be maintained in the tank the more generally beneficial will it be for the plants. Only sufficient fresh water need be allowed to enter to prevent stagnation. An efficient outlet is also a necessity, and this should be situated at the intended water-level line to prevent any appreciable fluctuation. In favour of tanks it may be urged, without in any way depreciating the value of ponds, that they afford better facilities for more closely viewing the beauty of the Water Lilies than is the case when the plants are situated in large pieces of water.

Ordinary tanks or fountain basins, where they already exist, if of sufficient depth and dimensions, as previously stated, would be available, although their stiff, artificial appearance makes them less pleasing to the eye in comparison with those which are designed on more natural lines. In the case of fountain basins choice plants should not be allowed to occupy positions where sprays of water would be continually falling upon them when the fountain is playing.

PLANTING.—Before planting a naturally-formed piece of water it will be obvious that precautions should be taken to effectually eradicate any coarse-growing vegetation that may have become established therein, and which might prove detrimental to the plants, or mar their effect. In water of this description, where a deposit of several inches of mud has accumulated, very little difficulty will be occasioned in establishing the plants if due care be taken to make their roots secure when the planting operation is in progress. But should the bottom be of a gravelly nature, or otherwise unsuitable to their requirements, then mounds of soil, consisting of good, rich, heavy loam of a tenacious nature, with about one-third of well-decomposed cow- or stable-manure, to which a little leaf-soil might be added, although not absolutely necessary, and the whole thoroughly incorporated, should be deposited for their reception. This observation also applies to the planting of artificial ponds, unless it be intended to grow the plants in submerged tubs or boxes—a plan, however, which, in respect to a pond of any large extent, cannot be recommended as being more satisfactory than that of planting them out on mounds.

Where it is inconvenient or undesirable to lower the depth of the water sufficiently to allow of the planting of Aquatics directly into the mud, or mounds of soil, in which they are to grow, a good method to adopt is to plant them firmly in similar soil to that recommended above, in baskets about $2\frac{1}{2}$ ft. in diameter and from 6 in. to 9 in. deep—what are known as small nursery rounds would answer the purpose. This operation should be performed

as expeditiously as possible, afterwards lowering the baskets from a punt or raft into the positions the plants are to occupy, whether on the bed or on the mounds of soil, as the case may be. When the baskets become decayed, or even before, the roots will be found to have penetrated through, and have taken possession of the mud or soil below, attended with a corresponding vigorous growth of the entire plant. In the case of *Nymphæas*, only strong, healthy plants should be submitted to this treatment. Small plants should be nursed in shallower water, or where they would be under close observation until sufficiently strong to be transferred to deeper quarters. In the case of small plants it is advisable to remove the flower-buds as they appear, so that their vigour may be concentrated in making an unchecked growth. The compost recommended to be used for planting in the above instance would be that which would also be found to meet the requirements of those grown in all circumstances where beds, tubs, or boxes are used for their reception, provided a minimum depth of 9in. of same be allowed for them to develop as much root growth as possible. This compost would also serve for the purpose of renovating the surface whenever necessary, and this operation is invariably attended with good results if done before each season's growth commences.

In planting a water garden where sufficient space exists for the inclusion of a representative collection of the most ornamental Aquatics, it may be made all the more attractive by a judicious disposition of the plants according to their individual characteristics, more particularly with respect to their habit of growth. For instance, there are those kinds whose leaves float on the surface of the water, amongst which are included the beautiful Water Lilies and the sweet-scented Water Hawthorn; whereas other kinds assume a more or less tall and erect habit, as, for example, the Flowering Rush and the Bog Bean. Then there are those the foliage of which is entirely submerged, but which produce their flower-scapes above the surface of the water, such as the pretty Water Violet, the Water Soldier, and the interesting Bladderworts, besides numerous other equally desirable and pretty subjects that thrive luxuriantly at the water's edge, where their roots can revel in an abundance of moisture.

The most suitable time for planting hardy Aquatics is about the beginning of April, or as soon as they commence active growth, thus affording a long-growing season in which to get established. Of course it may be desirable afterwards to introduce a few plants in the shape of new acquisitions, to fill up spaces where plants may have failed, or to introduce a few tender kinds during the summer months which require the protection of a greenhouse during the winter; but for the general planting, the time stated above is invariably the most advantageous. It is also very important that due consideration should be given to

the arrangement of the plants, for the nearer imitation approaches Nature the more does it attract and delight. Where practicable, and circumstances are favourable to planting in groups of one sort, this style is the most suitable to adopt, as it presents a bolder and a more natural effect than when planted singly. In ponds, the groups, more especially those with floating leaves, should be separated from each other by clear open spaces of water, so that when in full growth their beauty will be better displayed, and the surface will not present the appearance of being too much covered with foliage, which would have a too decidedly monotonous effect.

Nymphæas.

The various lovely-coloured flowers of the beautiful new hybrid Nymphæas, which only a few years ago were undreamt of, now furnish a variety of colours that were previously entirely wanting in hardy floating Aquatics. The important part that these Water Lilies, now and in the future, are destined to take justly entitles them, without exception, to be located in the best and most conspicuous positions. In describing the colours of the flowers it should be borne in mind that under varying climatic conditions and exposures, as well as according to the earliness or lateness of their flowering, the colours of some of them present much variation. Unlike the Lotus section of tropical Nymphæas, which includes so many handsome kinds, the flowers of which expand at night and are closed during the day, all the kinds from temperate climates, including Marliac's beautiful hybrids, are day-flowering. The duration of the flowers in both cases is the same as they appear in varying beauty for a period of three successive days or nights, when their flowers, whether fertilised or otherwise, sink below the surface of the water.

To admit of a selection of Nymphæas being the more readily made, the undermentioned list is presented in two groups, the first of which includes kinds possessing the most vigorous constitutions and that require the greater space and deeper water in which to grow. The sorts in the second group are much less vigorous in growth, and are better suited for locating in shallower water. They are also adapted for planting in tanks and fountain basins. A good selection can be made from the older sorts enumerated in these two groups, which can be procured at a moderate cost; therefore, if it be desired to plant them three or more in a group, so as to produce an immediate and more striking effect, it would not incur a very great or extravagant outlay.

GENERAL COLLECTION.—GROUP I.—*N. alba*, our native white Water Lily, is so well known that it would be superfluous to give a detailed description of it. Although its

freedom of flowering is surpassed by some of the hardy hybrids, it still holds its own in public favour. *N. a. candidissima* is a robust variety with larger blossoms of the purest white. It also flowers more freely, and is in every way more effective than the type.

N. Marliacea albida (Fig. 579) is undoubtedly one of the very finest of all hardy Water Lilies. The flowers are very large, of good



FIG. 579.—*NYMPHÆA MARLIACEA ALBIDA*.

shape, white, with a slight tinge of pink at the base of the sepals and outer petals, slightly scented, and produced with remarkable freedom. It is one of the most vigorous growers of any of the hardy hybrids. *N. M. carnea* is another grand hybrid, somewhat similar in habit to the preceding, but the white flowers which are freely produced are delicately suffused with pale pink. *N. M. chromatella* is one of the most desirable and beautiful of all hardy *Nymphæas*. The flowers are of a lovely clear yellow, and are produced continuously throughout the summer and late into the autumn. The deep green leaves are prettily marked with irregular blotches of dull reddish-chocolate. It is a vigorous

N. odorata.—A North American species of moderate growth, with medium-sized, sweetly-scented, white flowers; the sepals and outer sepals on some plants are slightly tinged with pink. To thrive and blossom satisfactorily this species and its varieties should be planted in the sunniest and most sheltered positions that can be chosen. *N. o. caroliniana* is a very desirable hybrid of American origin; the flowers are large and of a soft pink or flesh colour. *N. o. exquisita* is a charming hybrid of moderate growth, with fragrant flowers of medium size, deep rose colour shaded with carmine, and stamens of a deep yellow. *N. o. minor* is a very small and compact-growing variety, having pure white and slightly fragrant flowers. *N. o. rosacea* is one of the most desirable in this group, and somewhat resembles *N. o. exquisita* in habit of growth, but is more robust; the flowers, which are also fragrant, are of a rosy-pink colour, with deep yellow stamens. *N. o. rosea* (Cape Cod Water Lily) is similar in habit to the type; the flowers are of a rosy-pink and scented.

N. pygmaea is a native of Central and Northern Asia, and is the smallest species in cultivation. The flowers of this elegant little *Nymphæa* are pure white and sweetly scented. *N. p. helvola* is a small but exceedingly pretty hybrid, of which the preceding species is one of the parents. The dainty little fragrant flowers, which are freely produced, are of a pale primrose-yellow; the leaves are dark green, prettily spotted with reddish-brown.

NEW AND RARE SORTS.—The following *Nymphæas* are rare and expensive at present. With the exception of *N. alba rosea* they are all hybrids raised by M. Marliac, and include some of the choicest and most beautiful kinds, as well as being vigorous growers. *N. alba rosea* (*N. Caspary*), commonly known as the Swedish Water Lily, has small, pale rosy-pink flowers, which appear very early in the season. Its flowering period is, however, a very brief one; and it is often at rest before some sorts have commenced to blossom. It partakes but little of the character of the type, or what is considered to be such, for, apart from being a very shy blossomer, the plant is much less vigorous in habit, and does not increase very rapidly. *N. Andreana* is a very free-flowering hybrid, with medium-sized flowers of a deep red slightly tinged with violet; it is of robust habit, and the leaves are sparingly spotted with reddish-brown. *N. aurora* is a hybrid of compact habit; the flowers are of a clear yellow, sometimes shaded with tints of rose. *N. Ellisiana* is an extremely beautiful and free-flowering hybrid of good habit; the blossoms are of a reddish-purple, shaded with carmine, and have bright orange-coloured stamens. *N. fulva* is a free-flowering hybrid; its yellow blossoms are slightly tinged with red, and have orange-coloured stamens; the leaves are spotted with reddish-brown. *N. gloriosa* is a magnificent hybrid, having sweetly-

scented, large, double flowers of a rich dark purplish-rose, shaded with carmine; it promises to be of good habit and free-flowering, but at present it is one of the scarcest and most expensive sorts. *N. lucida* has attractive, large, star-like flowers of a soft, rosy-vermilion colour; the leaves are heavily marked with irregularly-shaped reddish-brown blotches. *N. Marliacea flammea* is a lovely hybrid, having large flowers of an amaranth-red, delicately suffused with white; it is of robust habit, and the leaves are marked with reddish-brown. *N. M. ignea* is distinct in colour and one of the very choicest of hardy Water Lilies; the flowers are large, of a brilliant reddish-magenta, with bright orange-coloured stamens. *N. M. rubropunctata* has large flowers of a deep reddish-purple, spotted with carmine, and stamens of a dark orange-yellow; it is a vigorous grower of great merit. *N. Robinsoni* is a very desirable hybrid, with medium-sized flowers of a violet-red colour on a yellow ground, the centre petals being deeper in colour; it is robust and compact in habit, and the dark green leaves are marked with unequal-sized spots of reddish-brown. *N. sanguinea* is undoubtedly one of the best of the many beautiful hybrids yet introduced; the colour of the flowers may be described as a rich dark crimson-purple, and the orange stamens produce a charming contrast; it flowers with great freedom and is of good habit, but at present it is very scarce and expensive. *N. Seignoureti* has small, unattractive flowers, of a pale yellow, tinted with carmine-rose; but it is of robust and compact habit.

Other Aquatics with Floating and Submerged Leaves.

In introducing other Aquatics with floating leaves, the Nuphars, which are botanically closely allied to the Nymphæas, and of similar habit of growth, may be planted where there is a depth of water of from 2½ft. to 3ft.; but they cannot be recommended for including in tanks or where the water is of very limited extent. They are vigorous-growing plants, with bold foliage, and withstand exposure without suffering much injury; for this reason they are well adapted for situations in lakes and ponds where it would be difficult to establish more conspicuous flowering Aquatics of less vigorous habit. In choosing kinds that require a less depth of water in which to permanently establish themselves, the chief requirements in most cases will be met by making a selection from the most striking species in the following list, which likewise embraces those with submerged leaves:

ALISMA.—See Elisma.

APONOGETON DISTACHYON (Cape Pond Weed or Winter Hawthorn) (Fig. 582).—This is one of the most desirable of floating Aquatics; it blossoms the greater part of the year, and the forked inflorescence and showy white bracts are deliciously

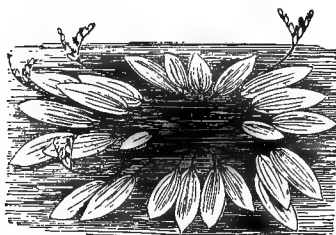


FIG. 582.—APONOGETON
DISTACHYON

Hawthorn-scented. It prefers a position where there is a gentle current of water, and increases rapidly by means of its tuberous offsets.

BRASENIA PELTATA (*Hydro-peltis purpurea*) (American Water Shield) is a handsome little plant with oval-shaped peltate leaves and small purplish-coloured flowers.

ELISMA NATANS (Floating Water Plantain) is a rare British plant, of small and neat habit of growth, and bears showy three-petalled white flowers.

HOTTONIA PALUSTRIS (Water Violet) (Fig. 583).—This is one of the most beautiful of our native Aquatics. It has finely pinnate submerged leaves. The scapes rise above the surface of the water to a height of about 12 in., and bear whorls of several pretty rosy-lilac coloured flowers.

HYDROCHARIS MORSUS-RANÆ (Common Frogbit) (Fig. 584).—This elegant little plant has small orbicular or kidney-shaped leaves and three-petalled white flowers.

HYDROCLEYS COMMERSONI (*Limnorcharis Humboldtii*) (the Water Poppy) is a neat-growing, tender Aquatic, and produces pretty pale yellow flowers with great freedom. It is very effective for introducing in shallow water during the summer months, but requires the protection of a greenhouse in the winter.

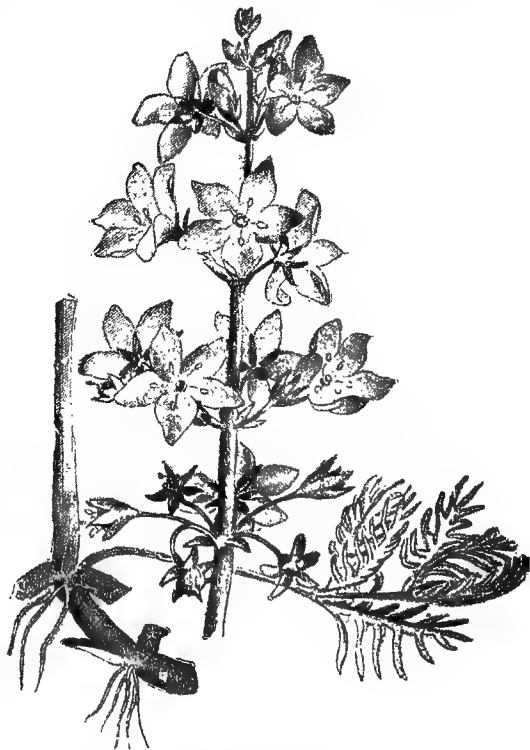


FIG. 583.—HOTTONIA PALUSTRIS.

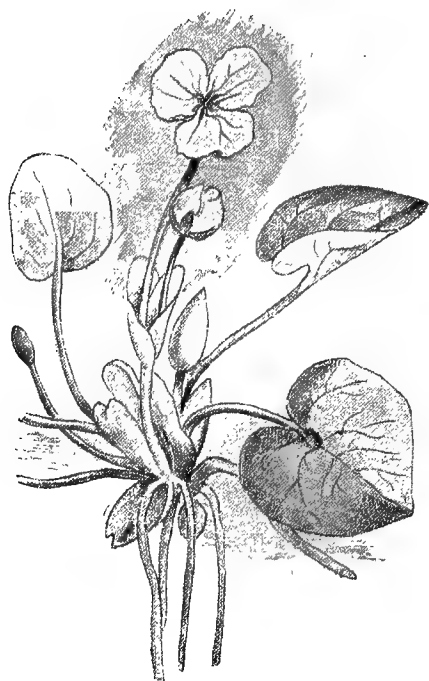


FIG. 584.—HYDROCHARIS MORSUS-RANÆ.

and, therefore, requires the protection of a greenhouse.

NUPHAR ADVENA is a North American species having large peltate leaves and yellow flowers, with reddish-coloured anthers, standing well above the surface of the water. *N. lutea* (Fig. 586) is the well-known yellow Water Lily of our ponds and rivers. *N. pumilum* (*N. Kalmiana*) is a rare British species, with yellow flowers, and much smaller in all its parts than either of the preceding.

ORONTIUM AQUATICUM (Golden Club).—An Aquatic

LIMNANTHEMUM PELTATUM (*Villarsia nymphæoides*) (Fig. 585) (the Fringed Water Lily) is a free-growing ornamental British plant, having small Water Lily-like leaves and pretty yellow flowers, the segments of which are fimbriated, giving them a very attractive appearance. It increases rapidly, therefore precaution should be taken in planting it, or it may encroach on other plants.

MYRIOPHYLLUM PROSERPINACOIDES (Water Milfoil or Parrot's Feather).—A free-growing tender Aquatic. Its stems are densely covered with very finely-cut leaves, presenting a pretty feathery appearance as they float on the water. This species is not sufficiently hardy to withstand a severe winter,



FIG. 585.—LIMNANTHEMUM PELTATUM.

belonging to the Aroid family, with pretty, deep-green, velvety-looking, lanceolate-ovate-shaped leaves, which are floating or erect,

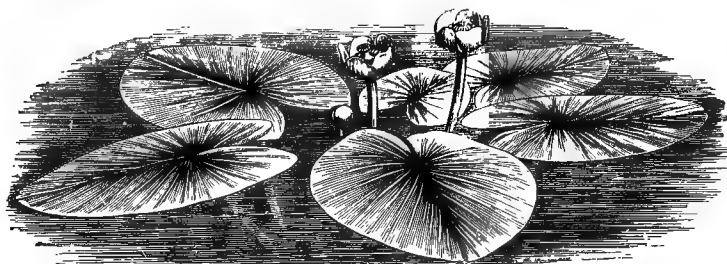


FIG. 586.—NUPHAR LUTEA.

according to the depth of water. The long-stalked spadix is covered with numerous very small flowers of a yellowish colour.

STRATIOTES ALOIDES (Water Soldier) (Fig. 587).—This is a monotypic genus and an inhabitant of our ponds and slow-running waters. The plant—a rosette-like tuft of leaves—resembles a small-growing Aloe, and is usually entirely submerged, only floating when it is in flower, the tips of the leaves then rising above the surface of the water. It increases rapidly, and therefore should be kept under close observation, or it may obtrude itself where not wanted.



FIG. 587.—STRATIOTES ALOIDES.

TRAPA NATANS (Water Caltrops; Water Chestnut) (Fig. 588).—A desirable Aquatic, of annual duration, with peculiarly-shaped four-horned fruits (Fig. 589). The leaves have swollen petioles, and are arranged in the form of a rosette.

UTRICULARIA VULGARIS (Common Bladderwort) (Fig. 590).—
This is an interesting little British plant, having very finely-divided,



FIG. 588.—*TRAPA NATANS*.

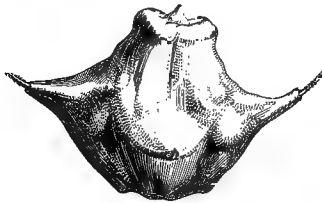


FIG. 589.—FRUIT OF *TRAPA NATANS*.

submerged leaves, which are furnished with minute vesicles, or air-bladders. The pale yellow flowers are borne on scapes, which rise about 6in. above the surface of the water.

Erect-Growing Aquatics and Sub-Aquatics.

When planting on the margins of ponds, tanks, or water-courses, advantage should be taken of the most suitable spots for the introduction of such subjects as are best fitted for them; and this may be determined by a consideration of their heights and habits of growth. The stronger-growing kinds are best adapted for locating in the more exposed situations, and these

should not be allowed to extend to the areas provided for those of less robust habits. None of the plants included in this group



FIG. 590.—*UTRICULARIA VULGARIS*.

require any special preparation of soil, provided a good depth of mud is present; but if this is not the case soil of a similar nature as previously recommended should be deposited for their reception.

For the guidance of those who are not familiar with this class of plants, the following list may be of service in making a selection:—

ACORUS CALAMUS (Sweet Flag) (Fig. 591).—This well-known plant of our riversides is a very desirable subject for planting in exposed situations where ample space can be afforded. Height about 3ft. *A. C. aurea striata* is

similar in habit to the type, but more effective, the long narrow leaves being prettily striped with golden-yellow. *A. gramineus* (Grass-leaved Sweet Flag) is a dwarfier and more slender-growing species with very narrow leaves. Height about 1½ft. *A. g. variegatus* resembles the type, but the leaves are handsomely striped with white.

ALISMA PLANTAGO (Common Water Plantain) (Fig. 592).—This free-growing British Aquatic has pyramidal panicles of small, delicate rose-coloured flowers, which present a very light and graceful appearance. Height about 2½ft.

BUTOMUS UMBELLATUS (Flowering Rush).—This handsome British plant is one of the most ornamental of hardy Aquatics. The showy flowers, which are produced in umbels on long, stout scapes, are borne well above the foliage, and are of a rosy-lilac colour. Height from 3ft. to 4ft.

CALLA PALUSTRIS (Water Arum) is a dwarf-growing Aquatic with creeping stems and erect cordate-shaped leaves. The showy part of the inflorescence is the white flat spathe. Height about 6in.

CLADIUM GERMANICUM (*C. Mariscus*) (Marsh Saw Grass) is a handsome tall-growing British plant, belonging to the Sedge family. The long, rigid, glaucous green leaves are deeply keeled, and very sharply serrated at the edges. Height 4ft. to 5ft.

IRIS PSEUDACORUS (Yellow Flag).—This familiar waterside plant is very suitable for exposed situations; height about 3ft. *I. P. variegatus* is similar in habit to the type, but the leaves are beautifully striped with white, which imparts a very handsome appearance.



FIG. 591.—*ACORUS CALAMUS*.

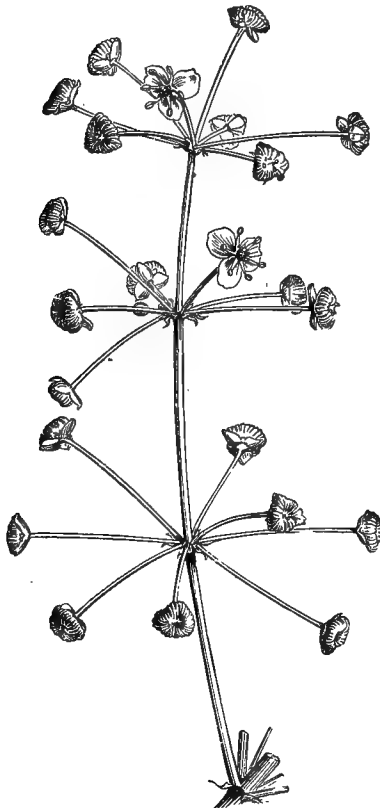


FIG. 592.—*ALISMA PLANTAGO*.

LYSIMACHIA THYRSIFLORA (Tufted Loosèstrife) is a close-growing British plant, with short and compact racemes of small yellow flowers. Height about 2ft.

MENYANTHES TRIFOLIATA (Bog or Buck Bean) (Fig. 593).—A very ornamental dwarf-growing British Aquatic. The handsome flowers, the segments of which are finely fimbriated on the inside, are white, tinged externally with delicate pink, and are borne on erect scapes about 9in. in height.

PELTANDRA VIRGINICA (Arrow Arum) is an Aquatic of the Aroid family, with hastate leaves. The flowers are thickly set on a short

spadix, or flower-spike, which is surrounded by a greenish-coloured spathe. Height about $1\frac{1}{2}$ ft.

PHRAGMITES COMMUNIS (Common Reed) is a very graceful plant of vigorous habit, and the largest of the British grasses.



FIG. 593.—*MENYANTHES TRIFOLIATA*.

Its large handsome panicles are of a dull purplish colour. Height 6ft. to 10ft.

PONTEDERIA CORDATA (Pickerel Weed) (Fig. 594).—An elegant erect-growing plant, with heart-shaped leaves on long petioles. The flower-spikes, which are freely produced, bear numerous small pretty blue flowers, closely set together. This should be included in all collections of choice Aquatics. Height about 2ft.

RANUNCULUS LINGUA (Great Spearwort).—A vigorous-growing British plant with bright yellow flowers. Height about 3ft.

RICHARDIA AFRICANA (*Calla æthiopica*), the Lily of the Nile, or Arum Lily, readily adapts itself to aquatic culture, and forms a very effective feature in the margin of a pond. A sunny,

sheltered situation should be selected, and the crowns of the plants submerged sufficiently deep in the water to prevent them from becoming frozen. Although the first severe frost will cut the plants down, they will nevertheless restart into growth in the spring.

SAGITTARIA SAGITTIFOLIA (Common Arrow-head) (Fig. 595).—This well-known British plant, with its handsome sagittate leaves, and scapes of showy white flowers, is a very desirable subject for the water-garden; height about 2ft. *S. s. flore-pleno* is less vigorous in habit than the type, but has handsome double white flowers; height about 1½ft.



FIG. 594.—*PONTERDERIA CORDATA*.

SCIRPUS LACUSTRIS (Common Bulrush).—This vigorous-growing British plant has tall cylindrical tapering stems which produce a very striking effect. Height about 6ft.

TYPHA ANGUSTIFOLIA (Lesser Reed Mace) is an elegant tall-growing British plant with long narrow leaves; the long,

cylindrical flower-spikes are densely packed with minute brownish-coloured flowers; height about 6ft. *T. latifolia* (Great Reed Mace or Cat's Tail) is a very familiar plant of our rivers and ponds; the vigour with which it grows and increases only admits

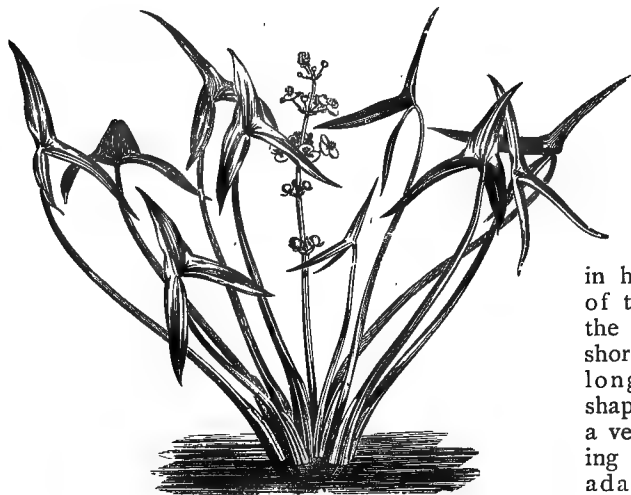


FIG. 595.—SAGITTARIA SAGITTIFOLIA.

of its being planted on the margins of large pieces of water; height 6ft. to 7ft. *T. Laxmanni* (*T. minima*) (the Dwarf Reed Mace) is much smaller in habit than either of the preceding; the flower-spikes are short, forming oblong or globular-shaped heads. It is a very graceful-growing plant, and well adapted for the margins of small ponds and tanks; height about 2ft.

Plants for the Waterside.

The adornment of the waterside with choice vegetation is equally as important as the embellishment of the water itself with choice Aquatics, and the arrangement of the plants should be such as to impart an additional feature to those plants that decorate the water's surface. The numerous ornamental foliage and handsome flowering subjects that are suitable for this purpose, delighting in having their roots in a moisture-laden soil, include many of our most graceful bold-foliaged and showy-flowering hardy plants. In hot, dry summers, when plants in borders and flower-beds are languishing for the want of moisture, the freshness of the waterside vegetation presents an enjoyable contrast.

The size and shape of a piece of water are to a great extent the determining factors in the selection of the plants to introduce and the positions they are to occupy. For example, in planting the sides of large or moderate-sized ponds, large and

vigorous-growing plants may be introduced; where the ground rises prominently or projects into the water these situations should be furnished with those kinds that would produce the boldest and most striking effect. As previously stated, groups of a sort should be formed in preference to arranging a thin line of plants of various kinds around the pond, as the latter scheme would produce a less natural and satisfactory appearance. Groups of tall-growing plants should be judiciously interspersed with those of dwarfer habit, thus giving an irregular and also a more artistic effect. For the sides of small ponds or where space can be afforded around tanks or fountain basins only plants of medium height and moderate growth should be introduced, a variety of which may be selected from the kinds enumerated hereunder, all of which are well adapted for such positions.

FOLIAGE PLANTS.—Conspicuous amongst waterside plants that are valued chiefly for their ornamental foliage are the giant



FIG. 596.—POLYGONUM SACHALINENSE.

Gunneras, *G. chilensis* (*G. scabra*) and *G. manicata*, with large, bold, cordate leaves, from 5ft. to 8ft. in diameter. The handsome Rheums, *R. Emodi* and *R. palmatum*, are bold and effective plants, the former with broad ovate leaves, and the latter with

cordate leaves, deeply incised at the margins; their tall inflorescences are also very showy. *Acanthus mollis* and its more handsome variety *latifolius*, *A. spinosissimus* and *A. spinosus* are all elegant, bold-foliaged plants, and produce showy, erect

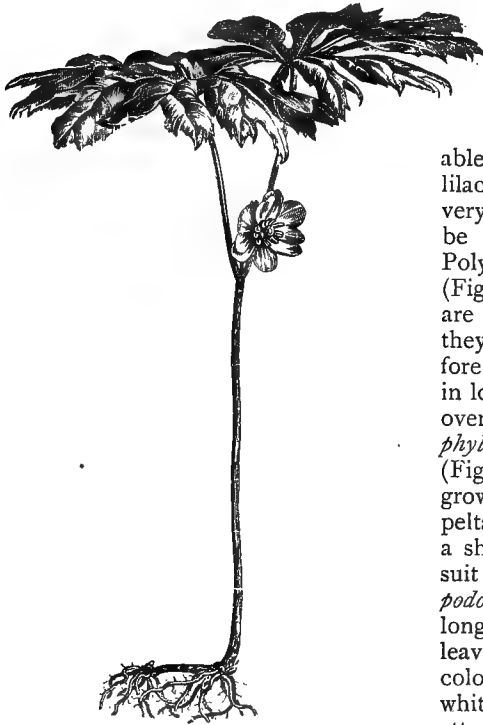


FIG. 597.—*PODOPHYLLUM PELTATUM*.

spikes of flowers. The compact-growing Funkias, *F. Sieboldiana*, with its pretty glaucous foliage, *F. ovata*, and its handsome variegated variety *marginata*, are all desirable subjects, and their pale lilac-coloured flowers are also very effective. Where space can be afforded the tall-growing Polygonums, *P. sachalinense* (Fig. 596) and *P. cuspidatum*, are strikingly handsome, but they increase very rapidly; therefore precaution should be taken in locating them to prevent their overrunning other things. *Podophyllum Emodi* and *P. peltatum* (Fig. 597) are handsome dwarf-growing plants, with orbicular, peltate, five- to nine-lobed leaves; a shady situation and peaty soil suit them admirably. *Rodgersia podophylla* has handsome, large, long-stalked, palmately lobed leaves of a pretty pale bronzy colour; the panicles of yellowish-white flowers are also very attractive. The graceful-growing Horsetails, *Equisetum sylvaticum* and *E. Telmateia*, are British plants with erect-growing stems bearing numerous whorls of long

slender branches, the latter being the taller and more vigorous grower; they are very effective for shady situations. The pretty Creeping Jenny, *Lysimachia Nummularia*, and its golden-leaved variety *aurea*, are charming little plants for covering the moist banks of the waterside. The Sweet Cyperus, *Cyperus longus*, is a British plant of very graceful habit, and thrives well planted close to the water's edge. *Scirpus Holoschænus variegatus* and *S. Tabernæmontani zebrinus* are very effective variegated plants of moderate height, having erect, cylindrical stems, transversely banded with green and white, and are excellent subjects for

situating close to the margin of the water. A similar situation also suits the Spiral Rush (*Juncus effusus spiralis*), which is an interesting plant, with curious corkscrew-like stems.

The following are giant members of the Grass family of very graceful and effective habit: *Miscanthus japonicus*, better known as *Eulalia japonica*, and its handsome variegated varieties *foliis-striatis* and *zebrinus*, are tall, elegant subjects, with large plumose panicles of purplish flowers; their beauty is best displayed when planted close to the water's edge. The tall *Arundo Donax*, and its variegated variety, *A. D. versicolor*, are strikingly handsome plants, the latter being the tenderer and less vigorous, but both should be situated in sheltered, sunny positions, and their crowns protected in winter. *Panicum virgatum* is a very ornamental plant, of erect and robust habit, producing large branching panicles of flowers. The well-known Ribbon Grass (*Phalaris arundinacea variegata*), with its prettily striped leaves, is a very effective plant for the waterside. In sheltered, sunny situations the stately-growing *Erianthus Ravennæ* could be introduced with good effect, its bronzy-coloured foliage being very attractive. The well-known Pampas Grass, *Gynerium argenteum*, with its long glaucous green leaves and handsome silvery panicles of flowers, is a very desirable subject to introduce; as is also the North American Grass (*Uniola latifolia*), with its broad flat leaves and graceful panicles of flowers.



FIG. 598.—EPILOBIUM ANGUSTIFOLIUM.

In the background, in drier situations, groups of the stately-growing Bamboos might be introduced with very telling effect.

Amongst Ferns may be mentioned the Flowering or Royal Fern (*Osmunda regalis*) and its pretty crested variety *cristata*;

the handsome Ostrich Fern (*Onoclea germanica*) and *O. sensibilis*; and the common Harts-tongue Fern (*Scolopendrium vulgare*) and its numerous beautiful varieties. All of these are of vigorous growth and delight in moist, shady situations.

FLOWERING PLANTS.—The following is an enumeration of waterside subjects having the greatest merit as flowering plants,



FIG. 599.—IRIS LÆVIGATA.

their various coloured blossoms imparting additional life to their surroundings. Amongst the foremost of these are the handsome herbaceous Spiræas, *S. Aruncus*, *S. camtschatica*, and *S. lobata*, all being vigorous-growing plants, with large and graceful inflorescences of whitish, or, in the last-named species, deep rose-coloured flowers. Of much less vigorous growth, but equally as beautiful, are *S. astilboides*, *S. Ulmaria*, and *S. palmata*, the former two with panicles of whitish, and the latter bright crimson-coloured flowers. *Astilbe rivularis*, the habit of which resembles some of the Spiræas, has large handsome panicles of yellowish-white flowers; it grows freely close to the water's edge. The Purple Loosestrife, *Lythrum Salicaria*, and its varieties *roseum* and *superbum*, are desirable plants that grow vigorously when their roots are close to the water. A similar situation also suits the free-flowering and vigorous-growing *Epilobium hirsutum*, *E. angustifolium* (Fig. 598), and the pretty white *E. a. album*. The Swamp Milk Weed, *Asclepias incarnata*, with its umbels of pretty pink flowers, delights in a situation close to the margin of water; a position that also meets the requirements of the well-known Marsh Marigold, *Caltha palustris*, and its double-flowered variety, *C. p. monstrosa*, their rich yellow flowers being very effective. *Iris lœvigata* (*I. Kœmpferi*) (Fig. 599) and its many beautiful forms thrive when situated in a sunny position with an abundance of moisture at their roots. *I. Monnierii* is a very showy plant, of vigorous habit, with large lemon-yellow-coloured flowers, and there are other species and varieties of the genus

which might also be introduced with advantage. The well-known Solomon's Seal, *Polygonatum multiflorum*, is a decidedly handsome plant for moist, shady situations; so are the beautiful *Primula japonica* and *P. sikkimensis* (Fig. 600), groups of these plants when in blossom producing a most charming effect. The vigorous-growing *Saxifraga peltata* and *S. purpurascens*, with their bold foliage and handsome pale pink and purple-coloured flowers, are desirable subjects for moist, sunny situations. The common Forget-me-Not, *Myosotis palustris*, is a delightful plant for wet situations, as is also the pretty little Grass of Parnassus, *Parnassia palustris*, which thrives best in a peaty soil. *Lysimachia clethroides* and *L. vulgaris* are handsome moisture-loving plants, the latter thriving best in a shady position.

The Globe Flowers, *Trollius europæus* and *T. asiaticus*, are very effective; as are also the free-flowering Cardamines, *C. pinnata* and *C. pentaphylla*, the latter being shade-loving plants. Clumps of the American Swamp Lilies, *Lilium superbum* and its variety *carolinianum*, and *L. pardalinum*, are conspicuous and handsome subjects, preferring a moist, peaty soil and partial shade; and similar conditions are favourable to the well-doing



FIG. 600.—PRIMULA SIKKIMENSIS.

of the pretty dwarf-growing *Trillium grandiflorum*. The tall and stately-growing herbaceous plants, *Bocconia cordata* and *Meconopsis Wallichii*, are very effective; so are also the vigorous-growing Day Lilies, *Hemerocallis flava*, *H. fulva*, and the double-flowered and variegated varieties of the last-named species. The handsome Yuccas, with their tall, branching panicles of showy white flowers, and the vigorous-growing *Kniphofias* (commonly known as *Tritomas*), with spikes of brilliant red, yellow, or orange-coloured flowers, are amongst the best for affording a bold and handsome effect.

Other hardy ornamental-foliaged and showy-flowering plants might be mentioned that are adapted for moist situations, but the above will suffice to show what a variety of plants we have to select from for adding to the picturesque appearance of the waterside.

Tropical and Tender Plants.

Everyone who has viewed a representative collection of tropical and tender Aquatics, such as is represented in Fig. 602, must have admired the great diversity of their appearance and, in many instances, the contrasts they present to the more familiar hardy ones. Forming, as they do, a class of plants requiring conditions resembling, as nearly as possible, those in which they are found thriving in their native habitats, their cultivation in this country has necessarily been limited to some of the principal establishments where these conditions have been afforded, and they then have gained for their enterprising owners a genuine appreciation of horticulturists. Foremost amongst these plants are the Water Lilies that have been introduced from far distant lands, as well as the Egyptian Lotus Lily (*Nymphaea Lotus*, Fig. 601), which may be mentioned as one of the most noteworthy plants that flourished in the land of the Pharaohs, its name being intimately associated with a remote civilisation. Enduring as has been the fame of this plant, it is with its varieties and hybrids but one section of a class of Water Lilies that embraces several others possessing the best qualities of these beautiful flowers; the exquisite colouring of some of them is most remarkable, and, in addition, some of them are delightfully fragrant. Rare as some of these kinds are, and consequently difficult to procure, their great beauty more than compensates for the expenditure involved in obtaining them as well as for the attention that is necessary in cultivating them successfully with those which are more generally grown and therefore more readily procurable. Included amongst the choicest of them are the beautiful clear light blue *N. gigantea* from Australia, and the deeper, richly-coloured blue *N. zanzibarensis* from Zanzibar, both of them unique as regards their colours and the elegance of their flowers. Every available space in a well-constructed Aquatic house serves to provide a congenial situation for some appropriate plant that will then display itself to the best advantage, and there are many suitable for this purpose. Subordinate effects should always be studied if flowering plants be introduced when the *Nymphaeas* and other showy Aquatics are in blossom; and this may be best effected with the aid of a sufficient number of ornamental foliaged plants of suitable sizes; otherwise the practice might detract from what should be the leading and most pleasing feature of a structure designed for the cultivation of tropical Aquatics.

Only since the introduction of hot-water appliances for heating horticultural buildings has the cultivation of these plants been undertaken on a comprehensive scale, the most complete collections having been at first formed in botanic gardens,



FIG. 601.—*NYMPHAEA LOTUS*, SHOWING (a) ABNORMAL AND (b) TYPICAL FLOWERS.

where for many years they have received special attention. Excepting in a limited number of instances their cultivation, save in these establishments, has not been undertaken with such an enterprising spirit as they merit, or as in the case of plants which have a greater commercial value, but

which in many cases have a flowering period of much shorter duration. Few instances can be cited of them having been subjected to outdoor cultivation in this country where waste steam or hot-water has been utilised for increasing the temperature of the water; but where these experiments have been made they may be said to have been attended with fairly satisfactory results. One has, however, to seek much further for data of this kind, and in doing so to gladly recognise the enthusiasm of the American cultivators of tropical Aquatics; for it is in the United States that progress, especially in latter years, has been most noteworthy, where more favourable conditions prevail than those of this country, the chief of them being a more suitable climate. Regarding their general cultivation in this country, it is in suitably-constructed heated tanks under glass that the best results are invariably attained, as these afford a choice of positions adapted for the accommodation of particular kinds free from the disadvantages of the too variable temperature of the atmosphere. Distributed over a very wide range in tropical countries, the *Nymphæas* include sorts which naturally present individual divergences of constitution and habits of growth that the observant cultivator will not fail to note, and which will provide an indication of details relating to their treatment of much practical service to him.

During the winter months the Lily tank (Fig. 602) is least attractive, but even then, provided goldfish have been introduced in sufficient numbers, it is not altogether devoid of interest; and these fish are decidedly an acquisition as well as being serviceable in checking confervoid growths and insect pests when the Aquatics are in growth. To view a collection of these lovely tropical Lilies in flower during the daytime is always gratifying, but it is then only possible to see a partial display of their glories. To do so in the late hours of night when the night-flowering section expand their large and showy blossoms is a revelation of beauty that must be seen to be fully appreciated, and there is certainly a new delight to be experienced by those who may not as yet have been afforded an opportunity of doing so.

HOUSES.--In the construction of a house for the cultivation of Tropical *Nymphæas* and other Aquatics, the span-roofed form is the most suitable to adopt, as this admits the greatest amount of light, which is a most essential condition to their successful cultivation. The roof should not be too lofty, for this is also an important point in connection with the conditions to be observed in their treatment. As no shading will be required, it is all the more necessary that the house should be glazed with good clear glass, as sometimes, through the presence of air-bubbles in the glass, which focus the sun's rays, heat is conducted which scorches holes in the leaves, thereby



FIG. 602.—VIEW OF LILY TANK IN THE OXFORD BOTANIC GARDEN.

disfiguring the plants. Ventilation should be amply provided, both in the sides of the house and in the roof, for Aquatics generally, and *Nymphæas* in particular, when in full growth require abundance of air on hot, sunny days. Around the inside of the house, abutting on the walls, benches or borders may be formed for the accommodation of ornamental plants; or small tanks or beds may be constructed for the culture of Aquatics, or moisture-loving plants. For heating the house, sufficient piping should be introduced to ensure a minimum temperature of from 65deg. to 70deg. Fahr., and this will provide for the maintenance of a higher temperature when desired, and will minimise the amount of piping necessary to be employed for heating the tank.

TANK.—A tank for the reception of the Aquatics should be constructed in the centre of the house, and whatever the desired shape may be, whether entirely sunk in the ground, or partly above the ground-level, a firm foundation must be first secured. The bottom should be made perfectly solid with a layer of bricks well bedded in cement and sand, and on the top of this course a good thickness of stone or brick rubble concrete should be added. The walls may be built with either brick, concrete, or stone, the thickness of which will largely depend upon the size of the tank. If it be desired to have a tank from 20ft. to 30ft. in diameter and about 2ft. 6in. in depth, walls 12in. thick to within 10in. of the top, and from that point sloping outwardly, with the masonry set in cement, would be sufficiently strong. The tank should afterwards be faced both inside and out with about 1in. coating of good cement, and the surface smoothly finished off to make it watertight. On the inside, formed against the walls, a few beds, enclosed in brickwork, may be introduced for the accommodation of strong, erect-growing Aquatics; these should reach to about 6in. below the top of the tank, so as to admit of their being submerged to a depth of 3in. or 4in. when the water is at its normal height. A raised tank has the advantage of bringing the Lilies and dwarf-growing Aquatic plants closer to the eye; but the formal appearance of plain external masonry may in some instances be objectionable. It might, however, be made interesting and pretty by forming a little rockwork close against the wall, which might be furnished with a variety of trailing and other dwarf-growing plants adapted for the purpose. In favour of a tank sunk in the ground, it may be urged that a better view of the tall-growing Aquatic and sub-Aquatic plants is obtained, and if the top of the masonry be surmounted with a stout, ornamental iron rail, on which a selection of choice plants of climbing habit might be trained, it would present a very effective appearance and at the same time afford protection.

HEATING.—For heating a tank of the dimensions given, two 4in. pipes (a flow and return) carried round the inside, about 6in. from the walls and the same distance from the bottom, will be quite sufficient, and these should be furnished with valves on the outside of the tank to allow of regulating the temperature of the water. An air-pipe should be fitted to the flow-pipe at its highest point, to release any air or steam that may accumulate in the pipes. The tank should be furnished with a plentiful supply of water, and a tap connected with the service-pipe, so that it can be turned on to its full capacity when the tank required refilling, or regulated to a gentle flow when the Aquatics are in full growth, or as desired. An overflow stand-pipe is also necessary, the top of which should reach to nearly the full height of the tank. If constructed in two parts somewhat on the telescope principle, so that the upper portion may be raised or lowered by sliding or screwing into the bottom part, means will thus be afforded for keeping the water at any desired height. A large brass perforated cap similar to the rose of a watering-can should be fitted to the top of the overflow-pipe to prevent floating matter from choking it, and the escape of small Aquatics. This stand-pipe should be situated conveniently close to the wall. It should be fitted into another pipe, set level with the bottom of the tank and connected with the drain provided, so that when any operations necessitate the tank being emptied the stand-pipe could be removed and the water readily drained off.

If it should be considered desirable to paint any part of the tank that is above the ground-level, it will be best to defer doing so for a time, as the new cement would blister the paint and cause it to peel off.

It is not advisable to plant a new tank immediately after it is finished, but it may be filled with water, which should be allowed to stand for at least a week. The scum that will have by this time accumulated on the surface should be flushed and syringed off, and the tank then filled up with fresh water.

ARRANGEMENT OF TUBS, POTS, ETC.—The next important operations are the arrangement of the tubs or large pots in the tank, and preparing the soil in which the Aquatics are to be planted. Of course brick enclosed beds may be more freely introduced where plenty of room is afforded for growing very large specimens; but in a tank of limited dimensions where it is desired to grow several plants of moderate size, tubs or large pots will be the most suitable, as these have the advantage of being readily moved. If tubs are employed—and perhaps they are preferable for an indoor tank—a very useful size will be found in those measuring about 18in. square, and the same in depth, with the angles securely dovetailed. They are best made

of well-seasoned 1in. elm boards, as this wood is very durable when submerged in water.

CULTURE.—The *Nymphæa* family is represented by so many species and varieties of decided merit that they should occupy a great portion of the tank; therefore, it will be best to treat upon their culture first. From their habit of growth it is necessary that they should occupy the central part of the tank, the tubs or pots when in position being about 5ft. apart, and arranged alternately, so as to utilise all available surface space for the foliage. For *Nymphæas* to display their greatest beauty, in respect of both size and colour of their flowers, when under artificial treatment, they must have a good rich compost; and, unless this is afforded them, it is only courting disappointment to attempt their cultivation. If our common Water Lily (*N. alba*) when growing in a wild state furnishes any criterion, it will be found that it thrives most luxuriantly where the natural bed of the river or pond is of a clayey description, or where there is a deposit of accumulated mud, enriched with decomposed vegetable and other matter, in which its thick, fleshy roots can become deeply embedded. This suggests that efforts should be made when cultivating it artificially to provide a soil which the action of the water will reduce to a somewhat similar state. To accomplish this a compost should be prepared consisting of good, rich, heavy loam, containing an admixture of clay, and to this should be added a good proportion of well-decomposed cow or stable manure as well as a small quantity of leaf-soil, but the last-named is not absolutely necessary. If it is convenient to procure the loam from an old pasture, the top spit should be selected, and this should be stacked for about twelve months, so as to destroy all live vegetation; it will then be in a better condition for use. When preparing the compost the loam should be chopped up fairly coarse, and to every three parts of this should be added one part of the cow or horse manure—the former for preference. This, when well incorporated, will form a compost of a tenacious nature, suited to the wants of the plants. The soil should be placed in the house for a few days previous to its being required, so that it may get moderately warmed before being used.

When filling the tubs and planting, the soil should be pressed firmly down and around the plants or tubers to within 3in. of the top, which should be surfaced with about 1in. of sand, to prevent (as far as possible) the manure in the soil from rising and discolouring the water. If the tubs or pots are filled too full, the action of the water causes the soil to swell and run over the sides; allowances must therefore be made for this contingency. When the water in the tank is at its normal height, a depth of from 10in. to 12in. above the crown of the plants will be found sufficient.

As tropical *Nymphæas* may be definitely classed in two divisions—namely, those displaying

their flowers by day, and others that do so by night—the best effect will be secured if they are planted alternately, so as to have them equally distributed over the tank, with due regard to the distribution of their colours. The *Lotus* and the *stellata* section form two distinct groups of Water Lilies, the former embracing colours ranging from white to deep red, and the latter from pale to deep blue. As soon as the boxes are planted, the tank should be filled with water. By turning the heat fully on in the hot-water pipes, the water will be warmed as it gradually rises. This will not in any way interfere with the planting at the sides, as the plants situated there, excepting the floating ones, will be in beds or in pots resting on shelves or brick columns, provided for those which only require a shallow depth of water above the surface of the soil. Tall and vigorous-growing Aquatics, such as *Cyperus Papyrus*, *Thalia dealbata* (Fig. 603), and *Sagittaria montevidensis*, should be planted in beds, to form good bold clumps, and any old or superfluous growth should be cut away before planting: this should be done firmly, leaving the crowns just above the top of the soil. The smaller-



FIG. 603.—*Thalia dealbata*.

growing kinds should be accommodated in pots at the sides with the surface of the soil just submerged.

The Nelumbiums, which form such an important feature in an Aquatic-house with their large, orbicular-peltate leaves and massive flowers—yellow, white, and various shades of rose—require very liberal treatment at the roots and plenty of space for their long, fleshy rhizomes to develop in. When preparing a bed for their reception, the soil should consist of rich, heavy loam (as previously recommended for *Nymphæas*), two parts, and one of good decomposed cow or horse manure, well incorporated. The soil should be firmly pressed down, planting the rhizomes horizontally, and covering them to a depth of about 6in. Nelumbiums are very impatient of root-disturbance, therefore they should seldom be interfered with, even when they are well established, beyond giving them an annual surfacing of good rich soil. They can be successfully grown in tubs or large pots, but the best results are obtained when space admits of their being treated as described above.

The floating Aquatics, or those kinds that do not necessarily require soil in which to grow, form especial objects of beauty when established in small colonies at the sides of the tank, and these include the Water Lettuce—*Pistia Stratiotes*, a pretty rosette-like plant with pale green leaves; *Limnobium bogotense*, which has little, round, deep green, shining leaves; and the elegant, little, fern-like annual, *Salvinia natans*, which reproduces itself from spores.

The most suitable time for planting *Nymphæas* in an indoor tank is from the middle to the end of February, and this also applies to the majority of tender Aquatics. Of course, the occasional introduction of additional plants will occur during the growing season—it may be of annuals or plants which are best treated as such—and these may be included at any time, as they will in no way interfere with the general planting and arrangement of the tank for the year. When this has all been done, the temperature of the water in the tank should be kept at about 70deg. Fahr., with a gradual rise as the summer advances; it should then not be allowed to exceed 80deg., but this should be maintained as uniformly as possible during the summer months. The house should be freely ventilated on bright sunny days, and the paths and sides occasionally damped down to prevent the atmosphere from becoming too dry, closing the ventilators in the afternoon while the sun is still on the house, and at the same time giving the plants a good syringing and the paths and sides a thorough damping down. Should green or black aphid affect them, fumigation, which is very effectual, should be resorted to; but before this is done, the surface of the foliage should be quite dry, or it will become disfigured. As the season draws towards its close, the temperature of the water in the tank should be gradually diminished to about 60deg. Fahr., and this should be maintained throughout the winter months.

When the season for replanting comes round, before operations are commenced it will be advisable to run all the water out of the tank, as this will greatly facilitate the planting, and no fear need be apprehended that the plants to be re-introduced will come to any harm, providing care is taken in removing them, as practically they will be at rest and without much foliage. It will also be obvious that the more expeditiously the work can be accomplished, consistently with proper care, the more satisfactory will be the results. With few exceptions the *Nymphæas* will then be quite devoid of foliage, and especial care should be taken when emptying the tubs of soil so as not to overlook any of the tubers. Some sorts increase very slowly, but the Lotus section are quite the reverse, being vigorous growers, and proportionately productive of tubers. Should a tuber of either of this latter section by chance get into a tub of another sort of weaker habit it will soon establish itself and take entire possession. The tubers, when removed from the tubs, should be placed in pots of damp moss, and each sort labelled to prevent any confusion arising when replanting is in progress. Tubs or large pans filled with water should be conveniently to hand for the accommodation of the floating plants, and wet moss will be found very useful for covering the roots of others when removed from the tank.

The tubers of Water Lilies during their resting period are best left in the tubs in which they have been growing, but if it is necessary to remove them they can be safely kept in wet soil or sand in a warm house; and those sorts that do not die down entirely should be kept in pots of soil, submerged in pans of water and placed in a similar position.

PROPAGATION.—Aquatics can be raised from seeds at any time during the growing season, but the best results are obtained if the sowing is done early in the spring, excepting in the case of the Royal Water Lily (*Victoria regia* and *Euryale ferox*), to which special reference will be made later on in this chapter when describing their culture. Seedling tropical Aquatics can be raised in an ordinary plant-stove if the temperature of the water can be maintained at about 75deg. Fahr. A simple and easy method to adopt is to sow the seeds in small pots or pans, about two-thirds filled with fine loamy soil, which should be firmly pressed down, and the seeds lightly covered. They should then receive a thorough soaking of water, and be allowed to stand for a short time before being submerged in jars or vessels of water, allowing about 2in. depth of water to cover the tops of the pots. Of course, tanks or cisterns, in which the water is of a suitable temperature, may be used; but if the water is constantly disturbed by some of it being taken out, it will have an injurious effect on seedling plants, and there will be the risk of seeds being washed out of the pots. Care should also be taken not to entirely fill the pots with soil, or the action

of the water will cause it to swell and float over the sides, as before stated, which would probably result in the loss of the seeds. The seeds of many of the *Nymphæas* germinate quickly, and if sown early in the spring and the seedlings are pricked off as soon as they are large enough to handle, afterwards transferred singly into pots filled with good, rich soil, and the depth of water above their crowns increased as the plants develop, they should form flowering plants before the season is over. This remark particularly applies to the *stellata* group, the seeds of which germinate in about a fortnight, and, as the roots of the majority of them increase very slowly, this is the quickest and best method of propagating them. The seeds of the *Lotus* section require about double the time to germinate, and, unless it is with a view to raising new sorts, they are scarcely worth the trouble, as they all, as previously stated, increase rapidly by means of tubers. *Nelumbiums* are easily raised from seeds, the germination of which can be greatly facilitated by carefully reducing the thickness of one side of the hard outer covering of the seeds with a file, after which process they will germinate in a few days: otherwise they will require several weeks. They will also germinate in water placed in a warm house, but this is not a better method than the preceding. The seeds retain their vitality for a great length of time, owing to the extreme hardness of their outer covering.

If it is desired to grow a plant of the Royal Water Lily, *Victoria regia*, with other Aquatics in a tank, as previously described, this will necessarily require the central part of the tank. In this case a pit should be formed in the centre about 18in. in depth and large enough to contain from three to four cart-loads of soil; otherwise there would not be a sufficient depth of water above the crown of the plant. Where a tank is constructed especially for the cultivation of this Giant Lily of the Amazon—and it well merits such accommodation—it may be treated as an annual, and will then only occupy the tank from the spring till the autumn. The place can then be cleared out and utilised for the reception of large specimen plants, either arranged in the tank or on a temporarily-constructed staging of planks, supported at the sides and in the centre by trestles or brick columns. It will also serve to accommodate tender plants removed from their summer quarters out of doors, and thus be rendered attractive throughout the winter months.

To cultivate the *Victoria* satisfactorily it requires very liberal treatment at the roots, a large tank in which to grow, and the temperature of the water to be kept at from 80deg. to 85deg. during the summer months. Although of perennial duration, it is usually treated as an annual, and the ease with which seedlings are raised where a temperature of 85deg. can be maintained renders this practice, in most cases, the better and more

convenient to pursue. The seeds, which usually take about eighteen to twenty days to germinate, should be sown about the end of January in a pan of soil, and submerged in water of the temperature already given. As soon as the seedlings are large enough to handle, they should be transferred singly into small pots, and when necessary shifted into larger ones containing good rich soil. The pots should be so submerged that the crowns of the plants are only a few inches below the surface of the water, increasing the depth as the plants grow stronger. Another plan sometimes adopted, and which has been attended with good results, is to place the seeds directly in the mound of soil in which it is purposed to establish them. If the former method is adopted, the plant selected will be sufficiently strong by the end of March to remove to the tank in which it is to grow.

The soil, composed of two parts stiff loam and one part well-decomposed cow manure, having been prepared for its reception, the plant should be firmly fixed in the centre of the heap of soil with the crown about 18in. below the surface of the water. It delights in abundance of sunlight, therefore the house should not be shaded in any way, nor should the temperature be allowed to vary much, as this would be injurious and check growth. The temperature of the house should never be allowed to fall below 75deg., and during mild weather ventilation should be freely afforded and the plant occasionally syringed during the day. When the leaves have attained about 2ft. in diameter, the edges on a strong, healthy plant begin to turn up, the depth of margin increasing according to its vigour; this is a characteristic that is never so marked in a plant of less robust health. Towards the end of June, provided the plant has made good progress, it should have reached its full size and flowering stage, when ample ventilation should be given. It produces a new leaf on an average about every three days; therefore it will be obvious that some of them will have to be removed to prevent overcrowding; this is best done as soon as they appear, only reserving those that are required to replace old ones that have become imperfect. For the benefit of the plant the old flowers should also be removed, unless it be desired to save seeds, in which case an early flower or two should be selected for that purpose, and should be artificially fertilised. It is noteworthy that shortly before the fruit is matured the peduncle rapidly elongates to several feet, a means provided by Nature for the distribution of the seeds. Each fruit contains numerous round, brownish-green seeds, about the size of an ordinary garden pea, and these take about ten weeks to ripen. Before reaching maturity they should be enclosed in a muslin bag to secure them when the fruit bursts. When this occurs, the seeds should be taken from the bag, put in a jar filled with

water, and kept at a temperature from 60deg. to 65deg. until wanted for sowing.

The special treatment that the Lattice-leaf Plant, *Aponogeton fenestrata*, requires in order to produce a luxuriant growth does not admit of its inclusion in a tank with Aquatics that require abundance of light and sunshine. A tub about 3ft. in diameter and 1½ft. in depth is a very suitable receptacle in which to cultivate it. This should be situated in a warm plant-house in a position where the light may be subdued and the temperature of the water maintained at from 60deg. to 65deg. in the winter, and from 70deg. to 75deg. during the summer months. A suitable compost in which to plant it is one consisting of good fibrous loam, a little leaf-soil, and a good sprinkling of coarse silver sand. An 8in. or 10in. pot is sufficiently large to accommodate a good-sized specimen, and the soil should be pressed firmly into the pot, afterwards covering the surface with small, white stones, or spar, to keep the soil from rising in the water; these also serve another purpose, displaying to better advantage the formation of the leaves. The crown of the plant should be submerged about 2in. beneath the surface of the water. It is most important that the water be clean and as free from sediment as possible, rain-water being far preferable; further, it should not be allowed to become stagnant, or confervoid growths will make their appearance, and injure the plant. To prevent this as far as possible, some of the water should be drawn off about once a week by means of a siphon, and the tub filled up with fresh water of about the same temperature. If this does not check their appearance, a good method to adopt is to cover up the plant and exclude all light for a few days, when the confervoid growths can be easily syringed off and flushed over the rim of the tub. It is beneficial to the plant for the tub to be filled to overflowing by adding a little fresh water every day by means of a watering-can with a fine rose; or the same result may be attained (excepting that there is a continual slight agitation of the water) by a constant drip conducted by means of a siphon from another vessel situated at a higher level. This will cause the water to run over at the sides, and any dirt that may have become deposited on the surface will be thus removed. Propagation of the Lattice-leaf Plant is effected by means of divisions of the root-stock and also by seeds. It is rather a capricious subject to cultivate, for treatment that suits it in one place sometimes disagrees with it in another, which perhaps may be owing to foreign matter held in suspension by the water. As is the case with many other plants, its successful cultivation greatly depends on apparently trifling details, but a well-grown specimen is a unique object of beauty well deserving all the careful attention bestowed on it.

The under-mentioned is a General List of Tropical and Tender Nymphæas grouped in Day- and Night-Flowering divisions, in order that a selection may be the more readily made; observations on *Victoria regia* and *Euryale ferox* are also included.

DAY-FLOWERING NYMPHÆAS.—*N. capensis* (*N. scutifolia*), a native of the Cape of Good Hope, has fragrant flowers that are above medium size, the colour being a beautiful clear blue; it is extremely floriferous, and one of the earliest to expand its flowers in the morning, but invariably closes them earlier in the day than any other day-flowering kind. The plant is of vigorous growth, with large, pale green leaves prettily scalloped at the margins; it is very handsome, and merits being represented in



FIG. 604.—NYMPHÆA DAUBENYANA.

all collections of tropical Water Lilies. *N. Daubenyana* (Fig. 604) is a very handsome hybrid between *N. stellata* and *N. micrantha*; it originated in the Oxford Botanic Garden, and is named in honour of Dr. Charles Daubeny, a former Professor of Botany of that University. The sweetly-scented, medium-sized, star-shaped flowers are of a pale blue, and have yellow stamens tipped with blue; their fragrance is pronouncedly that of Violets; it is perhaps the most floriferous, and the period of its flowering is longer than that of any Water Lily in cultivation, in fact, it might be termed a perpetual flowerer, for it is seldom out of blossom; it is of the easiest culture, readily propagated, and of vigorous growth. Like its parent *N. micrantha*, it is distinguished by the formation of viviparous buds on the upper surface in the angles of the lobes of the leaves, which soon develop into small plants and often produce flowers about the size of a penny-piece when they are still attached to the parent plant. Its excellent qualities entitle it to be included in the most select collections. *N. elegans* is a Mexican species, with fragrant flowers of medium size, and of

all collections of tropical Water Lilies. *N. Daubenyana* (Fig. 604) is a very handsome hybrid between *N. stellata* and *N. micrantha*; it originated in the Oxford Botanic Garden, and is named in honour of Dr. Charles Daubeny, a former Professor of Botany of that University. The sweetly-scented, medium-sized, star-shaped flowers are of a pale blue, and have yellow stamens tipped with blue; their fragrance is pronouncedly that of Violets; it is perhaps

a whitish colour tinged with blue; the small oblong-shaped leaves are of a deep green, marked on the upper surface with dark brown spots; it is a very desirable plant of moderate growth. *N. flava*, a native of Florida, has clear yellow flowers below medium size; the leaves are small, deep green, and irregularly blotched with reddish-brown. It is of slender growth but increases rapidly by means of tubercles formed on the long slender rhizomes; the stoloniferous growth that it freely produces should be removed to encourage it to flower with more freedom. It is sometimes grown in the open air in this country but is scarcely hardy, and being a very shy blossomer at its best, it does not merit inclusion in other than botanical collections.

N. gigantea (Australian Water Lily) is one of the handsomest and most distinct species in the genus. The beautiful deep, cup-shaped flowers are of the largest size, and contain a great number of petals of a lovely rich clear blue, with numerous yellow incurved stamens, none of which are petaloid (as is usually the case in other kinds); the leaves are large and of a pale green. It is rather difficult to manage compared with many other sorts: to grow it satisfactorily it requires very liberal treatment, a high and uniform temperature, a good depth of water above its crown in which to grow, and as little disturbance as possible. This treatment will ensure a vigorous plant and large flowers, suggestive of the appropriateness of the specific name it bears. *N. gracilis*, a native of Mexico, has sweetly-scented white flowers which are freely produced; the petals are long and pointed, which gives to the blossom a pretty star-like appearance. It is of vigorous habit, and a very desirable species. *N. mexicana*, as its specific name implies, is a native of Mexico. It very closely resembles *N. flava* in habit of growth and other respects, the chief differences lying in its greater freedom of flowering, and in the flowers being a shade deeper in colour, which trifling distinctions perhaps scarcely entitle it to specific rank. *N. micrantha* is a native of Western Africa, with whitish-coloured flowers below medium size; it is of moderate growth, and remarkably distinct from any other species, owing to its producing viviparous buds in the angle of the lobes of the leaves on the upper surface, which eventually develop into separate plants. *N. pulcherrima*, a hybrid of American origin, is held in high estimation by horticulturists in the United States; it is described as being of vigorous habit and very floriferous, with very large light blue flowers, which open early in the morning and remain expanded longer during the day than most other kinds.

N. stellata (*N. cœrulea*), a native of tropical Asia and Africa, is the blue Lotus held sacred by the ancient Egyptians; it has sweetly-scented medium-sized star-shaped flowers of a pale blue,

shading to a lighter hue towards the base of the petals. The plant is of moderate growth, with pale green leaves, which are sometimes sparsely spotted on the upper surface with reddish-brown. There are several handsome varieties of this very free-flowering and desirable species, varying in vigour of growth and the tone of colour of the flowers. *N. s. cyanea* is a



FIG. 605.—*NYMPHÆA ZANZIBARENSIS*.

desirable and free-flowering variety of the preceding; the flowers are sweetly scented, similar in shape to those of the type but larger, and a shade paler in colour; it is also of more vigorous growth. *N. s. versicolor* is a small-flowered variety of a faint bluish colour, slightly suffused with pale rose; it is slender in habit, and is remarkable for the numerous small tubers it produces, which are not characteristic of the *stellata* section. *N. zanzibarensis* (Fig. 605) is a native of Zanzibar, as the specific name implies; it is the darkest blue Water Lily known. The flowers are sweetly scented, very large, and of a beautiful shape; it is of very vigorous growth, with large deep green leaves, and is of the easiest possible culture. Its long period of flowering, and the freedom with which it produces its magnificent rich deep blue flowers, justly entitle it to a place in every collection of tropical Aquatics. The habit of the plant and the formation of the flower suggest its being closely allied to the *stellata* section.

N. z. azurea is a handsome free-flowering variety, the blossoms being a little paler in colour than in the type. In *N. z. rosea* the flowers are of a deep rosy-pink.

NIGHT-FLOWERING NYMPHÆAS.—*N. amazonum*, a native of South America, has fragrant yellowish-white flowers, below medium size. The plant is of moderate growth, with smallish leaves, which are light green on the upper surface, and reddish beneath. *N. ampla*, a native of the West Indies, has whitish flowers of the largest size; it is of vigorous growth, with large purplish-green leaves, deeply toothed at the margins, and marked on the upper surface with irregular-shaped dark brown blotches. It is closely allied to the

Lotus section, and increases freely by means of tubers. *N. Boucheana* is a hybrid raised in the Berlin Botanic Gardens, in 1853, between *N. Lotus* and *N. L. rubra*, the latter being the seed-bearing parent. The flowers are large, of a pleasing soft rose colour, slightly tinged with purplish-carmine, passing to a lighter hue towards

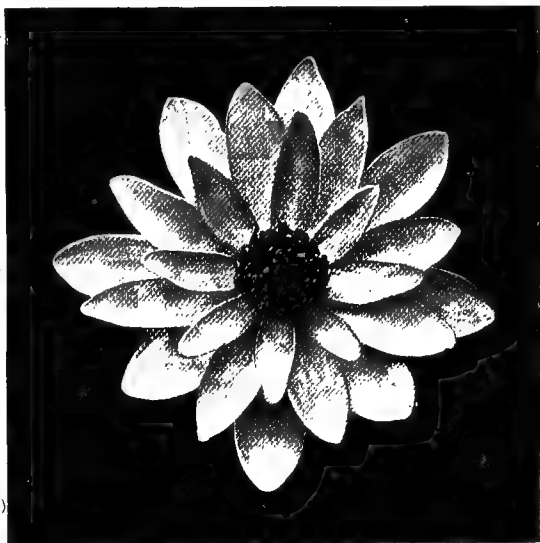


FIG. 606.—NYMPHÆA DEVONIENSIS.

the base of the petals. The plant is of robust habit, with large leaves, scalloped, and sharply serrated at the margins; it is a free-flowering and very desirable hybrid. *N. Deaniana* is a hybrid of American origin, producing large clear rosy-pink flowers very freely; it is of vigorous growth, with large bronzy leaves, and belongs to the *Lotus* section. *N. devoniensis* (Fig. 606) is a reputed hybrid between *N. Lotus* and *N. L. rubra*, the latter being the seed-bearer; it is stated to have been raised at Chatsworth in 1851, and named in honour of a former Duke of Devonshire. It is a magnificent Water Lily, with flowers of the largest size and of a rich deep red. The freedom with which it flowers, combined with its robust habit, entitles it

to inclusion in the most select collections. The leaves are large, of a bronzy-green, deeply and sharply toothed at the margins. *N. Eugenie* is a hybrid of Continental origin, with large flowers, containing fewer petals than many of the other forms of the *Lotus* section; they are of a soft carmine-rose, paler in colour towards the base of the petals. It is a free-growing plant with large leaves, the upper surface being of a dull bronzy-green, marked with reddish-brown blotches, and the margins sharply serrated; were it more floriferous it would be a decided acquisition. *N. keewensis* is a hybrid between *N. devoniensis* and

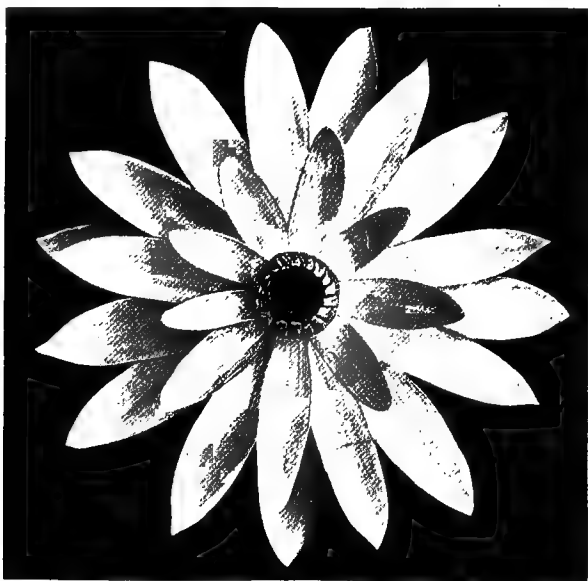


FIG. 607.—*NYMPHÆA LOTUS DENTATA*.

N. Lotus, the latter being the seed-bearing parent; it originated at Kew in 1885. The plant is similar in habit to, and equally as vigorous in growth as, the first-named parent, but the petals of the flowers are a trifle broader and more rounded at the points; these are of a bright rosy-red, shading off to a much lighter hue towards their base. They are large, freely produced, and keep open longer in the morning than most other kinds of the *Lotus* section.

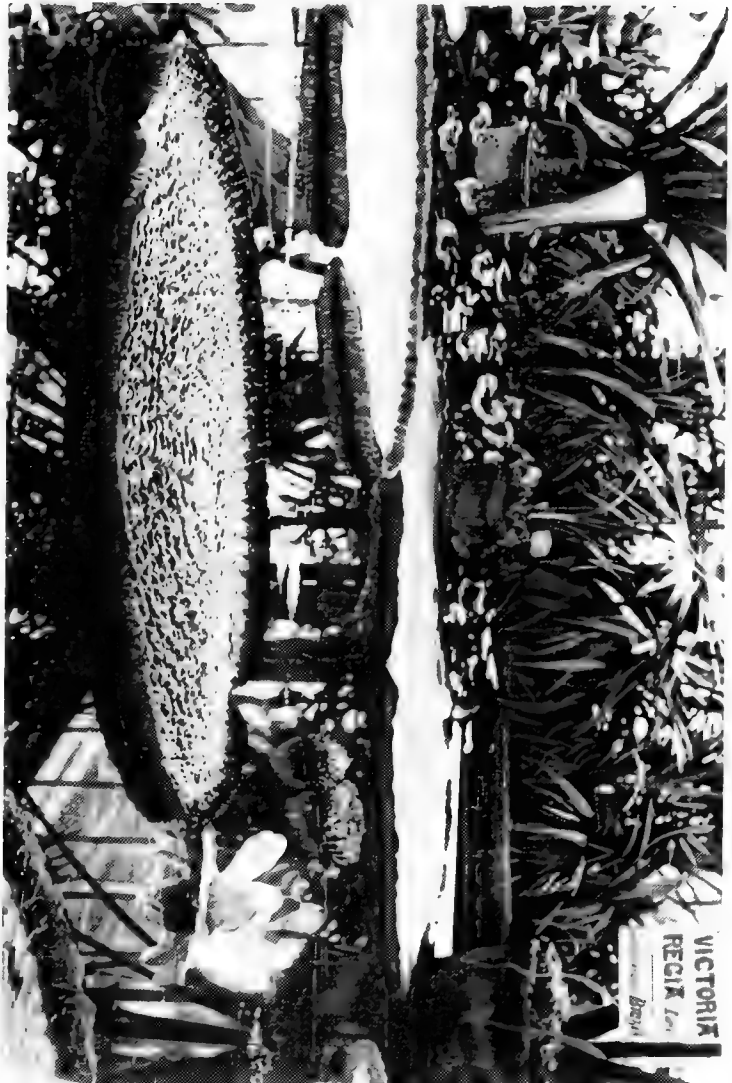
N. Lotus (Egyptian Water Lily, or Lotus of the Nile) has large white flowers, with sometimes a suspicion of pale pink in the sepals and outer petals; the leaves are peltate, deep green, and sharply serrated at the margins. This is the type of many beautiful

forms that differ more or less in the shape and size of their flowers, and also in colour, which varies from pure white to the deepest red. They are increased rapidly by means of tubers (which is a characteristic of the *Lotus* section), and are also the most vigorous growers of any Water Lilies in cultivation. *N. L. dentata* (Fig. 607), a native of Sierra Leone, is a free-flowering and magnificent variety, with flowers of the largest size and of the purest white. It is quite distinct from any other known kind by the arrangement of the petals when the flowers are expanded: on the first day of opening these are arranged horizontally, but on the second and third days they are decidedly reflexed. The very large, deep green, peltate leaves are prettily scalloped and sharply serrated at the margins. This is one of the handsomest, and, without doubt, the purest white Water Lily in cultivation. *N. L. monstrosa*, introduced by Sir John Kirk in 1886 from Lake Nyassa, is an interesting variety owing to the flower-buds usually being transformed into tubers, which eventually form plants. Occasionally a normal flower is produced, which, like the growth of the plant, closely resembles the type; the deep green leaves, however, are more freely marked on the upper surface with longitudinal and irregular-shaped blotches of dark brown. The plant is more curious than beautiful. *N. L. rubra*, a native of the East Indies, is a very desirable and free-flowering variety with large deep red flowers, the petals of which are much broader than in the type; the large, peltate leaves are sharply serrated at the margins, and are of a handsome dark coppery colour on the upper surface. *N. L. thermalis* (Hungarian Lotus), a native of the hot springs of Hungary, very closely resembles the type in every respect; the flowers are faintly scented, and are white with a slight tinge of pink on the under-side of the sepals and outer petals.

N. O'Marana is a beautiful hybrid of American origin, the result of a cross between *N. L. dentata* and *N. Sturtevantii* (itself a hybrid). The flowers are very large, of a bright rosy-red, and freely produced. The plant is of robust habit, with large bronzy leaves which are deeply toothed at the margins. It is of recent introduction, and when better known will probably be much sought after. *N. Ortiesiana* is a free-flowering and very desirable hybrid of Continental origin, the result of a cross between *N. L. dentata* and *N. L. rubra*, the latter being the seed-bearer. The flowers are of the largest size, of a bright rosy-red, with deep orange-red stamens. It is a vigorous-growing plant of easy culture, with large leaves of a bronzy-green colour on the upper surface, and prettily scalloped and sharply serrated at the margins. *N. Sturtevantii*, a hybrid of great beauty, originated in the establishment of Mr. E. D. Sturtevant, of New Jersey, who has made a speciality of Aquatics, and has done much towards popularising them. It produces very large, broad-petalled, cup-

shaped flowers of a bright rosy-red. The habit of the plant is extremely vigorous; its large leaves are of a bronzy colour on the upper surface, and are deeply toothed at the margins. This magnificent Water Lily does not flower as freely as many kinds in the *Lotus* section, to which it belongs.

VICTORIA, REGIA (Royal Water Lily).—A monotypic genus befittingly dedicated to the illustrious lady whose name it bears. This handsome plant is one of the most interesting and wonderful productions of the Vegetable Kingdom, and is by far the largest and most remarkable Aquatic hitherto introduced. No plant has probably attracted so much public interest and admiration, or, when seen for the first time, created so much astonishment. The gigantic leaves of this queen of Water Lilies are peltate and nearly orbicular in shape, the largest measuring from 6ft. to 7ft. in diameter, exclusive of the upturned margin, which is from 2in. to 5in. in depth, the whole presenting the appearance of a huge circular tray floating on the surface of the water. The under-side of the leaf is furnished with numerous large cellular ribs, extending in each direction from where the petiole joins and gradually diminishing in size as they approach the margin. These are connected by much smaller transverse ribs, forming a network of great sustaining power; and all are beset with sharp prickles, varying in length, as does also the cylindrical petiole, which has the peculiarity of elongating rapidly as soon as the leaf has attained its full size, and thus providing space for the young leaves that follow. The leaves are smooth, of a deep shining green on the upper surface, and purplish on the under-side. The rapidity with which the plant grows and expands its prodigious leaves, when they first appear, curled up inwardly and bristling with prickles, somewhat suggest the appearance of a hedgehog, and is probably not equalled by any other subject in the Vegetable Kingdom. Notwithstanding their rapid growth, however, the leaves will keep in good condition for six or eight weeks after they have become fully developed. A strong, healthy plant, when it has reached the flowering stage, produces, as previously observed, a leaf and a flower, on an average, about every three days, and, as in the case of all other Water Lilies, the flowers are rather short-lived. Two days is the usual limit of their duration, this being one day less than in the case of *Nymphæas*, so that it is a rare occurrence for a plant to have two flowers fully expanded at one time. On the first day the flower commences to open about four o'clock in the afternoon, and is fully expanded (excepting the central petals) in about an hour; it is pure white, measures from 10in. to 14in. in diameter, and emits an agreeable and powerful odour. The flower keeps open all night, but the following morning it closes up for several hours, but expands for the second and last time about



VICTORIA REGIA AT KEW GARDENS.

five o'clock in the afternoon; the outer petals are then reflexed, and some of them are faintly tinged with pink, while the central ones (that were not exposed on the previous day) are disclosed, and are of a deep rosy-red. The peduncle and the ovary are densely covered with sharp prickles. This remarkable Aquatic first flowered in Europe, at Chatsworth, on November 8th and 9th, 1849, and five days later (November 14th) it is stated that the then Duke of Devonshire had a leaf and a flower conveyed to Queen Victoria, at Windsor. There are but few recognised varieties in cultivation, and these differ principally in the colour of the flowers on the second day of opening, or in the depth of the upturned margin of the leaves. The first one on record was discovered and introduced from Brazil by Mr. Ed. S. Rand; he sent seeds of it to Mr. Sturtevant, of New Jersey, in whose establishment it first flowered under cultivation in 1886, and by whom it was distributed under the name of *V. r. Randii*. This has leaves of a dark bronzy-green, with the upturned margin of greater depth than in the type; the colour of the flowers is also much deeper. Another well-marked form is known as Dixon's variety, and this originated with Abraham Dixon, Esq., Cherkley Court, Leatherhead, who has for many years taken a foremost place in the successful cultivation of Aquatics, and has formed a very complete collection of them. Dixon's variety is remarkable for the size of the leaves and the depth of the marginal rim, as well as for the deep, rich colouring of the flowers. Another form, recognised as Tricker's variety (which originated with Mr. Tricker, of New Jersey, an enthusiastic specialist), has very distinguishing characters, and is a desirable variety. The plant is very floriferous and of vigorous growth, with large leaves, of a bright green colour on the upper surface, and the marginal rim very deep. It is also remarkable in that the leaves on young plants assume the turned-up margin at a very early stage. It is interesting to note that these varieties retain their distinctive characters when raised from seed.

EURYALE FEROX is an interesting plant native of India and China, the genus being monotypic and closely allied to *Victoria*. The species is of annual duration, and, before the discovery and introduction of the Royal Water Lily, was distinguished as being the largest and most ornamental-leaved floating Aquatic in cultivation. Its large, handsome, peltate leaves are nearly orbicular in shape, dark green on the upper surface, and of a rich deep purple on the under-side; they measure on strong-growing plants about 3ft. in diameter, and are furnished beneath with numerous prominent cellular ribs. Unlike the *Victoria*, the margins of the leaves are rimless and distinctly bullate (puckered) on the upper surface, and are beset with sharp, curved spines on both surfaces. The flowers, which are exceedingly small in comparison with the size of the plant, are of a deep

purplish-violet, and are often expanded beneath the surface of the water, in which position they remain. It produces seeds freely, which are larger than those of the *Victoria* and oval in shape. When ripe, these should be kept until wanted for sowing in a jar of water at about 50deg. Fahr., or they will quickly germinate. *E. ferox* is a vigorous plant, and can be successfully grown in a large pot or tub under similar cultural conditions to those recommended for the *Victoria*; and, of course, it can be accommodated in a much smaller space than the plant just referred to.

The following is an alphabetical list of the most desirable tropical and tender Aquatic or moisture-loving plants for cultivating in a Lily tank. Excepting the Aponogetons, they flourish in a similar compost to that recommended for Water Lilies.

APONOGETON FENESTRALE (*Ouvirandra fenestralis*, Lace-leaf or Lattice-leaf Plant).—This rare and remarkably handsome species is singularly interesting on account of the skeletonised appearance of its elegant submerged leaves. They are oblong in shape, with a stout mid-rib, and parallel with this on each side are several slender nerves extending the entire length of the leaf; these are connected by numerous short cross-nerves, which impart to the leaf the pretty lace or lattice-work appearance, from which the plant derives its common name. Well-developed leaves are from 12in. to 18in. in length, and 4in. to 5in. in breadth, of a deep green, and more or less horizontally arranged just beneath the surface of the water. The twin-spiked scape which rises above the surface bears numerous closely-packed, small, whitish flowers. Another species in the genus—*A. Berneriana* (*Ouvirandra Berneriana*)—has fenestrate leaves, and is equally as interesting as, and rarer than, the one just described, but not so handsome. The leaves are longer and much narrower, and the nerves are stouter and much closer together; it therefore does not present the same delicate and beautiful appearance of the Lace-leaf plant. It also differs in having a four-spiked scape, with the pale rose-coloured flowers more sparsely arranged. The same cultural conditions as recommended for *A. fenestrate* will meet the requirements of this species.

CABOMBA AQUATICA.—A small and interesting plant with submerged and floating leaves. The former are deeply divided, with the segments very finely cut on short petioles; the latter are shield-shaped, entire, and the petioles much longer. The solitary yellow flowers are insignificant, and are arranged in the axils of the leaves.

CERATOPTERIS THALICTROIDES.—A monotypic genus, the species being an interesting Water-Fern with handsome much-divided fronds, the fertile ones taller and more erect-growing than the sterile ones. It is easily increased by spores, and also by

proliferous buds formed on the sterile fronds which, if laid on wet soil, soon develop into plants.

CYPERUS ALTERNIFOLIUS.—This well-known and handsome plant needs no describing. It is very accommodating, suiting itself to ordinary pot culture, and thriving equally well when treated as an Aquatic with its roots submerged in water, in which position it is strikingly effective. *C. a. variegatus* is equally as handsome and effective as the type, although a little less sturdy in its growth. *C. natalensis* is a very desirable and handsome plant, with tufts of numerous long, narrow, deep-green leaves gracefully disposed. Like *C. alternifolius*, it is an excellent subject for ordinary pot culture, and thrives equally well with its roots submerged in water. Height 2ft. to 3ft. *C. Papyrus* (*Papyrus antiquorum*, Egyptian Paper Reed) is a particularly ornamental plant, having erect, long, triangular stems, surmounted with umbels of pendent thread-like leaves, which present a graceful and very effective appearance. It is of vigorous growth, and although usually treated as an Aquatic, it may be successfully grown in a pot placed in a pan of water. This species is also historically interesting from the fact that it was the plant which yielded the Papyrus of the ancient Egyptians. Height 8ft. to 10ft.

EICHHORNIA AZUREA
(*Pontederia azurea*,
Blue Water-Hyacinth)

(Fig. 608).—This is a very desirable Aquatic, with stout, erect-growing scapes, bearing numerous clear lavender-blue, funnel-shaped flowers; the upper and larger segments are marked in the centre with a yellow heart-shaped blotch, margined with white, and the three inner ones are deeply toothed, which imparts to the flowers a pretty delicately-fringed appearance. It is a very free-flowering and vigorous-



FIG. 608.—EICHHORNIA AZUREA.

growing plant, with long, thick, floating stems, and at each joint roots are emitted. The shining green leaves are borne erect on short, stout petioles, and are very variable in size and shape. To prevent this plant from encroaching on other things, it will be necessary to occasionally shorten back the stems, replanting the young growths. As it roots freely, this operation affects the plant but little, either in growth or in flowering, as the scapes are produced from the axils of the leaves towards the extremity of the stem. *E. Martiana* (*E. tricolor*) is an erect-growing, handsome, free-flowering plant of annual duration. It is of moderate growth, with cordate, sharply-pointed, shining green leaves, on long petioles.



FIG. 609.—EICHHORNIA SPECIOSA.

The flowers, which are arranged on a compound spike, are about 1 in. in diameter, the three lower segments being of a purplish colour, and the three upper ones deep blue, having a two lobed yellowish blotch in the centre, margined with white. Height about 2 ft. *E. speciosa* (*E. crassipes*, Water-Hyacinth) (Fig. 609) is a handsome, curious, and interesting plant. Unlike the other species, when under cultivation the flowers are seldom produced, but, nevertheless, they are equally as beautiful; these are large, of a pretty, soft rosy-lilac, the upper and largest segments being suffused in the centre with rosy-purple, with linear markings of violet, displaying a conspicuous oval-shaped blotch of pale chrome-yellow. It increases rapidly, and is very variable in its habit of growth. When treated strictly as a floating Aquatic, the petioles are short and very much inflated; but when the roots are in soil this inflation diminishes, the petioles assuming an almost cylindrical shape and growing to a much greater length. The shining, deep-green leaves are also very variable, both in size and in shape. In order

to succeed in flowering this species under artificial treatment, the plants should be allowed to become crowded and the roots well matted together. They should be located in the sunniest position in shallow water with a little soil for them to root in, and the offsets (which are freely produced) should be removed as soon as they appear. This pretty plant has been introduced from its native habitat (South America) to some of the water-courses in the United States, and in the St. John's River, Florida, it has increased to such an extent as to become a serious obstruction to navigation.

HERPESTIS MONNIERIA is a small but dense-growing plant of prostrate habit. The small, solitary, bluish flowers are freely produced, and are arranged in the axils of the leaves. It is a very serviceable subject for covering the bare surface of wet soil in which tall, erect-growing plants are situated.

HYDROCLEYS COMMERSONI (*Limnocharis Humboldtii*, Water-Poppy), is a very desirable and handsome Aquatic, with large, pale, yellow flowers, deepening in tone of colour towards the base of the petals; the numerous stamens are purplish, which add to the beauty of the flowers. They are very fugacious, but the freedom with which they are produced amply atones for that deficiency. It is a free-growing plant of neat habit, with floating, roundish ovate-shaped leaves, the mid-rib of which is very prominent on the under-side.

HYDROLEA SPINOSA (Fig. 610) is an erect-growing, free-flowering plant, producing corymbose panicles of rich, clear, blue flowers. It is of easy culture and compact in habit. Seeds sown in the early spring will produce flowering plants late in the season. Height 1ft. to 2ft.

JUSSIEUA REPENS GRANDIFLORA has shortly-stalked five-petalled flowers of a rich deep yellow. The plant is of vigorous growth, with long, prostrate floating stems, from the joints of which erect-growing, flowering shoots are produced, and also tufts of short, fibrous roots.



FIG. 610.—*HYDROLEA SPINOSA*.

LIMNANTHEMUM INDICUM (Water-Snowflake) is a handsome little Aquatic, with floating heart-shaped leaves, which somewhat resemble those of a miniature Water Lily. The elegant little flowers are produced from the slender stems near the base of the leaves, and are pure white, the upper surface of the corolla being prettily fringed. It is a free-flowering and attractive little plant of slender growth, and requires a situation in shallow water.

LIMNOBIUM BOGOTENSE (*Trianea bogotensis*) is a compact-growing little floating plant with oblong or orbicular deep-green, shining leaves about 1 in. in diameter, borne on short petioles, and arranged in the shape of a rosette. It freely produces short stolons from the base, and at the ends of these other plants are produced. The flowers are insignificant.

LIMNOCHARIS EMARGINATA (*L. Plumieri*) is an erect-growing plant with pale yellow flowers borne in umbels on stout, three-sided scapes. The ovate leaves are quite entire, very distinctly veined, and of a pale green; the petioles are long and triangular in shape. Height 1ft. to 2ft.

MYRIOPHYLLUM PROSERPINACOIDES (Parrot's Feather) is a very graceful plant of a pleasing shade of green. It has long slender stems, densely covered with very finely-cut leaves, which impart a pretty feathery appearance. The insignificant flowers are hidden in the axils of the leaves. It is a free-growing subject, and is very useful for covering unsightly mounds of wet soil in which erect-growing plants are situated; it thrives equally as well in this position as when the stems are growing on the surface of the water.

NELUMBIUM LUTEUM (Fig. 611).—This American species is a very handsome Aquatic, with pale yellow flowers, but is not so vigorous a grower or so floriferous under cultivation as the better known Indian species *N. speciosum*, which in its other characteristics it closely resembles. In favourable situations outside during hot summers it would probably thrive better than when cultivated under glass, and would produce more freely its large handsome flowers. Height 4ft. to 5ft. *N. speciosum* (*N. nuciferum*, Sacred Bean of India, and by some authorities reputed to be the true Lotus of the Ancient Egyptians), although not now found growing wild in Egypt, is commonly met with in many parts of the East Indies and tropical Asia, where it is, with its several varieties, held in high estimation. It is without doubt the most interesting and beautiful of all tall-growing cultivated Aquatics. Apart from the massive soft rosy-pink flowers which are freely produced, the circular, peltate, glaucous leaves are exceedingly handsome; their upper surface is densely covered with a microscopic down which renders them impervious to water, the latter when dropped upon them rolling off in globules

like quicksilver. Height 4ft. to 6ft. The genus *Nelumbium* embraces only two species, but specific names have been given to several varieties of *N. speciosum*, the only distinction being in the colour of their flowers, which range from white and pale rose to deep rosy-pink, and in some instances there are a greater number of petals which impart a semi-double appearance.

NEPTUNIA PLENA (Water Sensitive Plant) is a curiously interesting subject with long, spongy, floating stems, bearing bi-pinnate leaves consisting of numerous small leaflets of a pale-green colour, which are irritable, as in those of the well-known Sensitive Plant, *Mimosa pudica*. The flowers are small, pale yellow, and arranged in globular heads on rather long peduncles, which are produced from the axils of the leaves.



FIG. 611.—*NELUMBIIUM LUTEUM*.

OTTELIA OVALIFOLIA is a compact and interesting Aquatic, with oblong-ovate leaves, some of which are submerged, others floating on longer petioles. The flowers are borne above the surface of the water in a solitary spathe, the three large inner segments being of a pale yellow colour.

PHILYDRUM LANUGINOSUM.—A monotypic genus, the species being perhaps more interesting than beautiful. It is of biennial duration and of erect habit of growth, its lanceolate leaves being densely covered with woolly hair. The flowers are clear yellow, and are borne on long spikes. Height 2ft. to 3ft.

PISTIA STRATIOTES (Water Lettuce).—A monotypic genus of the Aroid family. The species is a very handsome floating

Aquatic, with tufts of soft, delicate, pale-green leaves, which are joined together at the base in the shape of a rosette. The flowers are insignificant, and are borne in little rosettes at the base of the leaves. This plant should be afforded slight shade from direct sunlight, or it will assume an unhealthy appearance. It increases freely by offsets, and where it thrives will soon outgrow its allotted space.

♣ *SAGITTARIA LANCIFOLIA* is an erect-growing Aquatic, with pure white flowers arranged in whorls on tall scapes. The plant is



FIG. 612.—*SAGITTARIA MONTEVIDENSIS*.

of vigorous habit, with lanceolate-ovate leaves borne on long petioles. Height 3ft. to 4ft. *S. l. angustifolia* has the leaves much narrower and less distinctly ribbed, and is smaller in all its parts than the type. *S. montevidensis* (Monte Video Arrow-head) (Fig. 612) is by far the handsomest species of the genus yet introduced,

and is also one of the prettiest and most desirable of erect-growing Aquatics. It is of vigorous growth, with large sagittate leaves borne on stout petioles 3ft. to 4ft. in length. The flowers are large, arranged in loose whorls on tall stout scapes, and are pure white, with the exception of a maroon blotch margined with pale yellow, situated at the base of the three inner perianth-segments. It is very floriferous, and thrives well in pots just submerged, but grows more robustly when planted out in beds, and presents a very striking effect when situated in the background of a tank. Height about 4ft.

SALVINIA NATANS is a charming little Fern-like floating Aquatic, of a delicate pale green colour, and of annual duration. It reproduces itself from spores, which are freely produced on the under-surface of the plant, and which are easily discernible, in the autumn. Before the so-called sporocarps are quite ripe, or in a condition to burst, the plants should be removed from the tank and put into a pan containing a depth of about 3in. of finely-sifted loam and filled up with water; the plants will die off, but the spores will sink and remain in the soil until they commence to germinate early the following spring. The pan, which must be kept filled with water, should during the winter months be placed in a temperature of about 60deg., removing to a higher temperature when the spores show signs of germinating. When the plants are large enough, they should be transferred to their permanent quarters for the season.

THALIA DEALBATA is an elegant erect-growing Aquatic of vigorous habit, with cordate-ovate leaves on long petioles. The plant is covered with a mealy powder of a whitish colour, which gives it a pretty glaucous appearance. The long-stalked panicles which it freely produces bear numerous small purplish-coloured flowers. It is a very desirable subject to plant in the background of a tank, where it presents a very bold effect. Height about 5ft.

In addition to the aquatic plants enumerated in the foregoing list there are numerous others that delight in hot, moist situations during their growing season, and that might be included where space permits of doing so. It will suffice, however, to mention some of the most important of them considered as to their graceful growth, or their bold effect when introduced with judgment amongst the plants that constitute the chief attraction in a well-arranged Lily-house. Amongst the most deserving of notice, with bold foliage and handsome flowers, are the Cannas and *Hedychiums*. The former embrace many kinds, from which a good selection can be made; and of the latter the best for the purpose are *H. coronarium*, *H. Gardnerianum*, and *H. flavum*; these respectively produce large spikes of white, lemon-yellow, or orange-yellow sweetly-scented flowers. The

Musas, too—*M. Cavendishii* and *M. ensete* more particularly—although requiring considerable space, are amongst the most effective subjects that can be associated with such ornamental foliaged plants as *Colocasia antiquorum*, *C. esculenta*, *C. odorata* (Fig. 613), *Pandanus Veitchii*, *Alpinia nutans*, *A. vittata*, *Xanthosoma Lindenii*, *X. violaceum*, *Dieffenbachia Bausei*, *D. chelsoni*, *D. magnifica*, *Caladium bicolor*, *C. Chantinii*, and many of the familiar brilliant-coloured hybrid forms. These should not be omitted from a supplementary list when necessary to enhance by their inclusion the general effect of a collection of tropical Aquatics. They may be depended upon for the purpose for which they are here recommended, and with the Aquatics would form a permanent source of much interest and pleasure.



FIG. 613.—*COLOCASIA ODORATA*.



21.—*On*

By
TREVOR MONMOUTH.

Forcing.

IN all gardens of any extent the early forcing of vegetables, salads, bulbs, and flowering plants is conducted on a more or less extensive scale, according to the family's requirements, and without the means of thus producing the above the supply of choice tender vegetables, salads, and beautiful flowers would be much curtailed.

Vegetables.

Taking vegetables first, as being the most indispensable and useful articles, particularly during and following hard winters, when all kinds are scarce, it would be difficult to imagine what the gardener would do without some, or all, of the sorts now so largely forced, and which can be thus artificially obtained with certainty at a comparatively small outlay, providing a few frames and a dark, warm place like a Mushroom-house are available.

ASPARAGUS.—This highly-esteemed vegetable is best forced in heated brick frames, having a slight hot-bed of manure, with hot-water pipes near the lights. On the manure a light layer of sandy soil should be placed, and on this the Asparagus plants, which should be at least three years old, should be placed thickly, taking care that the roots have not become dry through exposure. On the top of the plants another layer of light sandy soil to the depth of 3in. or 4in. should be placed, and a thoroughly

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good watering given. A temperature of 55deg. to 60deg. will be high enough, and beyond seeing that air is admitted if the temperature runs up too high, and careful watering, little further attention is necessary. As the plants become exhausted they should be thrown away, being no good afterwards. Unless Asparagus is required very early, January will be soon enough to commence forcing.

CARROTS.—At all times of the year small and tender Carrots are much appreciated on the table, and gardeners in general strive to meet requirements by forcing them as early as possible. By means of hot-beds made up in frames heated by hot water young Carrots may be had at almost any time during the winter. Unfortunately heated frames of that description are seldom available, except in very large gardens; in smaller establishments the best use must be made of cold frames placed on hot-beds made up of strawy manure, leaves, &c. In such cases the hot-bed should be made up early in January; it should be at least 3ft. deep, and should project about 1ft. outside the frame all round. Take care to tread the hot-bed thoroughly firm during the process of making up, or the heat will soon become exhausted. It need scarcely be stated that when the frame is put on the bed, it should face the south as far as possible, to catch all the sun-heat. When the frame has been placed on the hot-bed, a layer of fine sandy soil to a depth of about 6in. should be spread evenly over the whole of the inside surface (old potting soil that has been screened through a $\frac{3}{4}$ in. sieve is excellent). On this the Carrot seed may be sown broadcast thinly, and if the frame is kept close, only giving a little ventilation to allow any rank steam to escape, the seed will germinate in a few days. From this time onwards more air should be admitted, the grower being guided as to how much or how little by external influences. Overcrowding of the plants must be avoided, otherwise they would choke each other. If thinned out to about 2in. apart, the Carrots may be drawn immediately they are large enough, and those remaining will be able to develop into bigger ones. Towards the end of January, another bed may be made up, which will keep up a supply until those sown on a warm border outside are ready. With frames heated by hot water, a sowing could be made monthly from the end of September onwards, and a supply regularly maintained with certainty in spite of bad climatic conditions. For sowing in frames, the French Horn varieties are much the best, being very reliable and quickly coming into use.

CELERY.—When Celery is wanted for exhibition very early, the seed of white varieties is sown in heat in January, and when the seedlings are large enough to handle, they are pricked out into boxes of rich soil. When about 4in. or 5in.

high they are planted out in frames on a gentle hot-bed, 9in. to 12in. apart. In this frame they grow to their full size, and as the plants become large enough they are blanched by means of bands of stout brown paper tied round them. When wanted, the Celery is beautifully white and clean. Sutton's Solid White has proved a splendid variety for this early forcing.

FRENCH BEANS.—Few vegetables are so easily forced, or can be grown for a longer period in succession, than the Dwarf or French Beans; in fact, with a nice light hot-house and plenty of heat, there is no difficulty in having tender Beans from the time when the outdoor supply fails until it commences again. The first sowing may be made in 9in. or 10in. pots about the middle of August. Place a crock or inverted oyster-shell over the drainage hole, and some of the roughest of the soil over this, then half fill the pots with a compost of three parts good fibrous loam and one part well-decayed manure. In this insert about seven Beans at equal distances, and if all germinate reduce the number of plants to five, as if all were left they would become overcrowded, and the crop would consequently be light. A temperature of 55deg. to 65deg., or a little more by sun heat, will suit the plants admirably, provided they are kept close to the glass to get all the light possible. Also maintain plenty of atmospheric moisture, and syringe the growing plants freely on both sides of the foliage; unless this is carried out Red Spider is practically sure to attack the plants, and reduce their energy and crop. Watering must have the most careful attention; avoid any extremes of drought or wetness at the roots. Immediately the plants show signs of blossom forming the pots should be filled up to within 1in. of the top with a compost of half fibrous loam and half well-decayed manure thoroughly mixed; this will feed the plants and cause them to crop heavily, particularly if the Beans are gathered directly they are large enough for use, and the plants are occasionally given diluted liquid manure (or 1oz. of nitrate of soda dissolved in 3gals. of water, and applied weekly). By sowing at intervals of three weeks from the middle of August to the end of March, and giving the cultural details proper attention, a continuous supply of Beans will be produced through all the winter and spring months. Excellent varieties for this early and late forcing are Sir Joseph Paxton, Improved Mohawk, and Osborn's Forcing.

MUSHROOMS.—See the Chapter "On Vegetable Culture."

PEAS.—Occasionally Peas are forced to provide a few dishes in April or May, or before the ordinary supply grown outside is ready; but unless particularly wanted for some special purpose, the trouble and expense incurred in growing them under glass are not repaid by results. To get very early crops under glass the Peas should be sown at the beginning of January, or even earlier if they are wanted at the beginning of April,

sowing the seeds thinly in large pots or boxes that are well-drained, and filled with a compost of three parts good fibrous loam and one part leaf-mould or well-decayed manure. As the seedlings germinate they should be kept close to the glass, to prevent their becoming drawn and to induce a sturdy habit. A temperature of 45deg. to 55deg. should be maintained, and air be admitted on all favourable occasions. As the plants advance in growth they should be supported with short, twiggy shoots, and be given diluted liquid manure about once a week, taking care not to over-feed. The dwarf-growing varieties are the most suitable for growing in pots or boxes—Chelsea Gem, Improved Gem, William Hurst, American Wonder, and other dwarf sorts are excellent. Outside crops are forwarded considerably by sowing seeds of early varieties on turves or in boxes in February in heat. These are gradually hardened off in cold frames, and then planted out on a warm border and staked at once, as the stakes afford a certain amount of protection, not only from the weather, but also from birds.

POTATOES.—Although Potatoes are sometimes forced early in pots, they are seldom worth the trouble unless a few very early dishes are required. The more usual method is to make up a gentle hot-bed in frames, round which a flow-and-return hot-water pipe runs. On the top of the litter or manure, forming the hot-bed is placed a layer of fine sandy soil, in which plenty of leaf-mould has been incorporated, the layer being about 6in. deep. In this the Potato "sets," or tubers, are planted in lines about 15in. apart between the rows, and 9in. apart in the rows, an early variety that produces a short top being selected for the purpose. A good watering is given if the soil is at all dry, and a temperature of about 55deg. maintained. Whenever the weather is favourable air is admitted, the object being to get strong, sturdy plants in robust health. Some growers add a little compost to the plants, in fact, earth them up slightly; but, after trying earthing and non-earthing, we found absolutely no difference in the size of the tubers or weight of the crop. Care in watering is necessary to prevent undue dryness or moisture at the roots, the grower, as far as possible, striving for the happy medium. When the tops begin to lose their greenness, it indicates that the crop is maturing, and more air and less moisture are desirable to improve the flavour of the Potatoes. If the first beds are made up and planted early in January, and at intervals afterwards according to requirements, a supply for special occasions may be relied upon from the end of February onwards. The following varieties are all white, short in the haulm, and have proved valuable for forcing purposes: Harbinger, New Early Frame, Early Short-Top, Early Bird, and the old Early Ashleaf. There is little to choose between these five varieties for size of tuber and weight of crop,

but the first-named is the best in quality, being wonderfully mealy when cooked as compared with most kinds of forced Potatoes.

RHUBARB.—Although this must be classed as a vegetable, it is always used as a fruit. Sometimes amateurs and others find a little difficulty in getting the plants to start into growth when put in heat to force; but if the crowns are taken up at the end of October or early in November in good clumps with a good ball of soil attached, placed in a cool shed for a week or so, and then transferred into a mushroom-house or under the stages of a warm greenhouse, the roots being covered with ordinary garden soil, they will quickly commence growing, and throw up a plentiful supply of leaf-stalks. Strong clumps that have been about two or three years undisturbed should be selected. Very old and massive clumps are not so desirable, as they have formed big far-reaching roots that will not lift with a good ball of soil. At the same time, these strong and old-established plants are first rate for forcing where they stand, by means of barrels with the ends knocked out, with a cover placed over the top, and the whole covered with litter or strawy manure, as mentioned for Seakale. If the barrels and manure are removed about the middle of April late growth will be made, and the plants will be scarcely, if at all, weakened by the forcing; in fact, we have thus forced old plants for eight years consecutively without any signs of exhaustion.

SEAKALE.—Where ground is limited, as it frequently is in towns, it is much the cheaper plan to purchase crowns of this popular and very useful vegetable for forcing. Strong crowns are usually advertised in most of the horticultural papers from November to March, or later; these may be purchased in quantity at a moderate cost per hundred crowns, and all that are not required for immediate forcing can be laid their full length in the soil outside, with only the tips of the crowns out, until wanted for successional supplies. In the country, where plenty of land is available, strong crowns can be grown more cheaply than they can be purchased; and if these are lifted in November, and laid in soil as above described until wanted for forcing, successional batches can be put in the mushroom-house to force even during severe frosts. The mode of operation is to place a quantity of crowns in a mushroom-house, or other warm structure from which light can be excluded, and with a temperature ranging from 55deg. to 60deg. The roots, or crowns (as they are usually termed by gardeners), are laid in fairly good sandy soil their full length, the crowns being just above the surface and about 6in. apart. Not much water is required by the roots, but care must be taken that they do not suffer for want of water, otherwise the growth will be tough and stringy. A nice moist growing

atmosphere should also be maintained; in fact, the conditions as to heat and moisture requisite for Mushrooms will suit the Seakale admirably. If the first batch of crowns is put in heat early in November, and afterwards at intervals of three weeks up to the end of March, a constant supply of this delicious vegetable will be produced from Christmas to the middle of April.

Where there are no means of forcing Seakale in heated structures, very fine heads of beautifully white and tender growth may be obtained by means of Seakale pans or inverted boxes with movable tops to allow of examining the plants. These boxes or pans are placed over the roots as they stand on the ground, and the space between filled up with strawy manure to the depth of 4ft. or so, treading the same fairly firm, and well covering the boxes or pans at the same time with the manure. In a few days a strong heat will be generated that will quickly force the crowns into growth. When inspecting the boxes or pans to see if the Seakale is ready for use, special care should be taken to cover them up again properly, or the heat will escape and be much later in affecting the Seakale's growth. The end of January will be quite early enough to attempt this outside forcing, and then the grower should avoid putting on the pans and manure if the ground is frozen, as this makes a difference of at least a fortnight in the Seakale becoming ready for use. After the cutting is completed, all the strawy manure should be removed, and the boxes, &c., stored away for future use; the roots will then make fresh growth that will be strong enough to force again in two years without disturbance.

Salads.

The value of a daily supply of fresh salad all through the winter months is well known, and with proper structures there is not much difficulty in ensuring this. With a warm mushroom-house or similar place, Endive, Chicory, Dandelion, &c., can be forced in successional quantities equal to requirements, and with the aid of Mustard and Cress sown in boxes in a warm greenhouse or forcing-pits, and Radishes sown on hot-beds, a very acceptable variety in the salad-bowl may be secured. A very good practice is to sow Radishes, and occasionally Lettuce, on the hot-beds made for forcing Potatoes; if the Radish seed is sown immediately the Potatoes are planted they will form nice little "bulbs" before the Potatoes get much top, especially if the olive-shaped or turnip-rooted sorts are selected, as these types of Radish are earlier in maturing than the long-rooted varieties. If Lettuce is sown on hot-beds or in boxes to get an early supply, that little kind known as Early Paris Market is one of the best, being a small, compact, Cabbage variety, quickly developing into a useful size for use. Immediately the

little plants attain a fair size they should be planted out, about 4 in. apart, in rich soil in a warm frame, and in a very short time nice little crisp Lettuce will be ready for cutting.

Herbs.

In many establishments Mint and other herbs must be forthcoming when needed. For this purpose young and vigorous plants should be put in pots or boxes of good soil some time prior to their being placed in heat. A moderate temperature—about 55deg. or 60deg.—is most suitable. If much more heat is given the growth is weak and attenuated, and not so serviceable as that produced more gradually. If proper attention is paid to watering and other details, it is marvellous what a quantity of growth a few pots of herbs will produce.

Ornamental Plants.

With the present great wealth of bulbs and other plants now available for forcing, the difficulty of supplying flowers for the decoration of rooms, conservatories, &c., is much less than it was in our forefathers' days. Not only have we a much larger choice of subjects, differing in colour, form, and beauty, but we have also much better appliances for forcing plants into flower at all seasons. When the Lily of the Valley was made to flower in the early autumn a few years ago, gardeners were for some time at a loss to understand how it was accomplished; but now by means of retarding chambers these charming blossoms are procurable all the year round. The hastening or retarding of the flowering period is practised with many other plants, greatly to the benefit of the gardener and market-grower, who are thus able to produce almost any flower that can be forced at a season when it is most desirable that it should be in evidence.

BULBS are indispensable for forcing, and are so numerous in kinds, that a fair-sized volume could be written on their culture; but it will be sufficient here to deal with those mostly employed for furnishing flowers out of season. In the majority of gardens the well-known Roman Hyacinth is the first bulbous plant to commence forcing, and it is usually in blossom from November onwards through the winter months. But it will possibly be advisable to warn purchasers against buying very early importations of these bulbs, which, being lifted before they are properly matured, are always more or less unsatisfactory in flowering. The end of September or early in October is quite early enough to commence potting Roman Hyacinths, and if properly treated they will give a full quota of flowers. All Hyacinths and Tulips answer to the same treatment, and their culture is briefly as follows:

In the first place perfect drainage is essential, and it should be covered with moss or similar material to prevent it from

becoming clogged with soil. A suitable compost is three parts good fibrous loam and one part decayed manure or leaf-mould, with a little chemical manure added (not exceeding a 5in. pot full to each barrow-load of compost—very often these concentrated manures are condemned through their having been applied in excess). The soil should be made moderately firm, and in the case of Roman Hyacinths and Tulips five bulbs may be placed at equal distances in 5in. or 6in. pots, just leaving the crown or apex above the soil. With the ordinary Hyacinths, one bulb in the size of pots named will be ample, placing it in the centre of the pot, with its top projecting a little through the soil. After potting is completed, a thoroughly good watering should be given, and the pots of both Hyacinths and Tulips plunged to the depth of 2in. or 3in. overhead in sifted coal-ashes in cold frames: this will keep the soil uniformly moist, prevent damage by frost, and encourage the formation of roots, followed by strong, sturdy growth and fine flowers when put in the forcing-house or pit. If potted and forced at once the results are not so good, and sometimes the flower-spike refuses to rise above the foliage, or is deformed. Another advantage is that when plunged in frames a batch can at all times be taken out and put in heat as required to afford a succession of flowers. Where large quantities of white flowers are necessary during the winter, a quantity of Roman Hyacinths should be placed in boxes containing a depth of soil of about 4in. or 5in., and in a moist, warm atmosphere a considerable quantity of flowers will be produced for cutting purposes. The same remarks also apply to the Paper White Narcissi, which force admirably in pots or boxes, and are very useful indeed for embellishment from November onwards. Some of the larger-flowered types of Narcissi are likewise valuable for forcing, but these will not stand much fire-heat, and must be brought on gradually, for if hurried they will fail, more particularly in mid-winter. After blossoming, the plants may be gradually hardened off and planted out in the wild garden or nursery.

The gorgeous Hippeastrums (erroneously called Amaryllis) force splendidly, and enjoy plenty of heat and moisture. By having successional supplies of bulbs to put in heat a quantity of brilliant flowers may be had for many weeks. Again, many of the Cape bulbs are charming, and flower most profusely with gentle forcing. Last, but by no means least, amongst bulbous plants should be included Gladioli of the *Colvillei* type, and the glorious Liliiums, all of which force more or less readily, *L. Harrisii* being a special favourite. A compost of half fibrous loam and half good peat, with sufficient sand to ensure porosity, will grow these plants well; and if placed in a light position and carefully watered they will flower freely.

Although the Lily of the Valley can scarcely be termed a bulbous plant; it is so well known and highly appreciated that it is practically indispensable. To have this flower first-rate it is essential that vigorous crowns be selected, and for that reason a bed or portion of a bed of these plants should be taken up every autumn or winter, all the finest crowns selected and laid in soil until wanted, or, better still, potted or put in boxes at once, and all the smaller crowns replanted in rich soil about 3in. or 4in. apart in a sunny position. In two years a splendid lot of crowns will be ready for forcing. The large crowns, if potted or boxed as suggested, may remain outside until the middle of November, when the first batch should be placed in heat, covering the crowns with inverted pots or boxes to exclude light; this will cause them to throw up both foliage and flowers more freely. When the new growth is 2in. or 3in. high, light should be gradually admitted, until finally the covers are removed altogether. If successional quantities of plants are placed in heat at weekly or fortnightly intervals a fine lot of their deliciously-scented flowers will be obtained from Christmas onwards. After flowering it is seldom worth keeping the plants, unless stock is wanted very badly: if not, they should be thrown away.

Herbaceous Plants.

Many of the ordinary occupants of our borders force admirably and afford a welcome and charming addition to bulbs and other plants. As a case in point, we may mention the valuable *Spiræa japonica*, with its white feathery flowers and handsome foliage, rendering it not only one of the best for cutting, but also admirable for room or conservatory embellishment. This plant should be potted for early supplies in October, and again later to meet all demands. Unlike many other plants, it will stand hard forcing from the first—*i.e.*, the plants may be placed in strong heat at once with a certainty of success, and if gradually hardened off, and planted out again in rich soil, they will in two years form strong clumps ready for forcing again. Plenty of heat and moisture are essential to all this class of *Spiræas*, but other varieties will not force so easily or with such a certainty of success as the one named. Solomon's Seal, again, is valuable for large rooms, corridors, conservatories, &c., and forces readily, and the same remark applies to *Dicentra* (*Dielytra*), with its graceful racemes of pretty flowers.

The Ten-week Stocks are annuals, but they are very useful for supplying flowers in winter, especially the pure white variety, named Princess Alice. Carnations, too, are lovely winter-flowering plants; varieties like Winter Cheer, Uriah Pike, Miss Joliffe, and the Malmaisons are all first-rate, and may be had in flower all through the season by commencing with Winter Cheer,

and following on with the other sorts mentioned. The Hellebores are so well known for Christmas and New Year flowers as scarcely to need mention, and even the Gaillardias, Pyrethrums, Campanulas, and many other hardy plants can be forced into blossom earlier than their usual season, thus affording a considerable variation.

Of late years the Sweet Pea has greatly advanced in popular estimation as a plant for forcing, and very sweet and acceptable are the pure and delicate flowers when thus grown under glass. The seed may be sown in good soil, well drained, in either pots or boxes—the former for choice—early in January, and placed in moderate heat. When germination has taken place, care must be exercised that the plants are kept close to the glass in a temperature averaging from 50deg. to 55deg., and ventilation given whenever the weather is favourable, the object being to keep the plants dwarf, sturdy, and floriferous.

No list, however small, of winter-blossoming plants would be complete without the modest but popular Violet. In the neighbourhood of large towns it is only waste of time and labour to attempt its culture, as it absolutely refuses to flower; but in country places, where the atmosphere is not choked with impurities, it may be had in blossom all through the winter. The plan we have always found the most reliable is to take off all the young and vigorous runners as early as they can be obtained, and to put them in a dung frame, with good loamy soil over the manure, the plants not being more than 8in. from the glass when the lights are put on. This is usually done in July or early in August, the plants being well watered when put in, and encouraged to grow freely by syringing every evening after a hot day. Unless this is done, Red Spider is apt to prove very troublesome. The lights are not put on until there is danger of frost, and if any runners appear on the plants (which are about 6in. apart for small-leaved varieties like the Neapolitan, and 2in. more for sorts like The Czar), they are promptly pinched off, as they would only weaken the energies and reduce the quantity of flowers. All coddling or closeness of atmosphere in the frames should be avoided. Except in frosty or very cold weather a little ventilation is best left on the frames day and night, and in the middle of bright, warm days it is an advantage to remove the lights altogether for an hour or two.

Trees and Shrubs.

The number of hard-wooded plants that will force well are so numerous that it would be difficult to say how many will lend themselves to this purpose; consequently only a few of the principal kinds, running into many varieties, can be mentioned. The Azalea merits the premier place, as all the *indica* section force freely and give such a wealth of beautiful flowers,

varying in colour from the purest white to deep crimson, so that any particular taste as to colour or as to double or single flowers may be gratified. If a few plants are introduced into the forcing-house from early in November onwards at intervals of ten days or so, and due attention is paid to watering, insect pests, &c., every flower-truss will open out freely and impart a beautiful effect during the dulllest months of the year. The varieties are so numerous that it is best to refer the reader to the catalogues of nurserymen making plants for forcing a speciality. If the seed-pods are all carefully removed immediately after the flowers are past, and the plants are kept in a growing temperature, little or no exhaustion takes place, and they may be forced annually for many years. The Ghent and *pontica* types of Azaleas are also of immense value for forcing, giving a mass of orange-coloured flowers with a minimum of trouble; and as these plants are purchased at a moderate cost, even the amateur may find them within his means. Following Azaleas, we have the showy Rhododendrons; in fact, the latter are now included by botanists with Azaleas, some going so far as to state that the name of one applies to the other; but, be that as it may, many of the Rhododendrons force well, and provide gorgeous plants for rooms or conservatories. The large trusses of blossoms continue fresh in a cut state for a long time in warm rooms in vases of water. Some of the scented forms, like *R. Edgworthii*, emit a very pleasing odour, and if treated as advised for Azaleas will force freely every year.

Lilacs are admirable plants for forcing. Strong plants grown in the nursery (from which they can be lifted and potted, or if large plants, with big balls of roots, put in tubs) may be forced in the dark, and the flowers of pink varieties will thus be white. But in forcing Lilacs, either in the dark or in a proper forcing-house, it is best to remove all the buds on the previous year's growth except the one at the point; this often means all the difference between success and failure, as the side buds seem to draw on the strength of the terminal bud, and to prevent it from developing a good truss of flower. After forcing gradually harden off the plants, and put out in the nursery again in good soil; in a couple of years the plants will be ready to force again. If no nursery is available, plants may be purchased annually at a small cost, and having served their purpose may be thrown away or planted out permanently in the shrubberies.

All the Deutzias are first-rate plants for forcing, and, like the Lilacs, may easily be had in blossom at Christmas by putting healthy, vigorous plants in strong heat about the middle of November: After flowering most of the old wood should be cut away, and every encouragement given to the plants to make new growth. When this is completed for the season, they can be gradually hardened, placed outside, and forced again the following

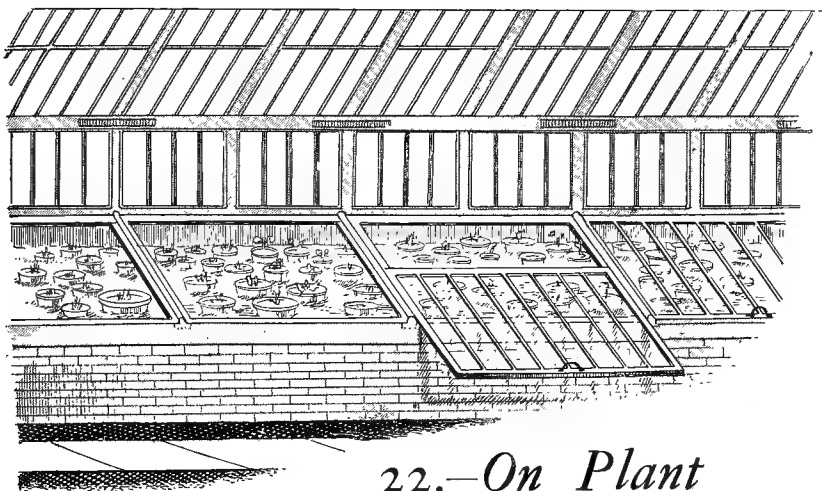
winter. Some of the *Viburnums* are lovely plants for early forcing, but to have them in full beauty they should be brought on gradually, and not subjected to strong heat at first. Nearly all the shrubby *Spiræas* force famously, and continue in blossom for a long time if placed in a light and moderately-warm greenhouse or conservatory. Even the common *Laburnum* and *Wistaria sinensis* have lately been proved suitable for forcing in spring. Quite small plants well established in pots blossom profusely; the yellow pendent racemes of the former and the delicate blue blossoms of the latter, are striking objects amongst other forced plants.

Staphyleas, covered with beautiful white flowers, are always objects demanding attention, and being of easy culture and forcing readily, should have a place amongst shrubs for supplying flowers early. In the *Prunus* family we have a grand collection of plants, varying in colour of blossoms from pure white to lovely shades of pinkish-red, all of which will force with ease, and a certainty of success. When we add *Roses* in their different forms and almost innumerable varieties, some idea can be formed of the many valuable plants at the command of the present-day gardener. The list of such might be extended considerably, and many more equally suitable things named; but quite sufficient has been mentioned to indicate that with the means and accommodation available there need be no dearth of fresh and exquisite flowers of almost every hue all through the winter and spring months.

Where means are limited, and it is impossible to afford the purchase of new shrubs, &c., annually, special attention ought to be paid to the growth of the plants after they have done blossoming by keeping them in the house, and encouraging the formation of young wood by pruning out all waste or exhausted shoots or twigs, by feeding with chemical or diluted liquid manure, and by putting the plants outside only after properly hardening off and when the weather is safe for them to be outside. When placed outside immediately after flowering in a warm greenhouse a violent check is given, and naturally plants so treated will not be in a fit condition to flower again or force the following winter. In many gardens space under glass is so valuable that room can ill be spared for plants that have performed their functions; still, it is best to supply this necessary space and attention.

For Methods of Forcing Fruit, see Chapter "On Fruit Culture."





22.—*On Plant*

By
A. GRIESSEN.

Propagation.

THROUGH the varied means of plant propagation, Horticulture has, to a large extent, reached its present high position. In competitions between growers the results have been such that we have greatly improved on the methods of increasing plants, and it is also due to the advance in this art that our new introductions are in most cases so rapidly distributed. First, as to the

Propagating-House.

In the erection of a propagating-house, several things have to be taken into consideration, for, without a suitable house, propagation in many instances becomes a very difficult matter. The plan shown in Fig. 614 combines several improvements. Heat, moisture, and light are essential conditions in propagation. Any kind of small house may easily be transformed into a propagating-house at a very small cost, provided heat can be obtained when wanted; but in the erection of a new house, the first consideration must be to find a suitable ground through which water will drain easily. If this cannot be obtained, it would be advisable to turn the soil over to a depth of 3ft. or 4ft., and put in good drainage. The situation must also be considered. It is a good

Amongst the various methods of propagation in vogue at the present time are the following: *seedlings*, decidedly the most natural way; *division of plants or rootstocks*, under which may be classed the numerous modes of propagation by bulbils, tubers, offsets, suckers, runners, and layers; next come *cuttings*, which are largely used in horticulture; and, finally, we have *budding* and *grafting*. The last-named two are the most artificial modes of propagation, but it is by these methods that an enormous quantity of trees and shrubs which form the chief ornamentation of our gardens, &c., are propagated.

Seeds and Seedlings.

Seeds are only obtained from flowering plants, and are the product of the union of the two sexual parts. In non-flowering plants (generally called Cryptogams) such as Ferns, Fungi, and Mosses, the reproductive power is found in spores, the groups of which can easily be seen below the surface of their leaves, or fronds. Seeds and spores possess all the elements required for the formation of plants if they are submitted to suitable conditions.

Although seedlings are the most natural mode of propagation, they do not answer for everything. Flowers are very readily influenced by "foreign" pollen, which in some instances has a predominant influence, and this fact is proved every day if we carefully watch the artificial conditions under which plants are cultivated. Horticulturists have found various advantages in the cross-fertilisation of flowers, commonly known as hybridisation, and it is through most careful selection of parent plants that many of our garden and greenhouse subjects have been improved. Glance twenty years back. What were our Roses, Gloxinias, Primulas, Begonias, Anthuriums, &c. ? What an amount of work has been done in that time! The hybridisation of Orchids, which was then almost unknown, is now carried out in nearly all collections, and the plants so obtained are generally far superior to the parents.

Seeds, as a rule, reproduce more or less the typical plant, but by careful selection the species may be improved, the seeds thus obtained producing in some cases a new type or variety more valuable than the original.

TESTING SEEDS.—Seeds ought to be sown while as fresh as possible, so as to prevent disappointment. Several methods of testing them have been recommended. One is to place them in water, when those sinking to the bottom are supposed to be good, whilst the bad ones remain on the surface; but not much value can be attached to this test, for in some cases the good seeds (especially oily kinds) will also float. It is a good plan to pick a few seeds from the lot and to cut them in two

pieces, when the germinating organ will show by its plump nature and white colour if they are in good order.

PRESERVING SEEDS.—To preserve for a long period the germinative qualities of seeds they must be kept in a condition neither too dry nor too wet, say at a temperature not exceeding 45deg. Fahr., and where outside weather will not have any effect on them. Several seeds, like those of *Aralia* and *Papyrus*, which lose their germinating properties very rapidly, must be sown as soon as they have ripened; but when they ripen in autumn, it is preferable to wait until the spring to sow them. In this case they may be mixed with sand or soil and placed in a ventilated bag, which must be kept as mentioned above until sowing-time. In the case of annuals and numerous soft-wooded plants, the seedlings of which are unable to withstand any degree of cold, similar precautions should be observed.

Seeds of Aquatics can easily be kept in the ordinary way indicated above, with the exception of the beautiful *Victoria regia*, whose seeds must always be kept in water. See Chapter "On Aquatic Plants."

Biennials should be sown about the middle of spring, so that the young plants will be established before the winter, and ready to flower in the following summer. In the case of hardy, woody plants, the seeds should be sown in the autumn, as they will not suffer from the cold, and will commence growing with the spring.

STRATIFICATION.—By this method seeds which quickly lose their germinative properties may be preserved. The direct action of air has a very detrimental effect on seeds, and those requiring protection are mostly stratified as soon as they are collected. The simplest way to do this is to take a receptacle of any sort possessing some outlets to prevent any stagnation, and of a size suitable to the quantity of seeds to be preserved. On the bottom of it should be laid a thin bed of breeze (small pieces of unburnt coke), and this should be covered with one of sand, on which the seeds should be deposited as closely as possible. Another layer of sand should now be added, then more seeds, and so on until the pan is filled, when the whole must be covered with more breeze to keep away worms. It is advisable to stand the receptacle in the coolest place. As cellars are too warm in winter, a good plan would be to bury it underground at a sufficient depth to avoid frost. The soil placed on the top must be arranged in such a way as to form a kind of cone to keep off the water; and this especially applies to tree and vegetable seeds. Stratification is also useful for tropical and sub-tropical seeds, which would otherwise lose their germinative properties before their arrival here. Cocoa- and Coffee-tree seeds must be stratified as soon as collected.

SOFTENING.—One great advantage of the softening process is to help the germination of a quantity of seeds which would otherwise require a considerable amount of time before showing any sign of life, during which time they might be destroyed by insect pests. Take for instance Palm seeds—these afford a very good example of the utility of softening, especially Cocos, Euterpe, Geonoma, and Latania—which are actually grown in very large quantities, and which would in some cases require a couple of years or more to germinate.

The following is the commonest method of softening, and one which is often resorted to in nurseries. Seeds on their arrival are deposited in large pans without soil of any kind, placed on the hot-water pipes of a warm house, and kept in a state of permanent saturation. Under these conditions, if the seeds are in perfect order, they soon give signs of germinating; indeed, a fortnight is sometimes sufficient time for several of them to show their embryos. All germinated seeds are carefully removed so as not to injure any of them, and then planted in pans or boxes in a very light soil, and kept in a warm house with a certain amount of bottom-heat to encourage growth. The remaining seeds are looked over nearly every day, and all those germinating removed, as without this precaution the embryo might easily be broken.

In the case of old seeds, the germinative properties of which are doubtful, they may be placed for several hours in slightly warmed water, with a handful of salt to each gallon; this helps the tissue to swell, and so aids germination. The thicker the shell the longer they may remain in water. Proofs of this may easily be obtained with Cabbages, Peas, Beans, &c., which have a very thin shell, and for which twelve hours are sufficient; but hard seeds require twenty to forty hours or more. This method is especially advantageous if the seeds have to be sown on dry ground.

FILING OFF.—This method is mostly applied to seeds which possess a very hard shell, and it must be done very carefully, filing that part of the seed in which the embryo is showing. They should then be placed on bottom-heat with moisture, when they will germinate much quicker, as is the case with Nelumbiums and some Palms.

SOWING.—Another very important point is the depth at which seeds should be sown. Taking the whole range from the enormous Coconut to the imperceptible seeds of Orchids, we may say generally that they must be sown at a depth equal to their size: for instance, Coconut seeds, with a diameter of 7in., must be covered with about 7in. of material, while the dust-like Orchid seeds should be placed on the top of the compost. Very fine seeds, such as those of Begonia, may be mixed with

an equal portion of dry sand, as the sowing is then more regular.

The period of sowing varies a great deal, and apart from the time already mentioned, it is also sometimes necessary to sow them according to the season at which the flowers, vegetables, and fruits are wanted—that is to say, when they are grown under artificial conditions.

Seeds are sown in various ways, mostly depending on their origin, sizes, &c., and the soil or material in which they have to be sown must more or less approximate to that on which they naturally grow. Many vegetable- and flower-seeds are sown on hot-beds, which must be well drained, and formed of a light mixture of loam, leaf-mould, and sand, carefully sifted so as to remove all stones or big lumps. For tropical or sub-tropical plants seeds may be sown in pans or pots, but boxes may also be used; these receptacles must be well drained and cleaned. In this instance the soil must be lighter and more sandy, and the seedlings must be kept in warm propagating-frames. In the case of Fern spores it is advisable to neutralise the soil intended to receive them. This neutralisation, or sterilisation, is easily effected by burning the loam or compost, and no foreign matters can in this case have any effect on the young plants. This method may also be applied to a multitude of fine seeds, which will require, as soon as they have germinated, to be pricked off; *e.g.*, many of the Begonias and the *Gesneraceæ*. The seeds of several hardy plants or trees are sown quite naturally, as is the case with many soft-wooded plants and numerous outdoor trees. Aquatic seeds should be sown in the usual manner in pots or pans, but they require to be submerged in water. This matter is, however, fully gone into in the chapter devoted to those plants.

SEEDLINGS IN PANS OR BOXES.—Seeds sown in pans or boxes are those which are required to be removed from place to place; it is therefore preferable that the pans or boxes be all of the same dimensions—square or rectangular—so as to prevent loss of space. The depth of these receptacles varies: deep ones are generally used for big strong-rooting plants, and shallow ones for little seedlings, which soon have to be pricked off or transplanted. These receptacles must be well drained, so that no excess of water is allowed. The compost employed ought to be suitable to the kind of seeds sown.

SEEDLINGS IN POTS.—This method of sowing is particularly employed for large seeds, like those of many Palms, which are too big to be sown in pans, or which suffer a great deal when transplanted—*Cocos nucifera*, for example. The pots are placed on hot-beds, and as soon as the seeds germinate they may be potted up if required. Such big seeds are often

sown on cocoanut-fibre in the frame of a propagating-house. Pots would answer quite as well as pans or boxes for small seeds, only they have the disadvantage of taking up too much room; but they are often used for Fern spores, and for some classes of plants when seeds are sown in small quantities.

NATURAL SOWING.—This kind of sowing is, of course, going on all over the earth. We may take for example the way in which a quantity of our British trees, shrubs, and other plants propagate themselves; and it is exactly the same with tropical and sub-tropical subjects in their native countries. The seeds when ripe drop to the ground, and when they find the conditions required they germinate and grow where they fall. It is also curious to note that many tropical and sub-tropical plants reproduce themselves in the same way in our houses, and some very striking examples might be mentioned. Take for instance a multitude of Fern spores which have been sown in pans in a most careful manner. Often it will be noticed that during the operation of sowing, spores get blown off, and germinate at the other end of the house, growing on the brick wall where moisture is permanent. In nurseries where Ferns are grown in considerable quantities, attention is always given to spores which germinate on walls or elsewhere.

Orchids are also prone to sowing themselves; indeed, this is mostly found with very light seeds or spores. Orchids are generally sown on the top of the compost of some other plants, as their seeds are so fine that the least action of air will easily blow them away, and they have several times been found germinating and growing along a wall or on woodwork. A most peculiar example of this is shown in the Orchid collection at Burford Bridge, where a splendid specimen of *Vanda Sanderiana* may be seen with a colony of Orchid seedlings growing on its roots. These instances serve to show us how little practically we at present know about the natural conditions under which tropical and sub-tropical plants grow.

AQUATICS are mostly and successfully sown in water, e.g., *Victoria regia*, numerous Nymphæas, and many others. The seeds should be sown in pans or pots, with a mixture of fibrous loam, leaf-mould, and sand, and the receptacles covered and placed in the tank of the house a few inches below the water level, and kept at an average temperature of 80deg. As soon as the plants commence to grow they may be transplanted in pots separately. They must always be kept *under* water; and as the plants grow the level of the water must be gradually raised, or the plants sunk, so as to enable them to float on the surface.

HOT-BEDS.—It is not always necessary to have a propagating-house, as many plants may be raised in frames containing a hot-bed, the bottom of which must be composed of fermenting matter, such

as stable sweepings, leaves, spent hops, &c., which are chiefly used in the preparation of hot-beds. The depths of the beds may vary from 2ft. to 3ft., according to the amount of heat required. Once the frames (Fig. 615) are fixed on, another bed of a couple of inches of suitable soil or fibre is laid on, and the whole is covered with lights. At first the heat increases so rapidly that

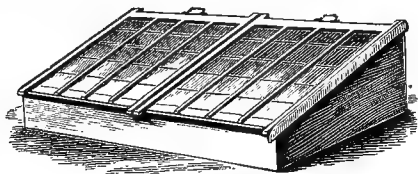


FIG. 615.—TWO-LIGHT FRAME.

it is advisable to wait a few days until the thermometer has dropped to a safe heat (about 70deg.). Seeds sown in pans or pots may then easily be started in these frames, and they may also in many instances be sown directly on the beds; indeed, this method is often adopted for early vegetables. These hot-beds under frames are very much used on the Continent.

PRICKING-OFF, &c.—Pricking-off is a kind of transplantation, which is required by nearly every seedling, especially those sown in a very limited space, as in pans, pots, &c. It is really surprising how thickly some young seedlings will come; they then require to be thinned, and that is the time to do the pricking-off. Thinning is the first necessity for the welfare of the whole patch; if this is not done, the young plants will grow up weakly, and will soon be exhausted. The operation must always be done with great care, to avoid breaking any roots or otherwise injuring the young seedlings. Some kinds of plants require several prickings-off to enable them to root more freely. The soil or compost used for this subsequent pricking-off must be more substantial than that in which the seedlings were first sown.

It is a difficult matter to describe all the ins and outs in regard to seedlings. All receptacles, frames, or outside beds in which seedlings are to be sown must be clean, so as to prevent them from coming in contact with any deleterious matter. Inside seedlings must be protected from the direct rays of the sun, and must not be allowed to become either too dry or too wet. The surface of the soil in which seeds are sown may be covered with a thin layer of silver-sand, so as to protect them from cryptogamous vegetation. No weeds or mosses of any kind must be allowed to get a footing. The temperature should also be observed; it can gradually be increased until the plants begin to grow. A great point is to place the pans or boxes as near to the glass as possible as soon as the seedlings develop their first leaves.

Division.

Next in importance to propagation by seeds comes the present method, by which a great many plants are propagated.

Under this heading may be classed bulbils, tubers, offsets, suckers, runners, and division of plants or rootstock.

OFFSETS.—A large proportion of plants are propagated by division of their underground parts—rhizomes, tubers, bulbs, &c. Bulbous plants mostly produce close to their roots, and attached to them, a certain number of offsets, which, when taken off, are used for propagation. “Bulbs” like those of Crocuses, Gladiolus, &c., are called “corms,” and they also produce a number of offsets. An offset is a small shoot capable of taking root after separation from the parent plant or bulb. When the parent plants have reached their resting period, and they have lost all their leaves, then the bulbs may be taken up, and division may be effected; all must then remain at rest until planting time. The small offsets, or corms, are planted at the same time as the parent plants, but they require a lighter soil and perfect drainage to prevent stagnation. This kind of propagation is very widely applied to the majority of our bulbous plants—Tulips, Hyacinths, Crocuses, Hæmanthus, and Gladioli. Bulbous Caladiums are also propagated in a similar manner.

BULBILS.—A certain class of plants produce bulbils, which are in many instances used for propagation. Such is the case with *Dioscorea japonica*, a few kinds of Liliium, &c., and in prolific Ferns, such as Aspleniums, bulbils are found on the fronds. They may easily be removed, and planted in pans or boxes in a light soil, when they will soon develop into a new plant, if given suitable conditions. These remarks also apply to *Remusatia vivipara*, *Mandirola*, &c.

TUBERS and TUBERCULES are underground succulent stems, possessing a multitude of buds, or eyes, from which, in many cases, new plants and tubers are obtained. Nearly all tuberous plants have a certain period of rest, which is more or less pronounced, and it is during the resting period that propagation is most successful. A tuber may be cut into as many pieces as there are eyes, or buds, on it, but care must be taken to have at least one growing eye on each part. Potatoes illustrate this very well.

Divisions of tubers must be planted and started in boxes in a light soil and in a moderate temperature. *Dioscorea* is chiefly propagated by division of the tubers, performed while the plants are at rest, for the stems of tuberous plants are all annual, and it is only when these have perished that the tubers ripen. The tubers are planted when the growing period is again approaching—in open ground if potatoes, in pots or pans if exotics, which must be kept under glass, so as to approximate as far as possible to their native climates, and when growing they must be treated as fully established plants.

The term "tuber" is widely applied to several fleshy tuber like roots, such as Dahlias, &c., but this is incorrect, for if those roots were cut into pieces, they would not give a new plant unless a shoot of the crown were attached to them. On proper tubers the eyes, or buds, are found all round them.

STOLONS, or RUNNERS, are a kind of branches, arising mostly from the base of the stock plant, remaining, in most cases, on the ground or soil and rooting at their tips, the tips finally forming another plant, which soon thrives by itself. Stolons are chiefly found in Ferns—*e.g.*, in *Nephrolepis*, the stolons of which are abundantly produced. Offsets, such as are found in *Sempervivums*, are sometimes considered as very short stolons. Runners are really very slender stolons or filiferous branches or stems, rooting at their ends, and which when separated and transplanted form as many plants in ground that has been well prepared and manured. This is the commonest mode of propagation used for the Strawberry. Some Saxifrages, as *S. sarmentosa*, are also easily propagated by this method.

RHIZOMES.—A rhizome may be described as a kind of stem of root-like appearance, found on or under the ground, and sending out numerous rootlets, while its extremity or apex sends up herbaceous stems. Rhizomes, runners, or stolons grow very quickly, and if the parent plant is in good growth these root-like parts are constantly on the move. Numerous, also, are the plants propagated by division of their rhizomes, *e.g.*, *Hedychiums*, *Polymnias*, *Cannas*, *Iris*s, &c. Fig. 616, showing surface rhizomes

of the German Iris, explains how easily this propagation may be performed. The rhizome in Fig. 616 may be cut into as many pieces as are required, allowing, of course, at least one eye, or growth, to each piece; and the same applies to the other species

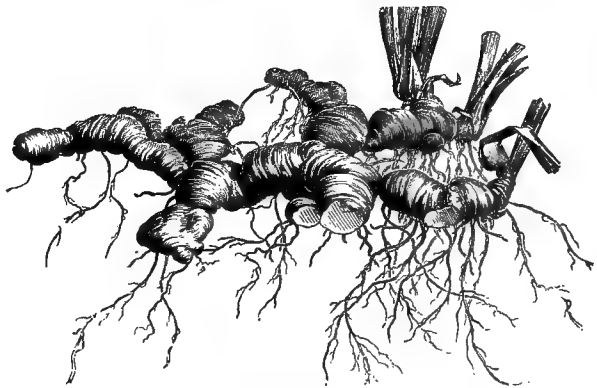


FIG. 616.—SURFACE RHIZOMES OF GERMAN IRIS.

mentioned. The divisions may be planted in pots or in beds, and when sufficiently strong should receive the same treatment as established plants. Several of the *Gesneraceæ* have a kind of

scaly rhizomes, which may be treated as seeds, and planted in pans or boxes in a very light soil in warm frames until they are strong enough to be transplanted.

DIVISION OF PLANTS.—Many plants are propagated by this means, and it may in some respects be applied to all bushy-growing subjects, such as many of our stove and hardy plants. Many Aroids are easily divided into several pieces; so are *Curculigos*, *Aspidistras*, and all plants giving several young shoots. The chief points are that each division should possess enough roots, and that it should be potted up freshly, and be carefully treated after the operation. This kind of propagation is the simplest in horticulture. It is the way in which *Marantas*; a great number of Ferns, and the majority of our Orchids are propagated. The period for the operation varies with individual plants, but it is most successfully performed when they begin to grow.

SUCKERS are shoots of underground origin, generally found growing by the side of the parent plant, and numerous plants may be propagated thereby. When suckers are detached they should, if possible, have a few roots attached to them, to enable them to start growing quickly. Suckers from any origin must be treated as young plants; a lighter soil must be used, no excess of humidity allowed, and the plants kept on a warm bed to facilitate starting. Pine-apples are often propagated thus: the suckers are cut off, left for a few days in order for the cut to "callus," and then placed on a strong bottom-heat in fibre or light soil, when they soon begin to grow. *Cycas* and nearly all Bromeliads, &c., are chiefly reproduced by this method. A common example is the well-known Globe Artichoke, which is often propagated by suckers from the old stocks. The separation of the suckers generally takes place in May. Care must be taken to have a good amount of soil over the roots, and they should be planted out in a well-manured ground. Suckers have the great advantage of reproducing the true type.

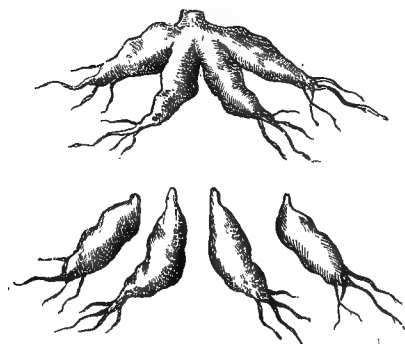


FIG. 617.—DAHLIA ROOTS, SHOWING TUBER-LIKE ROOTS, WITH MODE OF DIVISION FOR PROPAGATION.

DIVISION OF ROOTSTOCKS.

—A great number of our stove and greenhouse plants, such as *Aralias*, *Bouvardias*, *Dracænas*, &c., may be propagated by division of their roots;

these may be cut in very small parts, each of which will produce a young shoot if submitted to the required conditions. These root-divisions should be placed in pans or boxes, as close as possible, in a very light soil; or sometimes only fibre or sand need be used. The receptacles must be placed on a certain amount of bottom-heat, to enable the young shoots to break easily. As soon as they begin to grow, and have made both roots and leaves, they must be potted separately in suitable soil, and replaced in heat until rooted, when they may be treated as ordinary plants. Many Dahlias possess several fleshy tuber-like roots, which may be separated singly for propagation, allowing one shoot to each, as shown in Fig. 617. Numerous other plants possessing the same characteristics can also be propagated by the above means.

Layering.

This is one of the oldest methods of propagation, and also one which is often seen under really natural conditions. By this operation a branch is enabled to make roots without being separated from the parent plant. It is chiefly resorted to in the case of plants which cannot easily be reproduced from cuttings, and for such it is very advantageous. The plants to be layered may be divided into two groups: (1) Those possessing woody shoots, such as trees and shrubs, in which cases it is generally preferable to use well-ripened shoots; and (2) herbaceous plants having soft stems provided with leaves, in layering which it is advisable to remove the leaves from the portion of the stem to be layered. For hardy outdoor plants layering may be successfully performed in the open during summer months. For indoor layers no increase of heat is required.

Reproduction by layering is also divided into several classes, all answering the same purpose, but each particular principle being applied more or less to a certain kind of plants. The chief methods are bending or pegging the branch into the ground, tongueing, ringing, piercing, and insertion of the growing point, &c.

BENDING.—The simplest mode of layering is to bend into prepared ground the selected branch. Only a few buds must be retained close to the top, but all lower buds or eyes that would be buried must be carefully removed. The underground portion is fixed in such a manner as to prevent it from shifting, and the extremity must be fixed to a stake to keep it in an upright position.

RINGING is another method which is very well illustrated in Fig. 618, B. The branch is bent into the ground and well secured by a peg; a kind of ring is taken out of the bark, but in this case the outer and inner portion of the layers is

cut quite through, and consequently the sap is stopped on its return. The whole is buried well in the ground in such a manner that the cut portion remains in a moist condition.

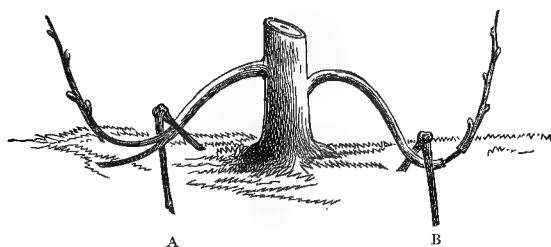


FIG. 618.—LAYERING (A) BY TONGUEING, OR HEELING, AND (B) BY RINGING.

618, A). A peg is fixed above the incision, and soil inserted between the tongue and the stem. This method is chiefly resorted to for Carnations (Fig. 619). In the case of hard-

TONGUEING. — This mode of layering is widely practised. An incision is made partly through the branch lengthwise, and varies in size according to the dimensions of the layer (*see* Fig.



FIG. 619.—LAYERED CARNATION SHOOT.

wooded subjects, it would be necessary to put a wedge in the cut to keep it open.

PIERCING is another simple and ordinary way of layering. Like all other underground methods, the selected layer is bent downwards, and the under part of it, forming the base of the curve (as shown in Fig. 620), is cut or punctured with a sharp knife. There should not be any bruises, the cut being made quite cleanly to prevent decomposition. Many growers prefer to remove a notch or eye found at the base of the layer as shown

in the illustration. Pegs are used to fix layers, and a light soil employed to cover the whole.

INSERTION OF THE GROWING POINT.—This is another excellent method useful when roots are found already attached to the layer, as is often seen in Currants and Gooseberries. When placed in a well-manured soil at the beginning of the summer, these layers will be found

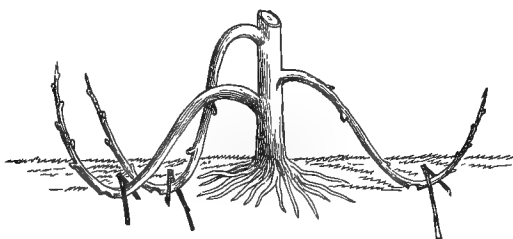


FIG. 620.—LAYERING BY PIERCING OR NOTCHING.

covered with roots by the autumn, and already possessing a growing bud. This fact is noticeable in several other shrubs.

LAYERING ABOVE THE GROUND (also known as *Circumposition*).—When the branches to be layered are too far off the ground to be bent down, this principle is applied in several ways. Small boxes are used, or a flower-pot is cut into two pieces, and these receptacles are fastened together around the portion to be operated on, being fixed in such a way as to prevent them from moving; long stakes, well secured in the ground, and to which boxes or pots may be attached, are sufficient. Instead of cutting the pot into two pieces, a section could be taken out of one side equivalent to the size of the branch to be propagated. Then the stem or branch may be easily fixed in the middle of the pot, and a piece of slate or glass used to close it up. The selected branches must be treated by the tongueing or ringing method, and the boxes or pots afterwards filled up with a very light soil, corresponding in some respects with that in which the parent plant is growing. The whole is generally covered with moss, which is kept saturated to prevent the soil from drying. When the branches begin to root, a partial incision is made in the stem just below the receptacle, thus enabling the sap to continue flowing; but as it cannot return it flows into the young roots. After the layered portion has emitted enough roots, it is entirely removed.

This method of propagation is often applied to *Cordylines* (*Dracænas*). Some plants, such as *Crotons* and the above-mentioned, which sometimes reach a large size and lose their bottom leaves, can by this means be reduced to the dimensions required.

LAYERING UNDERGROUND.—In this process the layered part which is to develop the roots is put in contact with the earth. If the branches are flexible, they are bent downwards in a place previously prepared with a lighter soil, according to the nature of the subject.

For plants which suffer by being shifted (possessing delicate and easily injured roots) another method may be mentioned. Baskets, boxes, or pots may be fixed in the ground where the branches have to be placed; the roots will develop in those receptacles, and when the plants are sufficiently rooted they may be transplanted at any time without being in the least affected. Of the present method of propagation *Lapagerias* are good examples.

PERIOD OF LAYERING.—According to climate and the nature of the plants, in the case of trees and shrubs layering may be practised from the beginning of spring till the middle of summer, employing the previous year's wood. As regards herbaceous layers, it is more advantageous to perform the operation during the summer, or as soon as suitable branches are available.

Cuttings.

Propagation by cuttings is very extensively practised, and is certainly one of the most useful methods. It consists in taking off a living portion of a plant, and placing it under such favourable conditions that it will root and form a new plant. Numerous subjects are successfully propagated by this means, by which also true sorts are kept up—that is to say, without any modification in the type; for, as already stated, plants propagated by seeds give rise to many unexpected varieties. Not every plant can be propagated by means of cuttings, for although many species are easily multiplied by it, there are a large number for which the method would not answer at all. However, some plants possess in all their parts the qualities required; and as a striking example we may mention some of the well-known *Cordylines*, or *Dracænas*, from which the head can be detached to form a terminal cutting. The stem can be cut into portions, each of which if provided with leaves can be treated as the first-mentioned; when leafless, these portions can be placed in moist sand on a strong bottom-heat, when they will give rise to a certain number of young shoots or plants, which can be potted up separately. These all spring from the latent buds which are to be seen at the base of the leaves.

Cuttings are generally taken from branches provided with leaves. The leafless stems of many plants are also suitable for propagation by this method; while roots also, for a certain class of plants, and leaves and divisions of leaves, are often used as cuttings, as well as the filiform branches of several plants, &c.

Cuttings of the majority of our soft-wooded plants require a closer atmosphere, a higher degree of temperature, and a more even degree of saturation than do the plants from which they are taken. Nearly all exotics may be so propagated. For the hard-wooded section such artificial treatment is not required.

Some of them, indeed, may be accommodated outside in beds previously prepared with light soil; but others require to be protected with lights, &c. They may, however, easily be propagated under quite simple conditions.

SELECTION OF CUTTINGS.—It is extremely difficult to describe how cuttings ought to be selected, for a certain amount of practical knowledge is required, and many things have to be taken into consideration. Cuttings should only be taken from healthy plants or growths possessing no appearance of disease. Numerous are the stove and greenhouse plants which may be increased by means of herbaceous cuttings, in which case it is preferable to select the stock plants a few weeks before propagation, and to have them potted up and placed in a little more heat, to induce them to grow freely, and thus produce some stronger growths, which may be more successfully struck. Before propagating foliage plants it is also advisable to sponge them very carefully with an insecticide to destroy any Thrips or Red Spider, which are so injurious to this class of plant.

As regards deciduous trees or shrubs, cuttings must be taken during the summer, enabling them to take root before they lose their leaves; otherwise, when their resting period approaches, the cuttings would perish. Young ripened wood or branches give the best results, and of course terminal cuttings are preferable. The evergreen, or true hard-wooded section, do not require such attention. However, the cuttings must be taken from well-ripened and healthy branches. Many plants belonging to this group require to be propagated by means of terminal cuttings.

Leaf-cuttings are often used for the reproduction of many *Begoniaceæ* and *Gesneraceæ*. It is advisable to take only fully-developed and characterised leaves free from disease, because if too soft they will "damp off" easily.

Cuttings of any description must be cut perfectly clean, and with the soft-wooded section it is preferable to take only a small quantity at a time to prevent them from drooping. The hard-wooded section do not require such particular treatment, but if a certain number of cuttings have been taken in advance it is advisable to keep them in a shady place, slightly damped.

COMPOSTS.—Cuttings need a very light soil, through which water can readily drain, and various materials are used for this purpose. Soft-wooded cuttings require, more than any others, a very light compost. *Silver- and river-sands* are the best substances for cutting-beds, and the plants that may be propagated in them are very numerous—*e.g.*, *Dracænas* or *Cordylines*, *Crotons* or *Codiaëums*, a quantity of *Melastomaceæ*, *Begoniaceæ*, and many soft-wooded plants like *Chrysanthemums*, *Verbenas*, *Calceolarias*, *Heliotropes*, &c. The chief advantage of good sand is that it is pure, and free from living matter. *Sawdust* is also a useful material, but it must be often renewed, because the constant

saturation required in propagation will soon decompose it. However, in large nurseries, where *Ficus elastica* are grown by thousands, sawdust is always used. It is extremely light and retains the heat very well. *Cocoanut-fibre* has only been used during recent years. It answers very well, and in several nurseries it is employed as a substitute for sand and sawdust; but it must be said of sand that it does not perish, whilst sawdust, fibre, &c., soon become rotten. Our well-known British sphagnum is an excellent factor, not only in the cultivation of Orchids, but also in propagation. *Nepenthes* are successfully increased when inserted in moss, but some growers prefer cocoanut-fibre. Several *Vandas* belonging to the *teres* section may easily be propagated by cuttings inserted in sphagnum. Different *composts* may also be prepared, but they must all be lighter than the soil in which the established plants grow. Peat, leaf-mould, fibrous loam, and sand, when well sifted and mixed in different proportions, according to the nature of the plants, form a useful material, which can be used for the majority of hard-wooded cuttings. Cuttings are sometimes inserted directly into the earth, but in this case a kind of bed must have been previously prepared after having been turned over and mixed with some peat, leaf-mould, or sand to make it lighter. A certain class of plants seem to strike and thrive more favourably if they are propagated or inserted in *water*. *Cyperus* is a characteristic example, and the well-known *Oleander* (*Nerium Oleander*) is another.

INSERTION OF CUTTINGS.—The insertion, or planting, of the cuttings can be executed in various ways. Tropical and sub-tropical soft-wooded cuttings may be inserted in beds of the above-mentioned composition in the frames of the propagating-house. It is advisable, when possible, to plant all the batch of cuttings in the same bed, because a more uniform treatment can thus be applied. Small and rare cuttings should be inserted in pots, pans, and boxes, and placed according to the nature of the plants in the propagating-frames or elsewhere. In nurseries where bedding-plants are largely propagated for early spring planting, shallow boxes are often used. A cutting-bed can be arranged without the help of a house. In this case the reader is referred to the first section on sowing in this chapter, and is advised to make use of the hot-beds under lights there described. It should not be forgotten that cleanliness pays, and that good drainage is one of the chief points on which success depends.

In inserting a cutting it is preferable to make a hole with a kind of pointed stick, known as a "dibber" (corresponding with the size of the cutting), and to place the cutting into it, the soil being pressed lightly down to prevent it from moving. If cuttings are inserted in pans, pots, or boxes, they will succeed all the better if planted all round the edges of the receptacles. If soil

is used a thin layer of silver-sand should be spread on the top, and a small portion of room left under the edges of the pots or pans for water when required.

It is rather difficult to say to what depth cuttings must be inserted, but it can be taken as a rule that the operated notches or buds must be inserted at a depth sufficient to keep the plant in an upright position. The illustration of a *Verbena* cutting (Fig. 621) shows what is required. Another difficult question to answer is, to what distance apart must cuttings be placed? In this case all depends on the nature of the cuttings as to size and room. Such cuttings as *Fuchsias* and *Chrysanthemums* may be inserted 1 in. apart, while some others, such as *Cyanophyllums*, which possess ample leaves, could not be inserted so closely. It is advisable not to crowd them; a certain amount of air must be allowed to circulate between the cuttings, or with the required saturation the rot will soon appear, and also what is generally called "damping off," a disease due to a specific fungus.



FIG. 621.—SOFT-WOODED CUTTING—VERBENA.

Another important point is the length of the cuttings. This depends on various circumstances; chiefly on the nature of the plant, and also on the number of cuttings required from it. The majority of soft-wooded cuttings do not exceed 3 in., and they can without inconvenience be cut much shorter; but for ample-foliaged plants the above length cannot be taken as a rule. *Ficus elastica*, for instance, roots quite freely when propagated by terminal cuttings, varying, according to the health of the growth, from 4 in. to 8 in. Several *Melastomaceæ* (e.g., *Cyanophyllums*) may also be mentioned. It is exactly the same with the hard-wooded section, many examples of which could be given. Eye-cuttings, as employed in the propagation of grapevines, do not exceed 4 in., and cuttings of several of our outdoor fruit-trees vary exceedingly.

WHEN TO TAKE CUTTINGS.—Cuttings may be taken all the year round, according to the nature of the plants and to the conditions under which they are kept. Many of our soft-wooded plants which are required during the summer months are propagated in the winter, but it may be taken as a rule that cuttings strike better in the spring than at any other time. If soft-wooded plants are required in the spring they must be propagated in the autumn. Deciduous plants are chiefly propagated about the end of the summer, enabling them to make their roots before the frost. Hard-wooded ones strike successfully in the autumn, and begin to grow with the early spring. The time of propagation

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When sufficiently rooted, the plants can be potted up separately, and not kept too wet until roots are to be seen under or in the pot.

Root-Cuttings have been partly described under "Division." Many plants can be propagated by divisions, or cuttings, of their underground parts. Ordinary roots, as found in *Bouvardia*, are

useful for propagation. *Yuccas* afford us another striking example of the present mode of reproduction. If the thick fleshy roots are cut into pieces and inserted in beds of sand on a good bottom-heat they will soon grow, making as many young plants as the number of pieces inserted. Fig. 625 illustrates a young plant of *Yucca* developed from a root-cutting. When the plants are first potted up they require a lighter soil than that in which the established plants thrive.

Heel-Cuttings are mostly used for propagating hardwooded plants (trees or shrubs). They are obtained by taking the cutting provided with a small part of the stem, or old wood. *Euonymus* and *Roses* are often thus propagated; but in this case wood of the current year is used. Many fruit-trees and shrubs are also propagated by this means. *Heel-cuttings* vary in length from 6in. to 8in., or sometimes more.

Cuttings in Water.—As previously stated, cuttings may be inserted in water in



FIG. 625.—YOUNG PLANT OF YUCCA.

various ways—in bottles for single cuttings, or in tanks for plants such as *Cyperus*, which when cut are left floating on the water. A quantity of eyes soon spring from the leaves, and the roots grow rapidly in the water. When well rooted, the plants may be potted up in a very light soil and kept in a state of permanent saturation which will help them to recover from the change.

GENERAL CARE.—Cuttings require a certain amount of practical care from the operator. Heat is required according to the nature of the plant to be propagated, but it must be kept uniform, no fluctuation being allowed. Cuttings of any kind must always be kept in the shade; those of exotic plants are mostly placed on bottom-heat in the frames of the propagating-house, which must always be kept in a suitable degree of moisture. No drying up should be allowed, as it will cause the cutting to “flag,” or “droop,” and probably die. As previously mentioned, for propagation on a very small scale, cuttings may be inserted in pots or pans, covered with a bell-glass, and kept in a suitable house. Attention must be given daily, removing all decayed parts to prevent them from spreading. The lights, or bell-glasses used should also be carefully sponged every day to remove all drip.

TREATMENT AFTER ROOTING.—As soon as cuttings have rooted, they must be “weaned” by potting them up in small pots, according to the strength of the subjects and their future development. After being potted, the plants should be replaced for a few days under similar conditions regarding heat, &c. Air must be gradually admitted, and when roots are to be seen at the bottom of the pot the plants should be removed from the propagating-house. Shading must be carefully looked after as in the case of cuttings, and as soon as the plants are strong enough to thrive by themselves they can be treated as fully-established ones.

Large foliage plants, such as *Cyanophyllums* and *Sphærogynes*, must not be removed so quickly, and it is preferable in many cases, if the house intended for their culture is not close enough, to keep them until they have been repotted twice, and they are sufficiently well rooted to stand the unavoidable fluctuations of the said house. Such plants as *Begonias* and *Dracænas* may leave the house as soon as they are potted up; so also may many others, such as *Alternantheras*, *Achyranthes*, *Coleus*, *Lantanas*, &c., which, as they are required for the ornamentation of our gardens during the summer, must be treated in such a way as to enable them to stand the outside temperature. This is easily managed by gradually getting the young plants used to a lower temperature.

Many of the hard-wooded section are propagated under frames outside; they do not present any difficulties as regards “weaning,” on account of their hardness.

A certain class of plants and trees cannot be reproduced by herbaceous cuttings; only well-ripened wood, which has lost all its herbaceous appearance, can be used. *Cassia floribunda* and several *Araliaceæ* have to be thus treated. Many hardy shrubs are best propagated by this means, *e.g.*, Lilacs, Privet, Roses, Gooseberries, Currants, &c. Some other plants seem to strike

more freely from old wood, as is the case with *Rhopala corcovadensis*, &c. Branches three or four years old will root quite as successfully as herbaceous cuttings for soft-wooded ones.

Grafting.

Grafting was well described by M. Baltet, a well-known French author, as "The triumph of Art over Nature." If it is the most artificial mode of propagation, it is nevertheless one of the most useful; and to this art we owe the acclimatisation of many of our fruit and ornamental trees and shrubs. It is well known that some trees will not thrive on their own roots in a certain ground, but if grafted on suitable stocks they will thrive admirably. Grafts also are most useful in the propagation of fruit-trees, chiefly those raised from seeds and which would otherwise require several years before bearing fruits, whereas if grafted they are brought into bearing condition in a much shorter time.

A graft is a living part of a plant, tree, or shrub, which has been entirely removed, and cut in such a way as to make it fit into a recess made in the stock plant, when the two parts (the graft, or scion, and the stock plant) will unite if analogy between them exists, and the stock will supply nourishment to the scion. Analogy in this case may be described as follows: the scion and stock should belong at least to the same order, so that the similarity required will be found. Even if the stock belong to another tribe, the analogy or natural affinity will be quite sufficient. Grafting is not only employed in propagation, but is also very useful in the fixing of variations or sports which would perhaps not be truly reproduced by seeds or cuttings, such as variegated leaves, double flowers, &c., and in the renovation of old fruit-trees. Like cutting and layering, grafting always reproduces the typical plant without any modification; and this result cannot be secured with seeds.

SELECTION OF STOCKS.—A first necessity is to select for stock a good growing plant, well rooted, free from disease, and capable of reaching the same development as the plant from which the graft, or scion, is taken, so that it will be capable of feeding the latter at any time. Without this precaution the graft would probably exhaust the stock, and this would afterwards prove detrimental to the plant. For certain purposes, the practice usually followed is to graft a strong-growing species or variety on to a small, weak-growing one, as in the case of Apples and Pears when dwarf bushes are required. Several other things have to be taken in consideration in the selection of stocks, for in many cases stock and scion have to be of the same dimensions. In regard to trees and shrubs the nature of the soil must also be taken into account.

SEASON.—Grafting is practicable nearly all the year round, everything depending on the nature of the plants and on the kind of graft to be used. In most cases it is performed when the sap is “in function”—that is to say, in the spring, just when it starts, and at the end of the summer, just before it finishes. The summer graft is not to be recommended, because the sap is then too full of activity. If grafting is done in the autumn with ligneous branches, preference must be given to well-ripened wood of the current year, which must be used as soon as the branches have been cut. Should the grafts have to be transplanted, all the leaves must be removed, and the portion which has been cut may be fixed in a potato or beetroot, which must be kept moist and in a position where air will not reach them. When grafting is done in the spring, it is often noticed that the branches of deciduous trees or shrubs begin to grow, which is very detrimental to their welfare. To prevent this it is advisable to cut off the required parts or branches during the winter, and to plant them in a shady place, where they will also be protected from sharp frosts. For exotics with ligneous branches that have to be grafted, no particular period can be mentioned, but preference is given to the spring or autumn. All the herbaceous grafts, and also the evergreen ones, require a greater amount of precaution than any of the others above-mentioned, and herbaceous grafts must, during their propagating period, be kept in a closer temperature, and in a place where they are less likely to be affected by air than would be the case normally. It is advisable, when such plants have to be grafted, to grow the stocks in small pots, so that when the operation has been satisfactorily performed they can easily be placed in frames under lights or bell-glasses in a house, for grafts succeed much better when they are entirely deprived of air. Grafting has been divided into over one hundred different classes, each with its own application, but in many instances the variation between these separate classes is very slight. It would not be of interest to describe all, but half-a-dozen of the principal methods are dealt with.

WHIP- OR TONGUE-GRAFTING is of general value, and can be used for the propagation of a great number of fruit and ornamental trees and shrubs, *e.g.*, *Ceratonia*, *Castanea* (Chestnut), *Anona*, *Euonymus*, *Magnolia*, *Negundo*, *Citrus* (Orange Tree), *Passiflora*, *Tacsonia*, *Tilia*, *Liriodendron*, *Rhamnus*, and *Arbutus*. The stock and graft should be as near as possible of the same dimensions, and Fig. 626 will enable anyone to understand the description. On the left, A shows the stock which can be potted up in regard to small subjects; B, in the middle, shows the scion; and C, on the right, shows the graft executed. Both parts (stock and scion) should be cut alike, but reversed, as shown in the illustration. The scion (B) must be cut from *d* to *e*,

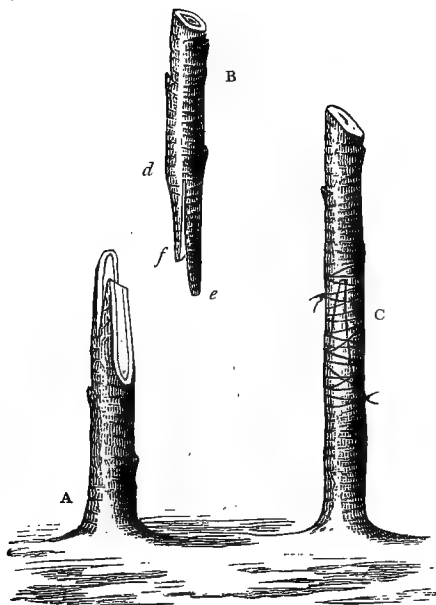


FIG. 626.—WHIP- OR TONGUE-GRAFTING.

should be of equal thickness. The shape like a wedge, and the scion split or cut up in such a way as to fit exactly on the top of the stock. Great care must be taken to see that the opening in the scion does not exceed the length of the wedge. This method of grafting generally requires young growing wood. When bound together, care must be taken not to compress the outer bark. This method is widely adopted in the propagation of Camellias, Rhododendrons, &c., and when dwarf-flowering plants are required.

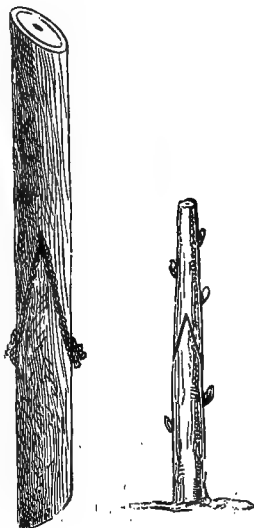
· WEDGE-GRAFTING is carried out on the same principle as saddle-grafting except that the cut is reversed.

GRAFTING BY APPROACH is the most natural method; indeed, it has been found under natural conditions. It was very much used about the middle of the present century, and is still in

and a small tongue must afterwards be removed (see *f*). If the other is treated in the same way, the cuts will fit, and the two barks will thus be placed in contact with one another, and will soon be united. If in some cases the stock has a larger diameter, the scion can be put on one end of it, and the two barks will soon be joined. Tying is necessary to fix parts together, and clay and grafting-wax are often used to prevent air or sun from reaching the cuts.

SADDLE - GRAFTING.—

For this method (shown in Figs. 627 and 628) the stock and scion stock must be cut to



FIGS. 627 AND 628.—SADDLE-GRAFTING.

vogue, chiefly in the propagation of the Vine. The most favourable time to operate is the spring or the end of summer, when the sap is in steady motion. If the scion has been grown in a pot, it can easily be fixed at any desired place, as shown at Fig. 629. The operation consists in removing a small portion of bark from both subjects, so that the two opened parts, when placed together, effect a junction; a well-fixed ligature is also necessary for this.

HERBACEOUS GRAFTING may be divided into two distinct classes, viz., herbaceous grafts on roots or underground parts, as in the propagation of Clematis, Roses, Dahlias, &c., and herbaceous grafts above ground, by which a quantity of *Coniferae* may be propagated. Potatoes, Melons, Cucumbers, Tomatoes, &c., may also be grafted by this means.

On Roots.—This method is very useful for Clematis, Dahlias, and many other plants, but can only be performed with branches grown and protected from the direct action of air. The roots, or stocks, must be perfectly healthy and not too long. We may mention as an example that this method is applied to Dahlias, and to many exotics—as several *Araliaceæ* and *Coffea* (Coffee Tree), &c. It requires to be performed in a propagating-house, and the best time for the operation is from January to May, having previously started the plants selected to bear the scions. As regards Dahlias, strong, vigorous roots from any free-growing sort must be selected; the top part should be cut horizontally, and on one side an incision must be made crossways in the form of a V. The herbaceous scion varies from 2in. to 3in. in length, and is taken from the plants above-mentioned, and cut in such a way as to exactly fill the V-shaped incision. If the cuts are well performed, no ligature is required, grafting-wax being sufficient. The grafted roots must be potted up or planted in beds in a suitable compost, and kept under lights, thus enabling them to unite and grow. An eye must always be reserved on the outside portion, at the base of the scion, or graft.



FIG. 629.—GRAFTING BY APPROACH.

Above Ground.—In herbaceous grafting above ground both stock and scion must be in a herbaceous state—that is to say, both parts must be still in the process of formation. One of the chief advantages of this method of grafting is that the union is nearly sure and extremely quick. In the present case more than in any other the cut must be perfectly clean, and on account of the herbaceous state of the grafts, they must be protected from the direct rays of the sun until the union is perfect. A ligature is required, but it must not be too tight, and the portion operated on must also be covered with grafting-wax. It is preferable to keep these grafts in a closer temperature, under lights if possible. If they have to be made in the open, a bell-glass may be used as protection. The middle of the summer is a good season for this method of grafting; but the time depends a great deal on the nature of the plant, and more or less on its state of growth. In the case of Conifers this kind of graft has several great advantages, for, owing to its mucilaginous nature, the sap is not subject to evaporation, and this allows the graft to be done in the open successfully; the union in this case does not require more than a month. Many exotics are thus increased, as Allamandas, Clerodendrons, Hibiscus, Pavettas, &c.

HALF-CLEFT GRAFTING.—Far superior to the ordinary cleft-grafting is the present method, which is now largely used in nurseries for the propagation of many plants. *Azalea indica*—so well cultivated in Belgium, France, and Germany—is grafted by this means. Stocks should if possible be potted up and well rooted before operating. The head of the stock must be entirely removed, being cut just above the axil of a leaf. An incision must be made on one side of the stock, reaching the inner bark. The scion, selected from a current year's growth, must be cut in a pointed shape (▽), and then inserted in the vertical cut previously made in the stock. A ligature is necessary, but if the operation is performed in a house no grafting-wax is needed; the grafts only require to be kept in a closer temperature for a few days. The union is sometimes perfect in less than a fortnight. All shoots thrown up from the stock must be immediately removed. This method is successfully employed in the propagation of Azaleas, Daphnes, Hibiscus, &c.

SIDE-GRAFTING.—Of all the methods known and described the side graft is certainly the simplest and the easiest to execute, and it ought to be more generally used on account of its great advantages. The stock and scion must be of the same size and shape, but the incisions reversed, so that the cuts cover each other. The stock must be well rooted, especially if grown in a pot, and the scion must be of the same year's growth. This method is successfully performed early in the year, when the buds, or eyes, are in a dormant state. If the graft has to be effected

outside, the stock may be cut just at the ground-level in an oblique way, varying in length, according to the size of the stock, from 1in. to 2in. An eye should be saved at the back of the cut, which will cause the sap to flow up. The selected branch, or scion, must also be cut obliquely to a length corresponding with the one made on the stock, and then the two operated parts must be joined together. If the scion does not properly cover the stock, the cuts must be joined in such a way that the barks will touch each other at least on one side. The scion varies in length: in the case of Lilacs, for instance, three eyes are generally kept, one on the back of the cut and two on the top. Binding is also required, and it must not be removed before a perfect union has been effected. This method applies chiefly to Lilacs, Apricots, and Currants.

GENERAL MANAGEMENT OF GRAFTS.—The treatment necessary for the success of the grafts is very varied, and depends on different circumstances—the nature of the subjects, the time of the year when the operation is performed, &c. In the case of outdoor operations, it is always preferable to use grafting-wax over the ligature, thus making it air-tight. Grafts requiring protection, such as the majority of the herbaceous and ligneous ones, must be kept in frames under lights in the propagating-house. They do not require bottom-heat, like cuttings: they only need to be kept at a uniform temperature, and to be deprived of air until the union is perfect. The atmosphere in which the plants are kept must not be either too moist or too dry. In the latter case the scion may dry up before being united; and in the former the excess of humidity may excite the sap, thus making it flow too vigorously.

The disposition of grafts in the frames may also be mentioned. When the grafts are too big to stand upright they can be placed on one side or even in an oblique position close to one another. In this case the operated part must be placed on the top, allowing the drips to come down without remaining on the cuts. If the grafts can be kept in an upright position, the part which has been operated upon must be placed in the front, thus enabling the operator to watch the progress of the union.

When the grafted plants require watering, care should be taken not to moisten the cuts, and as evaporation is bound to produce a certain amount of condensation on the glass, it is advisable to remove this with a sponge every morning. Shading must be well observed. In large nurseries, where grafting is undertaken on a very large scale, straw and matting are used; sheets of paper may also be placed on the lights.

TREATMENT AFTER UNION.—When the union is effected, and both parts are perfectly united, air must be gradually admitted

to prevent them from making weak growth. Sun becomes necessary, and should also be carefully admitted. Great care must be taken in regard to suckers thrown up by vigorous stocks, for if these are left they will soon make headway, taking all nourishment away from the scion. The best way is to remove all eyes along the stocks as soon as the union has succeeded. The grafted plants can then be removed, and they will become gradually strong enough to thrive as established plants; the ligature can then be taken off, but not that of the grafts covered with grafting-wax.

Stakes are often necessary to strengthen the subject, securing it from rough treatment; for even if the union appears perfect so far as the outer bark is concerned, in the case of young grafts they easily break off. When they begin to grow they should be pinched up according to the form required.

RAISING OF STOCKS.—Stocks are always selected from vigorous growing species, and their raising is an important point. In some cases wild species are preferred; in others the stock plants are raised from seeds, cuttings, or layers, all depending on the most successful mode of reproduction under which they can be increased.

Budding.

Budding is a kind of graft differing from others because, instead of using branches as scions, buds, or eyes, are employed. It answers the same purposes as grafting, but many trees and shrubs are more advantageously propagated by this means. Many ornamental trees and shrubs are propagated by budding—*e.g.*, Roses, and many other plants which are used daily in the decoration of our gardens. Acers, Chestnuts, Elms, Rhododendrons, Hollies, &c., are often propagated by this means. As indicated, budding can be applied with success to both deciduous and evergreen plants, and many fruit-trees are thus increased—*e.g.*, Peaches, Apricots, and Apples.

By this means of propagation a large number of plants can quickly be obtained from only one scion. In many instances as many as half-a-dozen buds, or eyes, can be obtained from one shoot. Delicate subjects are also strengthened by being budded on more vigorous stocks. Finer fruits and flowers are often obtained in a much shorter time than in the case of plants raised from seeds or cuttings. Often, also, it is noticeable that a plant which will not grow out of doors, or if it does grow, will perhaps not bear fruit, will, if grafted or budded on the stock of a hardier species (observing, as for grafts, the natural classification of plants), flower and fruit plentifully. Buds succeed, or “take,” much more readily than grafts, and have the great advantage of making a firmer union.

PERIOD OF BUDDING.—Generally speaking, the middle of summer (July) is the best time for budding, but the operator must partly depend on his own judgment, for there are many influences to take into consideration as regards the fitness of the buds and the condition of the stocks. Buds, or eyes, should be taken when they are well developed in the axils of the leaves, and when the bark pares easily from the wood, both in the case of the scion and in that of the stock, for unless this is the case the buds will be quite useless. The operation is preferably performed during the morning or afternoon, when the sun is not too powerful, dull weather being best; but it should never be undertaken directly after rain, when water can still be seen on the shoots, for if done then foreign matters can easily get into the cut, and will ruin the bud at once. Should the weather be very dry at the date fixed for grafting, and the sap be prevented from flowing freely in either the stock or the scion, it is advisable to give them a copious watering a night or two before operating, and this should be continued afterwards until the rain again falls.

There are many methods of budding, but when well performed all give the same result if both bud and stock are in suitable condition.

T-BUDDING is the method generally employed, and the one that is here recommended for its simplicity and value. Several other names have been applied to it, but all mean the same thing. The shoots, or branches, from which the buds, or eyes, are to be removed must be of the current year's growth, preference being given to those which are firm and well ripened. First, all the leaves must be removed, leaving only the petiole, or stalk; then the bark must be cut $\frac{1}{2}$ in. above the eye and cut downwards through the wood to $\frac{1}{2}$ in. below, and the thumb-nail of the right hand inserted between the wood and the bark. The wood must then be removed by a sharp jerk, and the bark will by this means have a tapering point at each end. When the wood is removed from the bud, great care must be taken to see that the core of it remains, for if the bud, or eye, is hollow it will not succeed. A **T**-shaped incision must next be made in the stock right through the bark, on a shoot also of the present season's growth. The transverse cut must be made first and then the perpendicular one upwards. The handle of the budding-knife must be placed under the bark on either side, raising it, and the bud can then be inserted so that its bark is clasped by that of the stock. Binding must be performed tightly, using strong bass matting or worsted, and the cut must be covered from one extremity to the other, leaving an opening for the bud, or eye. The binding is intended not only to fix the two parts together, but also to exclude air and wet. When dealing with plants of special value, it is advisable to

cover the ligature with grafting-wax, leaving, as above-mentioned, an opening for the bud.

FLUTE-BUDDING (Fig. 630) is a method occasionally employed, but presents a little more difficulty than T-budding. It consists in peeling off a ring of bark from the stock just under a terminal bud, or eye, and replacing it by a similar ring or cylinder provided with a bud or two taken from an ordinary scion. It can only be successfully performed during the spring. The bud should always be placed on a clear portion of the stem, free if possible from knots. In the case of very choice plants it is advantageous to shade the bud, which can easily be done by fixing a large leaf over it.

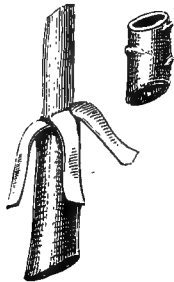


FIG. 630.—FLUTE-BUDDING.

GENERAL HINTS.—When budding, a certain number of shoots of the scion may be previously prepared and kept in water, but care must be taken to dry them perfectly before attempting to remove the bud. It is also advisable, if budding has to be largely performed, to have the matting or suitable worsted already cut into lengths; this prevents loss of time in the closing of the cut. It is on the quick performance of the operation that success depends, and by no means should the cuts of the bark or the bud be allowed to dry. The buds should be taken from the middle of the shoot; the top ones are generally not ripe enough, and those found at the base are too ripe and will therefore not succeed or grow so readily.

TREATMENT AFTER UNION.—As soon as the union is noticed, and the bud begins to swell, it is a first necessity to remove the ties before they begin to cut into the bark; and if the buds begin to grow during the same season they should be pinched back to within three or four eyes after having been allowed to make some growth. The remaining buds will thus be able to ripen well before the winter. The time required for a perfect union and the first sign of growth varies between a month and six weeks. The branches of the stock should be gradually reduced, enabling the sap to be sent into the bud as it grows, and the following year they may be entirely removed, leaving only the shoot of the scion. The latter, after a season of growth, should also be shortened, and again the following season, until the desired form of bush or tree is obtained.

STOCKS.—The selection of the stock on which the scion is to be inserted or budded is a very important item, particularly in regard to fruit-trees, for if it is not suitable the result will be *nil*. Stocks also vary a great deal in regard to the soil

in which they have to be planted, for some will succeed in one kind and not at all in another.

The following table, &c., has only been roughly compiled to show the knowledge required in the selection of stocks, and deals only with fruit-trees.

STOCKS.

| TREES. | HEAVY LOAMY SOIL. | CHALKY SOIL. | DRY LIGHT SOIL. |
|---------|---------------------------|--------------------|---------------------------|
| Apple. | Broad-leaved Paradise. | Crab and Paradise. | Broad-leaved Paradise. |
| Pear. | Quince. | Wild Pear. | Quince. |
| Plum. | Plum. | Almond. | Almond. |
| Cherry. | Wild Cherry. | Mahaleb. | Wild Cherry. |

Apples are certainly best budded on the Wild Crab for orchard trees. The Broad-leaved Paradise is best for the intermediate trees known as half standards or large bushes for dwarfs which are always preferable for small gardens. The English stock is used, this being a very small variety; it has also the advantage of transmitting its quality to all other kinds budded on it, and thus it is successfully used for Espaliers, Pyramids, Cordons, &c. It should also be noticed that although these trees do not produce large quantities of fruit, the quality, colour, and size of it is always superior to dwarfs. *Pears* are advantageously budded on the Wild Pear for orchard trees, and mostly on the Quince for dwarfs. For *Peaches*, *Nectarines*, and *Apricots* the Plum stock is generally used, and preference should always be given to the Mussel Plum; but on light, dry, warm soils the Almond may be used with satisfaction. For *Cherries* wild stocks are usually selected, but *Prunus Mahaleb* is preferred for dwarfs. For *Plums*, seedling Plum stocks are mostly employed, but in warm soils the Almond is preferable. *Medlars* are chiefly budded on the Quince for heavy and wet soils, and on the Whitethorn for dry, light ground. *Roses*: For standards these are always budded on the Wild Briar, the straight stems of which are collected in the autumn with a certain number of roots attached to them. For bushes the seedling Briar is preferable, but for light soils the Manetti Rose is also often employed, though the latter is objectionable by reason of the number of suckers it throws. For indoor cultivation the seedling Briar stock is always selected.

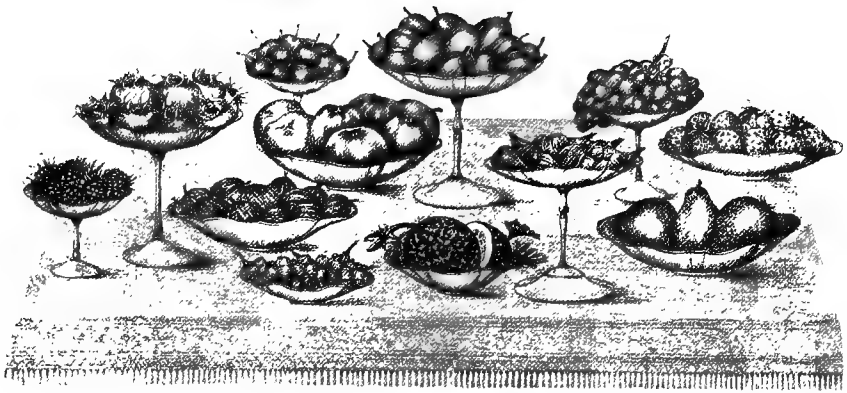
Budding is employed for the propagation of a great many other plants when it is desired to increase improved varieties or variegated forms. For the Mulberry, Walnut, Chestnut,

Holly, Ash, Lime, &c., stocks of the common species are generally used. Stocks may be raised from either seeds, layers, or cuttings; but when they can be obtained seedlings are to be preferred.

The only drawback to propagation by budding or grafting is the tendency of the stock to throw up suckers. These should be removed directly they appear, for if once allowed to make headway they will often cause the death of the scion.



ENTRANCE OF TEMPERATE HOUSE, KEW.



23.—*On Fruit*

By
TREVOR MONMOUTH.

Culture.

UNTIL within a very recent period the national value and importance of fruit culture have not received that attention their merits warrant. The consequence is that thousands of worthless varieties are occupying ground that could be far more remuneratively employed. In the gardens of both rich and poor, as well as in large and small orchards, this plethora of varieties is much in evidence throughout the whole country, and in the interests of both producer and consumer of fruit, it is high time that cultivators should exercise the greatest care in the selection of the varieties they plant, and that those selected are of the very best. These remarks apply alike to the private and the market grower, as it must be palpable to all that a small collection of any kind of fruit in those varieties which are known to possess high quality, good appearance, and a fruitful habit, are far more satisfactory than a multitude of sorts, many of which are practically worthless. In the following pages we shall endeavour to indicate which are the best varieties of each kind of fruit, both for home consumption and for market purposes, giving brief hints on their cultivation on different soils, and their general routine management. For convenience of reference, each kind of fruit is placed in alphabetical order.

Apples.

No fruit is so extensively grown (or even so largely imported) as the Apple, and it may justly claim the title of "King of British Fruits," being accommodating enough to keep practically all the year round, and also growing and fruiting more or less freely over the whole of the kingdom. Because of its well-known success in so many diverse parts of the country, some have looked upon the Apple as a tree that will fruit almost anywhere, and have acted accordingly by planting it in wet, undrained positions more suited to Willows or to Alders. The ground for all fruit-trees should be drained if the natural drainage is imperfect, especially if the soil is heavy and cold. Drainage renders the soil friable, as well as cool in summer and and warm in winter. It cannot be too widely known that stagnant water is fatal to good results in fruit culture, and Apple-trees planted in badly-drained soil become preys to lichen, insect, and other pests, until at last they die, never having borne as many Apples as would pay for their first cost.

Circumstances, of course, must determine not only the position or aspect, but also the most suitable form of tree, mode of planting, and the best varieties for the district. Many gentlemen's seats are high and exposed to gales, until forest trees that have been planted to give shelter have attained sufficient height to break the violence of the wind. In such cases bush or dwarf trees are the most suitable; but if the place is already formed and not much exposed to rough winds, standard trees could be planted in the park or grounds, shrubberies, &c., where they would produce a charming effect when in blossom, and be of great service in filling the fruit-room in the autumn. Very much indeed may be accomplished at a trifling cost by the employment of fruit-trees to produce effect, the only outlay being the purchase and planting of the trees, and their protection afterwards from rabbits or cattle.

In the garden only bush, pyramid, or trained Apple-trees ought to be grown. The standards or half-standards are not only too large, but they shade too much of the ground, making it impossible to grow vegetables near them. The bush is one of the best forms of all, as it is of a pleasing shape, and as a rule bears good and regular crops. The pyramid is a formal tree, and the close pruning necessary to keep it in correct shape is not the best mode of obtaining good crops. Espaliers produce fine handsome fruit, but a number of years is required to make well-proportioned trees. The same applies to all the various forms of fancy trained trees, and they cannot be recommended for general utility. Cordons may, however, be excepted, as they may be utilised in many ways, as indicated under their heading.

The best time to plant all fruit-trees is early in November. If the land is heavy, the trees may be placed on the surface, no excavation being made, and the roots covered with soil, thus forming a mound of soil over the roots, which are all above the ground-level. Trees thus planted usually succeed very well if properly staked immediately after planting, and mulched for the first year with strawy manure. On lighter or warmer land, holes should be excavated according to the depth necessary to cover the roots; the sides and bottom of the hole should be well broken to allow water to pass away freely and to permit of the roots penetrating into the surrounding soil. Deep-planting should be guarded against, as the nearer the roots are to the surface, the better for the future welfare of the tree. No time ought to be lost in properly securing the tree in position after planting, thus preventing any shifting or rocking about by wind, which would delay its root-action or establishment. Many grave mistakes have been made in planting dwarf and half-standard Apple-trees deeply to avoid the expense of staking: such trees are seldom, if ever, satisfactory, and it would have been far more economical to plant properly, and stake the trees until firmly established in their positions.

Standard Trees.—The country seat of a gentleman can scarcely be termed complete without an orchard, and if this is planted with first-class sorts it will prove most valuable to the occupier or owner by producing good crops most years. Sometimes climatic influences will destroy the greatest promise of fruit at the blossoming period; but it must be a bad season indeed that will cause all the fruit-trees to be barren. Where cattle are admitted to the orchard it is advisable to have all trees with a stem at least 6ft. from the ground to the branches. Immediately after planting, the trees ought to be securely fastened to stout stakes, employing grass bands or old pieces of hose-piping to prevent the ties from cutting into the young stems, and thus injuring them.

It will also be necessary to protect the trees with wooden or iron guards, otherwise sheep, cattle, or ground game will devour the bark, and kill every one. If planted as already advised, and mulched with strawy manure for a year, little attention is



FIG. 631.—APPLE ECKLINVILLE SEEDLING.

afterwards required beyond the timely removal of all shoots that cross or rub against each other, and the cutting away of small branches if very congested. It may also be necessary to cut

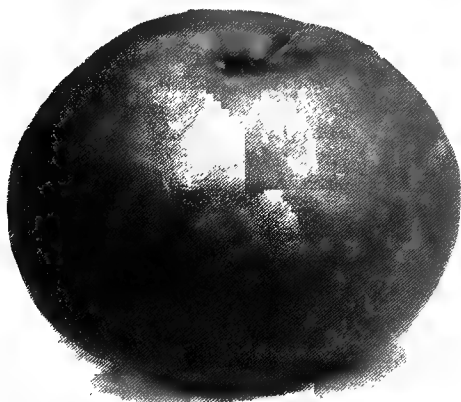


FIG. 632.—APPLE NEWTON WONDER.

back one or more shoots that rush into growth far ahead of others, and which if permitted to grow on unchecked would throw the tree into a bad shape. The point to aim at is to grow an even and well-balanced head through which a fair amount of light and air can penetrate, and thus mature the wood properly.

On heavy soils the following varieties succeed very well, and they also answer in cold or somewhat exposed positions. *Culinary*: Ecklinville Seedling (Fig. 631), Lord Grosvenor, Improved Keswick Codlin, Hawthornden, Newton Wonder (Fig. 632), Northern Greening, Dumelow's Seedling, Alfriston, Bramley Seedling (Fig. 633), Nancy Jackson, Yorkshire Beauty, and Tower of Glammis. *Dessert*: Duke of Devonshire, Cockle Pippin, James Grieve, Worcester Pearmain, King of the Pippins, Lemon Pippin, Ashmead's Kernel, Lord Burghley, Court Pendu Plat, Pearson's Plate, Sturmer Pippin, and Egremont Russet.

On sandy loam or warm soils the following are reliable varieties. *Culinary*: Beauty of Kent, Bismarck, Blenheim Orange, Bramley's Seedling, Bess Pool, Cox's Pomona, Ecklinville Seedling, Emperor Alexander, Gascoyne's Scarlet, Golden Noble, Mère de Ménage, Newton Wonder, Peasgood's Nonsuch, Hornead Pearmain, Tyler's Kernel,



FIG. 633.—APPLE BRAMLEY SEEDLING.

Warner's King, Wagner, and White Transparent. *Dessert*: Chatley's Kernel, Col. Vaughan, Cox's Orange Pippin, Duchess of Gloucester, Ross Nonpareil, Worcester Pearmain, King of the Pippins, Quarrenden, Roundway Magnum Bonum, Egremont Russet, Wealthy (Fig. 634), and Yellow Ingestre.

All the above are valuable, either as full or as half-standards for planting in orchards, or in parks or shrubberies for ornamental purposes. They are likewise suitable for home consumption or for the market, and the great majority will produce fruit sufficiently large and handsome for the exhibition table. Thirty feet apart each way is a suitable distance between the trees.

Dwarf or Bush-Trees.

—For the private garden or for market purposes the dwarf or bush Apple-tree is one of the best and most profitable forms that can be planted when worked upon the English Paradise stock. The Crab is also a good stock on light soils, but, taking all kinds of soil, whether heavy or light, our experience is



FIG. 634.—APPLE WEALTHY.

strongly in favour of the English Paradise for all dwarf-growing Apple-trees. Such trees produce heavy crops of large handsome fruit if adequately supplied with manure when fruiting, and they will continue in a productive state for many years when properly managed. It should be remembered that this Paradise stock makes a mass of fibrous roots in a limited area; consequently it is essential to success that the trees be liberally manured when cropping heavily. When thus treated, either in a small garden or in a large plantation, the results will be most satisfactory, not only in the good crops of fruit, but also in the health and vigour of the trees.

The following are of proved value, being free bearers and of good constitution. *Culinary*: Beauty of Kent, Belle de Pontoise, Bielo Borodawka (new), Bismarck, Byford Wonder, Bramley's Seedling, Cardinal, Manks Codlin (a great bearer on all soils), Cox's Pomona, Duchess of Oldenburg, Ecklinville Seedling, Gascoyne's Scarlet, Golden Noble (Fig. 635), Golden Spire, New Hawthornden, Lane's Prince Albert (Fig. 637), Lord Grosvenor, Newton Wonder, Peasgood's Nonsuch (Fig. 638), Potts' Seedling, Queen Caroline, Stirling Castle (Fig. 636), Warner's King, and White Transparent.

Dessert: Allen's Everlasting, Beauty of Bath, Chatley's Kernel, Cox's Orange Pippin (the finest dessert Apple in cultivation), Early Peach (new), James Grieve, Lady Sudeley, King of the Pippins, Quarrenden, Rosemary Russet, Sturmer Pippin, and Worcester Pearmain.

All the above will also succeed on espalier or other forms of trained trees, and if well grown, and the fruits are stored in a suitable room, they will afford a succession of both culinary and dessert Apples all the year round. Any good nurseryman's fruit catalogue will give particulars as to season of ripening and description of the size and colour of the fruit.

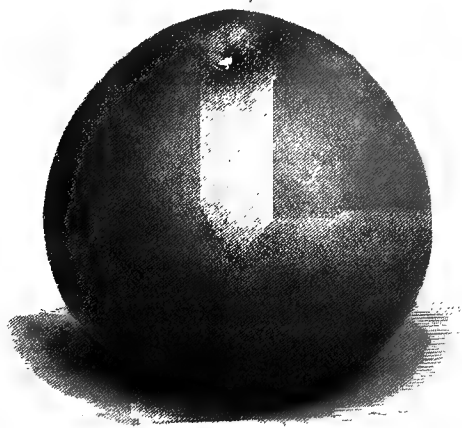


FIG. 635.—APPLE GOLDEN NOBLE.

The pruning of dwarf or restricted trees varies a little according to the shape. Taking bush-trees first as the most remunerative form, it is important to lay a good foundation by so regulating the growth that the lower branches are strong, well and evenly placed on all sides, and sufficiently far apart for light and air to pass through. Any branches crossing, rubbing, or growing inwards should be promptly cut out. The centre may be allowed to be the highest part, but no strictly formal shape is either necessary or desirable. The chief object ought to be to secure a well-balanced head, not congested in any part nor yet unnecessarily open, but just sufficient to allow the sun to colour the fruit and ripen the wood.



FIG. 636.—APPLE STIRLING CASTLE.

The pyramid-formed tree can scarcely be termed a profitable one by its greatest admirers, for though such trees bear a fair amount of fruit, yet the pruning and restriction requisite to keep



FIG. 637.—APPLE LANE'S PRINCE ALBERT.

them in correct form prevent a heavy crop. However, in some gardens the pyramid is planted and trained as much for ornament as for its fruit, and in training the cultivator should aim at a straight, upright, central stem, on which the branches taper upwards from a broad base to a fine point, the whole tree being rounded and of similar dimensions on each side. Any congestion of wood is best removed in summer or autumn, as one can

then see where the growth is too thick. In fact, with bush, pyramid, or any other trained Apple-trees, most of the pruning may with advantage be done at the end of July or early in August, cutting away all useless shoots to within about three or four eyes of their base, and, in the case of leading or other shoots required to fill up blank spaces or form the tree, permitting them to go on unchecked. In the autumn—say in October—the spurs left at the summer pruning may with advantage be cut back to two eyes; or, if they are very crowded, a few could be cut out entirely, giving more light and space to those remaining.

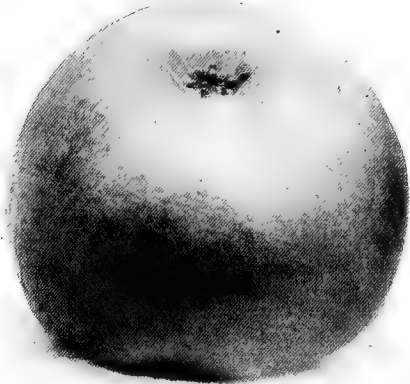


FIG. 638.—APPLE PEASGOOD'S NONSUCH.

In gardens bush- or pyramid-trees are usually planted round the margins of the vegetable quarters and near the gravel walks. The distance between the trees may range from 8ft. to 15ft., and

should never be less than 4ft. from the edge of the walk; in fact, they would be better another 1ft. apart. In almost every garden the fruit-trees are planted too near the walks, consequently they have to be cut back severely to prevent them from growing over the walk, and what would with more room have been shapely trees become one-sided. For commercial purposes bush-trees are the most suitable and profitable, and though opinions differ as to the distance they should be planted, it will be found that 9ft. each way is a fair distance, and is recommended by several well-known and practical fruit-growers as being the best medium between 6ft. and 15ft. apart, the former being too close and the latter too far.

Cordons.—There are a few varieties of Apples that lend themselves admirably to the cordon form of tree, annually bearing an excellent crop of fruit, and also maintaining their good health and vigour. Our experience is that the following varieties may be relied upon: Bismarck, Improved Keswick Codlin, Manks Codlin, Cox's Pomona, Calville Rouge, Cox's Orange Pippin, Duchess of Oldenburg, Ecklinville Seedling, Golden Spire, Grenadier, New Hawthornden, Lane's Prince Albert, Margil, Mother Apple, Ross Nonpareil, Worcester Pearmain, Kerry Pippin, Potts' Seedling,

FIG. 639.—APPLE RED WINTER REINETTE.

Egremont Russet, Stirling Castle (Fig. 636), and White Transparent.

Cordon trees may be planted 6ft. apart by the sides of walks, and trained on wires stretched tightly from each end of the walks, the wires being 18in. above the edgings of tile or box. If *double cordons* are planted—*i.e.*, with the branch or stem running in opposite directions—12ft. apart will be a suitable distance. These cordon trees by the sides of the walks are not in the way. They impart a nice appearance to the garden, and bear useful crops of fruits. Against walls not otherwise occupied cordon Apple-trees may be planted, and as a rule the fruit produced thereon has a delicate bloom never seen on Apples that grow away from walls. On low walls the trees may be grown at a sharp angle, thus giving a greater length; but on

high ones they may be trained as upright cordons. 18in. apart will be ample for such trees planted against walls.

The pruning of cordons is a simple operation: it consists really of allowing the leading shoot to go on unchecked until it has filled its allotted space, pruning all side shoots in to three or four eyes at the end of July, and then pruning back again to two eyes in the autumn. The stock should be the English Paradise; if the Crab or free stock were used, gross wood in profusion and little if any fruit would be the result.

Apples for Exhibition.—

Fruit-exhibitors have done much towards the improvement of Apple culture, and have also fired many amateur and professional gardeners with a desire to become successful growers and competitors at fruit-shows. The bush

or cordon tree is the best to plant for this purpose, as it commences to fruit quickly, the fruit can be thinned when there is a heavy crop, insect foes are more easily combated, and, if necessary, the roots can be supplied with liquid, chemical, or farmyard manures to assist in swelling the fruit to a large size.

The following twenty-four varieties of culinary and twelve sorts of dessert Apples will be a good selection for exhibition, being of good form, handsome, and nearly always found in prize collections.

Culinary: Beauty of Kent, Belle Dubois, Belle de Pontoise, Bismarck, Bramley's Seedling, Cox's Pomona, Ecklinville Seedling, Gascoyne's Scarlet, Golden Noble, Hambling's Seedling, Lane's Prince Albert (Fig. 637),

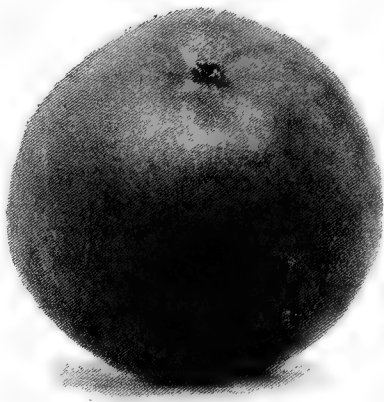


FIG. 640.—APPLE ALLINGTON PIPPIN.

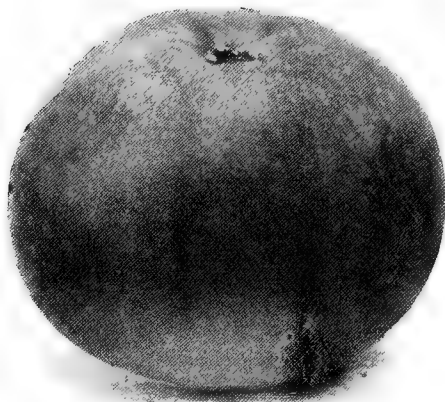


FIG. 641.—APPLE BLUE PEARMAIN.

New Hawthornden, Newton Wonder, Peasgood's Nonsuch (Fig. 638), Bow Hill Pippin, Potts' Seedling, Sandringham, Stirling Castle, Stone's Apple, Tyler's Kernel, Warner's King, Emperor Alexander, Lord Derby, and Yorkshire Beauty. *Dessert*: Beauty of Bath, Chatley's Kernel, Cox's Orange Pippin, Duchess of Gloucester, Lady Sudeley, Melon Apple, Mother (American), King of the Pippins, Red Astrachan, Ribston Pippin, Washington, and Worcester Pearmain. If three other good Apples for dessert are wanted: Red Winter Reinette (Fig. 639), the new and excellent Allington Pippin (Fig. 640), and also the late-keeping Blue Pearmain (Fig. 641).

Manuring.—The proper manuring of Apple, and, in fact, all other fruit-trees, is deserving of far more attention by large and small growers, many trees being very inadequately fed. At the same time, all manuring should be done judiciously, as it would be a grave error to heavily feed trees that are healthy, but not bearing a crop. A very safe policy is to manure them liberally immediately after they have set a good crop of fruit. The stimulant applied may be liquid from cattle-sheds or manure-heaps, somewhat diluted if very powerful. Farmyard manure, put on as a mulch, is also serviceable; so are the prepared manures sold almost everywhere. Market-growers, however, or others who have a large quantity of trees, will find it more economical to buy the ingredients separately, and mix them at home. On light soils $1\frac{1}{2}$ cwt. of muriate of potash, 4cwt. of superphosphate, and 1cwt. of sulphate of ammonia, all mixed together, is a good dressing for one acre of land planted with Apples. On heavy land 5cwt. of bone-meal, or the same quantity of basic slag, is excellent, inducing a sturdy growth, a fruitful habit, and large, highly-coloured fruit.

PESTS.—Fruit pests are extremely numerous, and correspondingly destructive. It therefore behoves the man who would be successful either as a grower for market or even for the home table to be at least acquainted with the chief symptoms of attack of the pests, both Animal and Vegetable. All that is aimed at here is to briefly deal with the commonest, making an individual fruit, as it were, a speciality, leaving the more numerous section to be described in the chapter "On Pests Generally." The animal pests feed in a great variety of ways. Some are easily reached through their food-plant, especially when this be foliage; but those which affect the blossoms are far more difficult. Then there are some which feed in the trunks and main branches; others which lay the small shoots under contribution, or, it may be, the buds or the bark; while one very common species is found alike on branches and roots.

Apples are amongst the most profitable fruits grown, yet, strange to say, they are beset with an extraordinarily large number of enemies. Some, like the Winter Moth (*Cheimatobia*

brumata), which, by reason of their widespread destructiveness, commonness, and the partiality they display for several other trees, are fairly well-known; but there are others, like the Apple Sucker (*Psylla mali*), the Pith-Moth (*Laverna vinolentella*), or the Shot-Borer Beetle (*Xyleborus dispar*), which are still unknown to the great majority of Apple cultivators.

Psylla mali is a relative of the Aphides, and a sucking insect. It is $\frac{1}{2}$ in. long, and variable as to colour, at one time red, at another green, striped or dotted with yellow, brown, or brownish-red, with a yellow abdomen. The insects are active on the wing, and are able, moreover, to leap. They are found in April, and the larvæ are wingless, and it is not until they are ready to assume the pupal state that the rudimentary wings are noticed (Fig. 642). These insects suck the young, unexpanded buds, causing them to decay; while the foliage in bad attacks assumes an unnatural yellow colour. Kerosene emulsion sprayed on when the larvæ are hatched out is effective, repeating it in a fortnight.

Laverna vinolentella is a black moth, about $\frac{1}{2}$ in. in wing-expanse, whose caterpillars feed on Apple shoots, and in certain seasons and districts do an amount of damage. These caterpillars are pinkish, and are found from September onwards through spring. Infested shoots die away for some considerable distance, and growers are frequently at a loss to account for the attack. If the larva is discovered, shoots showing signs of drooping should be cut away and burned.

The Small Ermine Moth (*Hyponomeuta padella*) is a terrible scourge to Apple-trees. The caterpillars are hatched in autumn, and remain in that condition through the winter. In spring they live in webs (Fig. 643), and thus may be readily destroyed. The "nests" should be cut out over a pail containing an insecticide, held beneath to catch any insects which attempt to descend. Then there is a well-marked distinctive moth known as Figure of

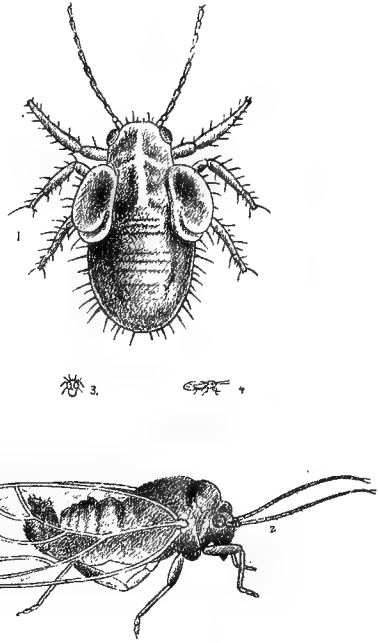


FIG. 642.—APPLE-SUCKER, SHOWING: 1, LARVA (MAGNIFIED 14 DIAMETERS); 2, PERFECT INSECT (MAGNIFIED 10 DIAMETERS); 3, LARVA (NAT. SIZE); AND 4, PERFECT INSECT (NAT. SIZE).

Eight (*Diloba cæruleocephala*), in consequence of its markings on the fore-wings. The moth itself is $1\frac{1}{4}$ in. in wing-expanse, and flies in September. The caterpillars emerge in spring, and attack the foliage. They are bluish-grey, with a yellow stripe on back,

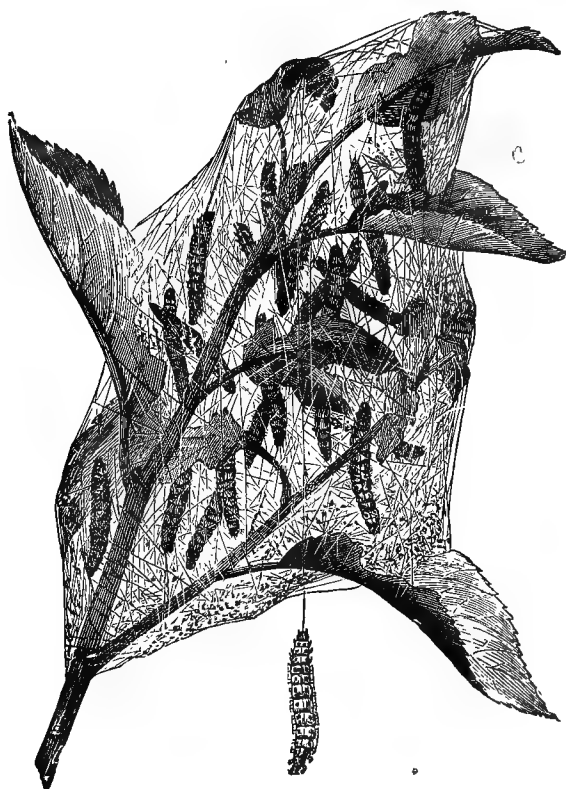


FIG. 643.—WEB OF CATERPILLARS OF SMALL ERMINE MOTH.

and another on the side, a bluish head, and black tubercular dots. Spraying with Paris Green is the best treatment.

The other animal pests of the Apple will be found in the Chapter "On Pests Generally," for the reason that they do not confine their attentions to one tree or plant. They include the Lackey Moth, Vapourer Moth, Winter Moth, Codlin Moth, Goat Moth, Wood Leopard Moth, Mottled Umber Moth, Aphides, American Blight, Scales, Sawflies, Fruit-Tree Bark Beetle, Shot-Borer Beetle, Rose Chafer, Cockchafer, &c.

Of vegetable pests of the Apple there are comparatively few, though what they lack numerically they make up for in virulence. Canker is the commonest of the fungoid pests, though the average gardener seems averse to believe that *Nectria ditissima*, and not soil influence, is responsible for the very familiar condition popularly known as Canker. Dessert Apples of the best kind seem to suffer the worst—Cox's Orange Pippin, Blenheim Orange (so called), and Ribstone Pippin to wit. *N. ditissima* is a wound-fungus, so that care should be taken not to injure the bark in

any way. Frost and hail are frequently responsible for wounds, into which the spores of the fungus enter, and in spring the deep red perithecia may be seen without the aid of a glass. Trees badly affected ought to be uprooted and burned; while those slightly affected may have the injured parts removed, smearing the wound with tar.

Apple Rot (*Glæosporium fructigenum*) is possibly known to everyone who has eaten apples, though its cause to the majority is obscure. The fruits attacked not only have an unsightly appearance, but also a nauseous, bitter flavour. Distinct spots may be found at a comparatively early stage, though it is not until much later that the brownish, diseased, black-dotted parts are noticeable. Potassium sulphide should be sprayed on the trees once or twice when the fruit is getting of fair size, by way of prevention; while it should be resorted to directly the disease can be recognised. Infected fruits should never be stored with sound ones, but should be burned, or the whole crop stands a risk of being lost. Similarly fallings from trees should be destroyed.

Apricots.

IN THE OPEN.—Comparatively few people care for the Apricot as a dessert fruit, but everyone thoroughly appreciates it for preserving, and the supply for that purpose is seldom equal to the demand. Unfortunately, there are many places where the trees refuse to grow, or in other gardens, even if they make good growth, they rarely produce a crop. On the other hand, in some districts they thrive splendidly, and annually bear abundant crops of really magnificent fruit, with scarcely any attention, trees against walls, and even bush-trees, being alike productive. Several theories have been propounded as to the causes of success or failure—situation, elevation, aspect, climate, &c.—but our experience is that soil is the chief factor. There is some ingredient in the heavy and light soils on which the Apricot is a success; but as to what that particular element is we are at present somewhat doubtful. Lime, in some of its many forms, is known to be very serviceable; potash, on light soils, is excellent; magnesia has also been known to prove beneficial; so has nitrogen in the form of nitrate of soda, or sulphate of ammonia. Where the trees have not been fruitful, or weak in growth, one or even all the above constituents may be tried with safety. Gardeners and others can seldom choose their soil; they are obliged to make the best of that at hand, whether good, bad, or indifferent. Though all fruit-trees resent stagnant moisture about their roots, the Apricot specially dislikes bad drainage, and for that reason extra care is desirable in preparing the sites, not only in seeing that they are well drained, but also on heavy or tenacious soil that the surplus water can pass away freely into the drains. Where there is a good natural drainage,

it would be quite useless to go to the expense of adding more, and as has been already stated, local conditions should determine what is necessary to be done. Old plaster or mortar refuse is useful for supplying lime; and, to keep the soil open and porous, wood-ashes, burnt vegetable refuse, roadside scrapings, &c., are all excellent for mixing with it and improving its quality for the roots. No doubt, the best soil for this fruit is a rich and rather sandy loam; but, even then, a great deal depends on the stock upon which the Apricot is worked; some consider the Brompton stock a good one, but as a rule the trees do not attain old age thereon. The St. Julien is much better, but it is doubtful if that is so suitable on all soils as the Mussel stock, and our experience is decidedly in favour of the last-named as producing a healthy and fruitful tree.

In purchasing trees, if any exhibit signs of gumming, they ought to be rejected at once, only planting clean and healthy-looking trees, that also possess plenty of nice fibrous roots; long straggling roots should be cut back, and any broken pieces taken clean away. Planting may be done either in the autumn or in the early spring; the former is much the better season, as trees planted at the end of October or early in November become half established almost immediately owing to the warmth remaining in the soil, and consequently a strong and vigorous start into new growth is made in the following spring. As already mentioned for Apples, deep planting should be guarded against, and the roots evenly distributed only a few inches below the surface, putting fine soil over the roots, and then the rougher soil. Make all very firm, and apply a mulch of strawy manure or litter at once. When trees are planted against walls or wooden fences, it is wise not to nail the trees to the wall for some time, as the soil settles down a little, and when the tree is secured to the wall, it cannot sink with the ground, and is therefore partially drawn out of the soil. The distance from tree to tree against walls may vary a little according to the height of the wall, but as a general rule 20ft. is a fair distance.

The pruning of Apricot-trees should be done both in summer and in autumn; in fact, they need attention from the time when growth commences, in the timely removal of buds or embryo shoots which are too numerous or badly placed. With a well-formed tree in view, the cultivator ought to study where new shoots are wanted and where they are not, selecting the best-placed buds to remain and fill the blanks on the wall, and rubbing away all those not required to make new shoots or to form spurs. Later on in the summer, or towards the middle of July, any very gross shoots will be all the better for a check by the removal of the point, and all breast-wood may be cut back to about four or five eyes or buds; further, if a few leaves that cover or hide the fruit are taken away, the latter will be

improved. About the middle or end of September Apricots may be finally pruned for the year, shortening back those shoots that throw the tree out of balance, and cutting-in all the spurs to two or three eyes or buds. It should be impressed upon amateurs and others that in young trees the lower branches should be the first consideration; unless these are secured and a good foundation is laid, a well-shaped tree is an impossibility. No anxiety need be felt about the middle filling up: the natural tendency of the tree is to do that. When once good side branches have been made, attention may be paid to filling up the centre.

The Apricot being one of the earliest kinds of fruit-trees to blossom, it is more subject to damage from frost than many others, and unless a certain amount of judgment is exercised in protecting the blossoms, a fine promise of fruit may be ruined. Nothing in the way of coddling is advisable—in fact, protection is, to some extent, injurious when the weather is mild. A piece of ordinary fish-netting, doubled in thickness and dropped down about 2ft. away from the trees on frosty nights, will prevent injury. Such material may be looped up on warm days or nights, and let down in a few minutes whenever the state of the weather renders it necessary. When the fruits have attained the size of peas, no further protection is requisite.

Thinning of the fruit should be done early and gradually if the set is a heavy one. All the worst-placed fruits—*e.g.*, those facing the wall—are best removed when quite small; and, when the fruits are about the size of hazel-nuts, they ought to be finally thinned to 6in. apart each way, of course retaining those that are in the best position for light, and employing those removed for tarts, &c.

The following varieties succeed very well on southern or western aspects: Frogmore Early, large and very sweet; Grosse Peche, large and of fine flavour; Hemskerk and Kaisha, two medium-sized varieties, of good flavour and free bearers; Shipley, another good sort; and Gloire de Pourtales, a large and promising new variety. In the warmer parts of the country Breda may be planted as a bush-tree, as it is hardy and prolific.

UNDER GLASS.—In many parts of the country the Apricot cannot be successfully grown outside. Where, however, a cool glasshouse or an unheated wall-case, is available, very fine Apricots may be produced with a minimum of expense and labour.

Taking a *cold orchard house* first, it is better to have established trees in pots than trees planted out in prepared borders; there is more labour attached to the former by reason of the daily attention necessary in watering, but the trees are more portable and fruitful, and if any prove barren they can be placed outside, the space inside being filled with other occupants that are productive. Under glass the Apricot is impatient of coddling in a stuffy atmosphere; what it enjoys is a good pure atmosphere,

with plenty of ventilation on all favourable occasions; in fact, air must be admitted as freely as possible when the trees are in blossom, otherwise the flowers will not "set," and the fruit will be conspicuous by its absence. Forcing, as the word is understood amongst gardeners, is seldom, if ever, a success with Apricots. To ensure good crops the trees should be brought on gradually, and no fire-heat employed except to keep out frost. Syringing with tepid water once or twice daily in bright weather is advisable, closing the house with a nice sun-heat in the afternoons. When the trees are in blossom, syringing should be discontinued, the floors only being damped; but immediately the fruit is set the practice should be resumed. As the young shoots advance those growing inwards or badly-placed may be rubbed off; and as the other shoots attain a length of 6in. or 8in. the point should be pinched out, repeating the process as often as may be necessary during the growing season. In this way sturdy wood, covered with fruit-buds, is ensured. Thinning of the fruit should be done early, taking care not to over-crop, and feeding the roots weekly with diluted liquid manure. If insect foes appear they may be easily ousted by means of XL All Vaporising Insecticide without any risk of damage to the trees.

A very good compost is four-fifths of good fibrous loam and one-fifth of old mortar or plaster refuse, broken brick, or broken oyster-shells, all well mixed together, and rammed firm in the process of potting, and with good and free drainage. Practically all the varieties of Apricot answer under pot culture, but Breda, Oullin's Early, and Shipley are extra prolific, and the new *Précoce de Boulbon* promises to be a valuable acquisition for growing in pots.

For the *unheated wall-case* the trees are usually planted out in prepared, well-drained borders, not more than 2ft. deep. These should be made of fibrous loam, somewhat heavy in character if convenient, and with a good proportion of plaster refuse; chalk, wood-ashes, or broken brick should be incorporated to keep the soil from becoming impervious to water and air. No manure should be applied to the border for a year or two, as it would induce a gross growth liable to gum later on; indeed, as a rule no fertilising matter is necessary until the trees commence to fruit freely. A mixture of 1oz. of muriate of potash, 2oz. of super-phosphate, and 2oz. of fine bone-meal to each square yard of border will prove an excellent manure if applied when the fruits are the size of small peas. Diluted liquid manure from cattle, given occasionally, is also advantageous; but over-feeding must be avoided, as that does as much harm as under-feeding. The trees may be in the form of cordons or fan-shaped, and the system of training and stopping is the same as already described with trees of that form in the section on "Hardy Fruit." Immediately the fruit is gathered, every inducement should be given to the trees

to rest by admitting air day and night to the fullest extent, or in the case of pot-trees placing them outside if the weather is not too continuously wet, which would be liable to cause a late growth. However, though too much moisture is injurious, too little is equally bad ; just sufficient water is necessary to properly develop the buds and mature the wood. The well-known Hemskerk, Moorpark, and Kaisha are all suitable for planting out in an unheated wall-case, and with ordinary attention will produce satisfactory crops.

Blackberries.

Many writers have lauded the American Blackberries as worthy of a place in every garden, but unless the seasons are very favourable they are seldom worth growing. Many of our British sorts are far better bearers in all seasons, and the fruit is equally large and of superior flavour to the American varieties. However, these are not worth planting except to cover waste ground, where little or nothing else will succeed. By cutting out all weak and dead wood, and encouraging strong growth by an occasional mulch of manure, very fine fruit indeed is obtained.

Cherries.

IN THE OPEN.—Before planting any kind of Cherry-trees one should carefully consider whether the soil is adapted to their culture, or if it can be made so by artificial means. When the soil is shallow, resting on sandstone, gravel, or chalk, the conditions are unfavourable, for though the trees may grow more or less freely for a few years, they will eventually be practically certain to commence gumming or dying back, and prove a failure. Again, if the site is low, damp, or badly drained, it is of little use to plant Cherries, and when the land is heavy and resting on cold clay many of the Sweet Cherries are unsatisfactory. To grow them successfully a well-drained soil is essential, also a fairly good elevation, and if the land slopes to the south or south-west all the better for the welfare of the trees. No doubt a deep loam, varying from a sandy to a moderately heavy character, is the best. Much can be accomplished in unsuitable soils by excavating and removing the natural earth and replacing it with good fibrous loam. When this is done, it is important that the roots should not be permitted to penetrate into uncongenial surroundings ; they should be restricted to the border prepared for them by the aid of annual mulchings of fresh compost and fertilising matter. This applies specially to trees planted in gardens against walls, or as bushes ; and with such it is advisable for the planter to order his trees early to enable him to get them in at the end of October or early in November. As already stated under Apples, this early planting enables the

tree to become semi-established at once. The trees are best not nailed up to the walls for some time after planting, as this will enable them to settle properly in their sites, which is not always the case if they are secured to the walls immediately after planting. For planting against walls the fan-shaped tree is the best form, the distance between the trees varying a little according to the character of the soil—if a nice loam, 20ft. apart will be none too much space for full development of the trees ; if not a very good soil, 16ft. will be plenty, as much less growth will be made than on a more suitable soil.

For the first few years the pruning must be done in such a manner as to form a shapely, well-proportioned tree. To this end special care is necessary to develop the lower branches first, not filling up the middle or centre of the tree until the lower and side branches are secured. If this is done, a beautiful tree is made, each branch being strong and fruitful. Summer pruning is necessary for obtaining good results. At any time during the summer, when the young shoots are 1ft. or so long, they should be cut back to about four eyes. Fresh growth will be made from the end bud, and this may be pinched back to two or three eyes again, repeating the process as often as may be requisite by the new growth made. At the end of September or early in October it is advisable to cut back the current year's wood to about the fourth eye, or where it was cut the first time in summer pruning : if cut closer, some of the finest fruit-buds will be destroyed. The young wood made at the point of the branches should not be cut back when summer pruning, unless the tree has filled up all the wall space available : then it would be necessary to cut it back, as there would not be room for further extension of the branches.

Sometimes cordon-trees are recommended as being excellent for planting against outside walls. In some few places they may answer fairly well, but our experience is that they are more adapted for culture under glass, and cannot be recommended for general outside culture. It is much preferable to plant the fan-shaped tree, putting the Morello against North walls, and the sweet or dessert varieties in other and more favourable aspects. The Morello and a few other varieties succeed admirably on the Mahaleb stock, notably May Duke, Late Duke, Empress Eugénie, Archduke, Royal Duke, Early Rivers, Emperor Francis, Governor Wood, and one or two others of that class. The above list includes early, mid-season, and late varieties. May Duke and Early Rivers are early, the latter possessing very fine flavour ; Late Duke and Emperor Francis are late ; and the others are more of a mid-season character. Opinions differ as to the best stock for the Heart, Bigarreau, and Kentish Cherries, but on the great majority of soils it will be found that the Cherry stock is the best, and the nurserymen nearly always employ it. The

Heart and Bigarreau Cherries are in many varieties so delicious that wall space should be given to a few varieties of proved merit, selecting a South or Western aspect if there is any choice of position. Frogmore Early Bigarreau is a very early, yellowish-red, highly-flavoured variety, ready for use at the end of June on a warm wall. Bigarreau Jaboulay is another very early sort, with reddish-black fruit of delicious flavour. Werder's Black Heart is another grand early Cherry of fine dark colour and rich flavour. Later varieties of fine quality are Bigarreau Napoleon, Bigarreau Monstreuse de Mezel, Late Black Bigarreau, Bigarreau Noir de Schmidt, Guigne de Winckler, and the new variety named Windsor. All the above are of exquisite flavour, nice colour, and free growers and bearers.

On soils favourable to Cherry culture bush-trees are very productive, and as they are easily protected from birds by nets, excellent crops may be obtained without the aid of walls. If the trees are on the Mahaleb stock it is essential to feed the roots liberally when the bushes are bearing good crops of fruit; this not only maintains the strength of the tree, but it keeps the roots close to the surface, whereas if such is not given the roots travel some considerable distance in search of the plant-food they require, and frequently run into soil that is injurious to the health of the trees, causing gumming or disease in the wood. When bush-trees are on the Cherry stock it frequently occurs that strong rampant wood is made; and the more this is cut back, the stronger becomes the growth, or else "gumming" sets in. In such cases it is wise to root-prune the trees, performing the work about the middle of October. A trench should be dug some 3ft. or so from the main stem, cutting through strong roots, working out the soil underneath the ball of roots and soil, and cutting through any tap-roots that may be growing straight down into the subsoil. When this is done it is advisable to fill up the cavity made with fresh soil, with which some lime-rubble or bone-meal has been mixed, making the new compost thoroughly firm, and applying a mulch of strawy manure immediately after the operation is completed. In this way a check is given to the gross habit of the tree, and a great formation of fruit-buds is the result. Once get the trees to bear a full crop of fruit and it is seldom that any further root-pruning is necessary, as the fruit will absorb, or rather check, the superabundance of sap and vigour.

As already stated, the Morello and the Duke class of Cherries succeed on the Mahaleb stock, which is adapted for both wall- and bush-trees. A few of the Heart section also answer on the Mahaleb stock, but nearly all other classes, such as the Bigarreau and Kentish kinds, do better on the Cherry stock. All the varieties recommended for wall-trees are equally suited for bush-trees; in fact, the majority of varieties in commerce are answerable, providing the instructions already given are carried out.

Under the section on Apples reference was made to the use that might be made of the trees for park or shrubbery ornamentation, and that remark is equally applicable to the Cherry where the soil is suitable. If the Wild Cherry makes a good tree in the neighbourhood it may be taken for granted that the better or cultivated varieties will also succeed. There are few flowering trees so beautiful as the Standard Cherry when in full blossom, and for beautifying gentlemen's estates it is infinitely superior to many of the deciduous trees planted for effect. The following varieties make large trees, and produce large, handsome fruit, valuable alike for home use or consumption: Kentish Bigarreau (a favourite market variety), Bigarreau Napoleon, Black Circassian or Tartarian (a grand old favourite variety), Black Eagle, and Elton (probably the best variety for heavy soils). On good soils Waterloo is an excellent variety. Of course it will be understood that all trees intended for growing as standards are worked upon the Cherry stock, as the intention is for them to develop into large trees; for that reason, if planted in clumps, they should be about 40ft. apart each way. After planting, firmly secure the trees in an upright position by staking and guarding against the ties cutting into the young wood and stem: much injury may follow neglect in this respect.

While the Cherry enjoys liberal treatment, the cultivator must be guided by the weight of crop and vigour of the tree in applying fertilising matter. It should be understood that trees can only take up and assimilate a certain amount of food, and excessive applications are very apt to cause bad health. When trees are bearing heavy crops, or are weak in growth, diluted liquid manure or a dressing of farmyard stuff is desirable, but only in moderation. The same applies to the prepared manures on the market. One of the safest manures for Cherries is bone-meal at the rate of 3oz. to the square yard, given just as the trees commence growth in spring.

· UNDER GLASS.—In a cool house or case, to which plenty of air can be admitted at both top and sides, Cherries are a very decided success; and it is rather remarkable that more are not cultivated in such structures. The trees fruit abundantly, and the fruit also attains a splendid size and a lovely colour, with a correspondingly delicious flavour. The cultural requirements are much the same as advised for Apricots, viz., no coddling, plenty of air, good soil and drainage, with careful attention to watering, feeding, and summer pruning (the same as for Apricots). The same manure is also suitable, although most of the chemical manures advertised by leading makers afford a desirable change occasionally.

For growing under glass, either in pots or planted out in borders, we prefer trees worked on the Mahaleb stock; they are moderate in growth, very fruitful, and will continue prolific

and healthy for many years, if adequately supplied with plant-food. Frequently Aphides, especially *Myzus cerasi*, infest the young shoots and foliage; but the XL All Insecticide or McDougall's fumer will quickly destroy these pests. The syringe should be used freely while the trees are growing, except when they are in blossom and when the fruit is ripening; this will assist to keep the foliage healthy and clean, and at the same time will encourage a sturdy habit. When our trees have produced a great mass of flowers we have with good effect cut away all the worst-placed with a pair of grape-scissors; the remaining flowers received extra support, and always set more freely than on trees not thinned.

The following sorts are admirably suited for growing under glass: Early Rivers, Belle d'Orleans, Bigarreau Jaboulay, Governor Wood, Guigne de Louvain, Late Duke, May Duke, Nouvelle Royale, Royal Duke, Ronald's Black Heart, and Emperor Francis. All of them possess fine flavour, and are abundant bearers as pot or other trees. When the fruit is picked, the trees should be induced to rest as mentioned under Apricots, never allowing them, however, to suffer for want of water at the roots.

Outside the other animal pests which it is proposed to deal with under general headings, there are only two calling for special mention. One is the Slug-worm, the larva of a species of Saw-fly (*Eriocampa limacina*). It is about $\frac{1}{2}$ in. long, and when mature of a dark brown colour. Prior to that it has undergone several changes, and in the first stages of that condition it has a most disgusting look, owing to its exudation of a black slimy secretion. The head is abnormally big, and makes the insect look repulsive. When nearly full-fed the slime disappears. The pupa-state is passed in an earthen cocoon in the soil, a little below the surface. The perfect insect has a black body and transparent wings, and is seldom recognised. The female selects the upper surface of the foliage for egg-deposition, and the young larvæ when hatched soon reduce it to the condition shown in Fig. 644.

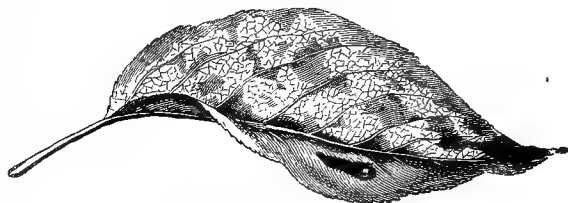


FIG. 644.—LEAF WITH EPIDERMIS EATEN BY SLUG-WORM LARVA.

Quicklime is the best remedy to apply

in the early morning, repeating it after an interval of a couple of days. In very bad attacks the surface-soil may either be stirred to expose the pupæ, or removed for 4 in. or 5 in. and buried elsewhere at such a depth that the insects could not make their way through. Pears are also attacked by Slug-worms.

Chestnuts (Sweet).

IN THE OPEN.—In a few gentlemen's houses these Chestnuts are liked for dessert, or by young people, and when the trees acquire age they produce immense crops of nuts most years if on good soil, and cattle have access to the land. The droppings of the cattle enrich the soil, and the trees afford good shade, which cattle appreciate in hot weather. However, on poor soil, and also amongst other trees, the Sweet or Spanish Chestnut will thrive and fruit freely without any attention whatever. There are a number of species and varieties, the commonest sort being *Castanea sativa* (Fig. 645). Apart from the nuts the tree is remarkably handsome, and worthy of inclusion in parks and ornamental grounds.



FIG. 645.—CATKIN AND FRUIT OF SPANISH CHESTNUT.

Crabs.

IN THE OPEN.—The Dartmouth Crab is probably the best known of all these very attractive trees. Its large handsome flowers and glowing crimson fruit have made it very popular for ornamental plantations. Though not so well known there are many other varieties equally as beautiful and fruitful, amongst which the following are all excellent: John Downie, Fairy Apple, Malakovna,

Orange Crab, Paul's Imperial, Scarlet Siberian, Yellow Siberian, Transcendent, and the new and lovely weeping variety, Elsie Rathke. All the above are most charming when in full blossom, and the fruit is useful for making jelly or preserves. The trees seem equally at home on most soils, providing they are not waterlogged, and it must be a very poor ground indeed that will not grow these subjects more or less well.

Currants.

IN THE OPEN.—Few fruit-bearing trees or bushes are so accommodating as the Currant, the Black, Red, and White kinds all growing and fruiting well on almost all sorts of soils, and either in the pure air of the country or in the sulphurous atmosphere of towns.

Black Currants.—Taking the Black Currant first, the ideal soil for this is one that is deep, rich, moist, and with sufficient drainage to take away all surplus moisture. Other soils, however, will produce very good crops of fine fruit by a little judicious management of the soil and situation. For instance, in a garden where the soil is naturally hot and dry, owing to its light or sandy character, the Black Currant plantation should be in the coolest part of the garden, and if somewhat shaded the better, giving a mulch of strawy manure every year early in May; this will keep the soil moist and cool during the dry summer months, and will assist in swelling the fruit to a large size. If planted on very light soils in the full blaze of the sun Black Currants are almost certain to fail. On heavier soil, which is of a much cooler nature, it is not necessary to select a low or shady position, as they will then succeed in almost any position, and may be planted wherever convenient. However, before planting the soil should be thoroughly cleansed of all noxious weeds, especially *Convolvulus* and *Couch Grass*. The first cost of doing this may be rather heavy, but it is the most economical method, for if these tiresome weeds once get established amongst the roots of the trees they can only be cleared therefrom by lifting and thoroughly cleaning both the roots and the surrounding soil. Another point of really great importance is the purchasing of plants from a nurseryman who will guarantee his stock free from that terrible pest—the Black Currant Mite. Thousands of trees are annually ruined by this creature, and proper precautions should be exercised that it is not introduced with newly-purchased trees.

As with all other fruit-trees, planting, if possible, is advisable at the end of October or early in November, the distance being 6ft. apart each way. Digging amongst the bushes is done in most gardens during the winter, but the system is not one to be recommended, as the Black Currant roots freely on the surface, and to dig amongst the bushes means cutting through the best fibrous roots. The difficulty of keeping weeds down will be comparatively easy by means of frequent hoeings in dry weather, and the loose surface soil following these repeated hoeings will conserve moisture, admit air, and prove highly beneficial to the health of the trees.

The pruning of Black Currants differs from that of the other kinds by reason of no spurs being made, but a good supply of strong, young wood annually retained, which is not cut back at all. In brief, the object is to encourage young wood from the lower part of the bush every year, and to cut out a corresponding amount of old wood without reducing the size of the bush. The pruning may be done at any time after the fruit is all picked, as it does not signify whether the trees have lost all their foliage or otherwise. All prunings ought to be burnt as

soon as possible, and the ashes returned to the soil. In this way many insect eggs, &c., are destroyed, and the ashes serve as a gentle stimulant to root-action.

The following few varieties are reliable for home use or for market requirements: Baldwin's Black (*syn.* Champion), a very profuse cropper, large, of fine colour, and very sweet. Lee's Prolific, an abundant bearer on good soil; the fruit is large, and travels well to market. Black Naples is somewhat later in ripening than the above sorts, and is a heavy and continuous bearer. Ogden's Black is a very free bearer, and excellent on all soils. The well-known Old Black, although a good variety, is neither so free in growth nor so prolific as the four sorts named above. Some contend that it is never attacked by the mite, but we have seen it quite as badly infested as any other variety.

Red Currants are always in a more or less limited demand in gardens of every kind, and fortunately they are not particular as to the soil or situation, providing no stagnant water lodges about the roots. The bush form is that most generally adopted for these Currants, and is no doubt the best, as heavy crops are obtained with very little trouble. As already



FIG. 646.—FRUITING BRANCH OF CHISWICK RED CURRANT.

mentioned, the ground should be well dug and cleaned prior to planting in the autumn, and a few of the best varieties only selected. Raby Castle is a well-known large and prolific variety. Comet is a new sort of great promise, producing long clusters of large and very sweet berries. Cherry and Red Dutch are two varieties with large, handsome fruit borne in profusion. Chiswick Red (Fig. 646) is also a free bearer of large, sweet fruit.

White Currants. — The pruning of both Red and White Currants is exactly the same. In bush-trees it consists in having five or more branches springing from a clean leg or stem (Fig.

647); these branches should be as near as possible equidistant from each other, and all side-shoots forming on the branches should be cut back to about four eyes, thus forming good fruiting spurs. Where birds are troublesome in taking

the buds it is advisable not to prune until spring, otherwise every bud will disappear, and a crop will be impossible. Both the Red and the White Currant are admirably suited to growing as single, double, or treble cordons, and may be planted against north or other walls. The pruning of cordons consists in merely cutting in all side-shoots at any time during the winter. One very decided advantage of these cordon Currants on walls is that by means of nets they are easily protected from birds when the fruit is ripe, and if some plan is adopted of throwing the rain off the trees, really plump and delicious Currants may be picked up to the end of November. If the rain fell on the fruit it would rot or split, and thus fail to keep.

Cuttings of the young wood of Black Currants root readily if put in firm, sandy soil immediately the foliage has all fallen. The same remark applies also to the Red and White varieties, but the cuttings are made differently. In

the case of Blacks none of the lower buds are removed, as it is always an advantage to have young wood annually starting from the base. With Reds and Whites the conditions are altered, as it would be undesirable to thus have young wood continually springing up; therefore, in making the cuttings all the lower buds are cut out. Supposing the cutting is 15in. or 18in. long, only three or four buds are allowed to remain. In this way a clean leg or stem is obtained, and if the buds have been properly cut out there will be no trouble with young shoots springing from the base. In two years the little bushes may be planted out in the position they are to permanently occupy.

Currants, and their near relative, the Gooseberry, are attacked by several voracious animal pests, of which the most prominent are the caterpillars of the Magpie Moth (*Abraxas grossulariata*,

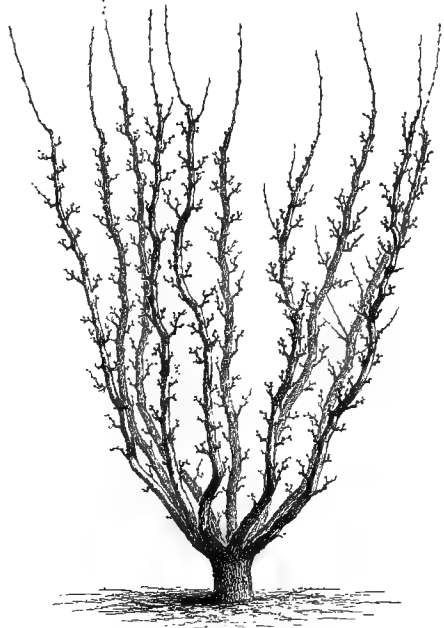


FIG. 647.—CORRECT METHOD OF PRUNING RED OR WHITE CURRANTS.

Fig. 648) and of the Gooseberry and Currant Sawfly (*Nematus Ribesii*, Fig. 649). Both these occur in spring, and the first-



FIG. 648.—PERFECT INSECT, CATERPILLAR, AND CHRYSALIS OF GOOSEBERRY MOTH.

named also appears in autumn.



FIG. 649.—LARVA OF GOOSEBERRY AND CURRANT SAWFLY.

Then come the caterpillars of the Spinach Moth (*Cidaria dotata*, Fig. 650). Spraying with Paris Green when the fruits are small is *the* remedy to apply, as all are chewing insects. Powdered hellebore dusted on in the morning is also effective. Both are virulent poisons. It is not advisable to use them when the fruit is of a size for market or the kitchen. The insects are all leaf-feeders.

Far more difficult to deal with, however, are two moths whose larvæ affect the shoots, causing them to droop and die. These are the Currant Clear-wing Moth (*Sesia tipuliformis*) and the Currant Shoot Moth (*Lampronia capitella*).

Insecticides are of little use in either case, and certainly not in the first. The *Lampronia* species also attacks the fruits for the sake of the seeds contained. Removal of all such shoots, and of prematurely-coloured fruits on trees known to be infested, would be beneficial.

The greatest pest of all is the Currant-Bud Mite (*Phytoptus ribis*), which has hitherto baffled all the most experienced entomologists to cope with its attacks. Black Currants only are infested, and the terminal



FIG. 650.—SPINACH MOTH.

buds are usually oftenest selected. Once the creatures are inside they cause (by the irritation set up) the buds to swell abnormally (Fig. 651), and such buds may easily be detected in late autumn. Here again insecticides are of very little avail, and hand-picking the galled buds is the most practical remedy. Still, if the trees could be sprayed during July with kerosene emulsion some good might be done.

The Hazel Nut is attacked by a relative of the Currant-Bud Mite, known as *P. Avellanae*, and the galled buds may be readily seen in winter. These two animals have spread over a very wide area, the former more particularly.

Scales and Aphides affect the Currants. Methods for dealing with these pests will be noted under their headings in the Chapter "On Pests Generally."

Damsons.—See "Plums."

Figs.

IN THE OPEN.—It seems strange that the Fig has not been more largely grown against warm walls in this country, as it is quite as hardy as the Peach and Nectarine, no more costly to grow, and affords a pleasing change on the table. Possibly, one of the causes of neglect has been that in many gardens the trees have proved barren, and little or no attention has consequently been paid to pruning and otherwise keeping them in order. To make Fig culture outside really successful, it is essential that good drainage be given, as water lodging about the roots is fatal to success. Next in importance to good drainage comes a rather poor soil. If the trees are planted in rich soil, rampant growth, with immense foliage, is made, which seldom matures, and fruit is conspicuous by its absence. Lime or plaster refuse mixed thoroughly with the soil before planting serves a very useful purpose, by not only keeping the soil open and porous, but also supplying an element necessary for the fruit.

Having prepared the soil, there arises the question as to the best time to plant. Some strongly advocate autumn planting, but, if a severe winter follows, the frost is very liable to seriously injure or cripple the tree; whereas, if planted towards the end of March, it has all the summer months to grow and take firm



FIG. 651.—SHOOT OF CURRANT INFESTED BY *PHYTOMYZA RIBIS*.

possession of the soil, and is thus infinitely better able to withstand frosts. In planting, the soil can scarcely be made too firm, and, for that reason, the operation should only be performed when the soil is fairly dry and does not stick to the tools. If the soil were wet, it would set in one solid mass later on, and would prove impenetrable to either roots or moisture. Immediately after planting, a thorough soaking of water should be given to settle the soil about the roots, and a mulch of litter spread over the surface to retain the moisture. During the summer months it may be necessary to water the tree again several times, and after very hot days a good syringing overhead will be very beneficial, as the Fig thoroughly enjoys heat and moisture. Neither liquid nor solid manure should be given until the trees are cropping; then one or both forms of manure will be of assistance, or, if the smell is objectionable, one or other of the odourless prepared manures may be given with advantage. 10z. to each square surface yard will be sufficient to allow at once, as it is better to be on the "weak" side in applying manures.

In training and pruning the Fig, due allowance should be made for the large foliage, and, for that reason, 6in. is none too much space to allow between the growing young wood. When each shoot has made seven or eight leaves, the point should be pinched out; this induces the formation of fruit. In fact, trees that have been noted as cumberers of the ground and wall space have been turned into most productive and valuable specimens by a

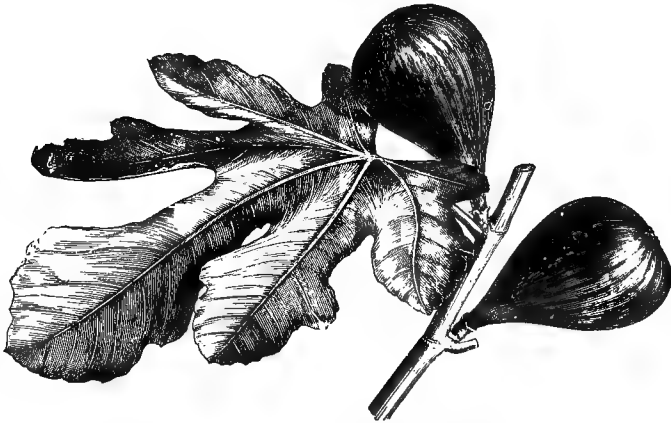


FIG. 652.—FIG BROWN TURKEY.

judicious system of pinching during the growing season. Not only is this mode advisable from a fruit-production point of view, but it is also much better for the health of the tree, as it practically does away with the knife in order to keep the tree

in bounds. No fruit-tree is so impatient of the knife as the Fig; it shows its resentment of the same by a kind of canker setting in, which sometimes eats nearly through the branches, and often causes the death of young wood. When the growth has been so regulated that each shoot has sufficient space for proper development, the wood becomes well ripened, and protection in winter is neither requisite nor desirable. Our experience is that it is only those trees which have had their growth too congested that suffer from hard frosts.

The well-known Brown Turkey (Fig. 652) is a favourite variety, because of its hardy and fruitful character; some lovers of Figs object to its flavour, but most people consider it good. White Marseilles is a splendid variety on warm walls, and is superior in quality to the first-named, and a greater bearer. Brunswick is a very large variety, of fair quality, hardy, and a good bearer in warm positions. The Black, White, and Yellow Ischia are all three of most delicious flavour, also good and constant growers and croppers. The comparatively new variety, St. John's, is proving a good early kind, a free bearer, and hardy.

Figs may be easily propagated by suckers, layers, or cuttings; they quickly take root if placed in gentle bottom-heat just before the trees start into new growth.

UNDER GLASS.—The improvement in Figs grown under glass as compared with those from outside, is so very marked that many are now devoting special attention to their culture, with very gratifying results. Not only is the fruit of delicious flavour, but it may be grown easily in houses given up entirely to the plants, or with other plants in the orchard-house or similar structures, either in pots or planted out. A good fibrous loam, with the addition of mortar rubble or broken oyster shells, and a 6in. pot full of bone-meal to each barrow-load of loam, forms a very good compost indeed. If Figs are planted out, the roots should be confined to within a limited area; otherwise the growth will be rampant, with very little fruit. The same remark applies to pot-plants; when repotting, only a small shift should be given. The soil should be made firm both in pots and in borders. For some time after potting or planting, water must be given with caution, and only when really necessary. Later on, when the plants are in active growth, copious supplies are essential, as the Fig revels in abundant heat and moisture while growing. It will, therefore, be apparent, even to the novice, that good, free drainage is very important. In prepared borders, 1ft. of broken bricks will be none too much, and in pots the drainage also should be liberal. Inverted oyster shells (to the depth of 2in. in large pots) make excellent drainage if covered with moss to keep them from clogging with soil. Opinions differ as to the best time to pot or plant the trees;

but, from actual experiments, the finest results were obtained from trees planted or potted just before they commenced growth in the early months of the year. In borders, made as indicated previously, the trees will continue healthy and fruitful for years if annually top-dressed with soil and manure. When in pots, once in two or three years will be often enough to repot, providing the pots are mulched annually with a little fresh soil and manure, and are supplied with liquid or chemical manures (not too strong) frequently when bearing full crops of fruit.

In starting Figs into growth, a temperature of 50deg., with a gentle rise during sunshine, is plenty at first. The heat should be gradually increased as the growth advances, the plants thoroughly syringed twice daily, and the paths and floors kept moist. This treatment will suit the plants admirably, and also keep Red Spider at bay. When the new shoots have made five or six leaves, the points of them should be pinched out. A fresh shoot will soon be made, and this must be treated in the same way. When the length is sufficient, two, or sometimes three, such pinchings are requisite during the season. It is much wiser to regulate the growth by summer pinching than by pruning with a knife in winter. Not only are heavier and finer crops produced, but *Phoma cinerascens*, a fungus which causes old and young shoots to die back so badly, is not so much in evidence; in fact, some plants which have never been touched with a knife show no signs of the fungoid attack, although placed amongst infested plants. As the fruit exhibits signs of ripening, syringing should cease, and a drier atmosphere be maintained, gradually increasing the ventilation; this will improve the flavour of the Figs, and prevent the fruit from splitting to any serious extent. A little judgment will soon show when the fruit is quite ripe; it should be eaten almost immediately, as it deteriorates with keeping.

When the fruit has all been picked, a closer atmosphere should again be resumed, with thorough syringing twice daily; a second crop will then be borne, often better than the first one. As this second lot commences to ripen, repeat the process already advised with the first. Afterwards gradually encourage the plants to rest by giving plenty of air for a few weeks, and then stand them outside, if in pots, until there is danger of frost, when they should be placed in a cold house; but whether outside or in, the roots should have enough water to keep them healthy and plump.

For first supplies St. John's and Pingo de Mel are unequalled. The latter seldom, if ever, casts its first crop of fruit, and is a most valuable variety for forcing. Bourjassotte Grise is a later variety, a free bearer, and of the most exquisite flavour. Violette Sepor is another grand mid-season sort, possessing delicious flavour, and is an abundant bearer. White Marseilles is an early

variety, well-known for its merits as a cropper, and for its rich flavour. White, Black, and Yellow or Green Ischia are all small but delicious kinds, that bear profusely. Nebian is one of the best late sorts, and of fine flavour. For exhibition, Negro Largo is unsurpassed; it is followed by Brunswick and Brown Turkey. All of these are large and handsome if not too heavily cropped.

Red Spider and a small Scale like the Mussel Scale are the two greatest animal pests of the Fig. Methods for treating these pests will be found in the Chapter "On Pests Generally."

Gooseberries.

IN THE OPEN.—The value of the Gooseberry is so well known that it needs no introduction even to the greatest novice. When Apples are over, and Rhubarb has begun to be monotonous, green Gooseberries enable the gardener to make a welcome change for tarts, &c.; and for the market-grower they are equally valuable. Another advantage is that half the crop may be gathered for use while green, and the remainder will still prove a good crop, and the fruit be all the finer on account of the previous gatherings. Many market-growers adopt the plan of picking all the largest berries immediately they are big enough for sale; a little later, the berries on the lower branches, or where at all thick, are picked; and the last, or final, gathering is made when the fruit is ripe. The last picking is usually remarkable for the fine berries, and these are in good demand. Some persons might be tempted to state that the large berries are inferior in flavour to smaller berries of the same variety, but there is really no comparison, as the large berries are far superior to the small ones in quality.

Probably no fruit under cultivation responds so freely to good treatment as the Gooseberry, and, because of its accommodating nature, less attention is paid to it than its great merits deserve. On all soils where the drainage is good, the position open, and the soil fairly deep, really magnificent crops of fruit may be readily produced; as the Gooseberry is not at all particular as to soil. Before planting, the ground should not only be deeply dug, but all weeds that may prove a nuisance later on ought to be eradicated, thus saving labour and annoyance as the bushes become larger. Deep-planting is injurious; the nearer the roots are (in reason) to the surface, the better will be the progress of the tree or bush.

When to plant is a question that must be decided by local influences; no doubt exists as to November being the best time. Gardeners, however, are often obliged to plant when circumstances will permit; but under no conditions ought planting to be done when the land is wet and the soil sticky. It will be far preferable to lay the plants in by the roots in a shallow trench, and plant out when the soil is in a good working

state, irrespective of season, at any time between the beginning of November and the end of March. If the soil is not poor, manure is unnecessary; in fact, the little bushes are better without it until they commence fruiting. As a rule, the bushes may be planted from 5ft. to 6ft. apart each way in large or small blocks. Another mode of planting is by the side of paths round the kitchen-garden; in such cases 6ft. to 8ft. ought to be allowed the line or row, thus enabling free access to the quarters occupied by the vegetables.

Another excellent method of growing Gooseberries is as cordon trees trained to supports by the sides of walks; or they may be trained against north walls to afford late supplies of fruit. Single, double, or other cordons may spring from one stem, each cordon being 1ft. from another. Good crops of fine fruit are borne on these closely-pruned cordons; they are easily protected from birds, and occupy very little space; and for small gardens or where space is very limited, they are extremely useful, and worthy of greater attention.

The pruning of the Gooseberry in whatever form the tree is grown is a very simple operation, but frequently it is not correctly done. Supposing a tree is bought from the nurseryman, it should have a clean stem, or leg, 1ft. high at least; from this stem the branches should spread in all directions, and the person pruning ought to aim at having a bush equally proportioned, with branches and young wood so arranged that light and air can pass all through, with sufficient room between the growth for the hand to pass in to gather the fruit. The leading shoots should be left nearly their full length, and all other side-shoots cut in to about three eyes. If the tree has a "weeping" habit, it is essential that all shoots left to form a tree be cut back to a top, or upright, bud; if cut to a bud on the lower side of the shoot, they will soon be growing downwards instead of upwards. Of course, in those varieties which naturally have an upright habit, it does not matter much about cutting to any bud in particular. Birds are often fond of devouring the buds, and where they are troublesome it is advisable to leave the pruning until the spring, just as the buds are moving. Cordon trees are pruned in the same way as other fruit-trees grown on that system: the leading shoot is allowed to grow nearly 1ft. or more annually, and all side-shoots are cut back to about three buds in the autumn or winter. If exhibition fruit is required, there must first be strong healthy, young trees, and all useless shoots judiciously removed while small. In the gardener's words, the trees must be "dis-budded," retaining only just those shoots necessary for the further development of the tree and to form the requisite spurs. Over-crowding or congestion must be avoided, and the fruit carefully thinned, leaving only the berries in the positions where they will get the full benefit of light and air.

Heavy or rather strong applications of manure are unnecessary—indeed, harmful. If diluted liquid manure is applied once or twice weekly the effect will be far better than in the case of concentrated and less frequent applications. Failing liquid manure, guano, at the rate of 10z. per square yard, and 10z. of nitrate of soda, similarly applied every fortnight while the fruit is swelling, will cause it to attain a large size. Almost any of the manures in a prepared state may be applied with advantage, and at the strength recommended by the manufacturers, but in every case care must be exercised that none of it falls on the foliage, or damage will be done, and the tree weakened and disfigured.

A large number of varieties are equally good for exhibition or for cooking and dessert purposes; the following sorts combining all three qualifications:—*Red*: Dan's Mistake, Crown Bob, Monarch, Lord Derby, Speedwell, and Clayton. *White*: Antagonist, King of Trumps, Careless, Lady Leicester, Postman, and Alma. *Yellow*: Leader, Leveller, Ringer, Trumpeter, Criterion, and Drill. *Green*: Plunder, Telegraph, Gunner, Matchless, British Queen, and Stockwell.

Some owners of gardens have a decided objection to large Gooseberries, preferring the smaller fruiting varieties for both dessert and cooking.

To meet such demands the following are excellent: White-smith, an old favourite of high quality; Snowdrop, a pretty and delicious fruit; Early Sulphur (Fig. 653), a fine-flavoured variety, and the earliest to ripen; Yellow Champagne, one of the finest-flavoured sorts; Greengage, an early and delicious variety; Green Gascoigne, also excellent; Whinham's Industry, a



FIG. 653.—GOOSEBERRY EARLY SULPHUR.

favourite market variety, and very good indeed for dessert or cooking; Warrington, a sterling old variety, of proved excellence. Both the Red and White Champagne varieties should be included, as they are second to none for flavour; in fact, all the above are thoroughly reliable alike as to their cropping qualities and general excellence.

Gooseberries are easily increased by cuttings or layers, the former being much the more expeditious method, as a large number of cuttings may be propagated from one bush. Cuttings may be made from pieces of young wood immediately after the foliage has fallen, and each cutting should be from 1ft. to 1½ft. in length. Some people leave an inch or so of the previous year's wood at the base of the cutting, but experience has proved that they root equally well with or without a heel of older wood. Having cut the shoot or cutting to the proper length, all the lower buds, or eyes, should be carefully cut out, leaving only three or four eyes at the apex. This will later on furnish a tree, or bush, with a clean leg, and also prevent young shoots from springing up through the soil. As already stated in connection with Red and White Currants, these shoots from the base or soil are undesirable, for if such growth were permitted, all the fruit produced thereon would be covered with soil and filth after a heavy storm; and for that reason alone it is best to effectually stop the formation of these lower growths by cutting away all the lower buds when making the cutting. When the cuttings have been prepared, they should be inserted in soil and treated as already advised for Currants.

Apart from the Gooseberry Moth, Gooseberry and Currant Sawfly, and the Spinach Moth, which attack both Currants and Gooseberries, the latter has as a visitor one of the "infinitely small." This is the Gooseberry Mite (*Bryobia pretiosa*), commonly mistaken for Red Spider. It appears in vast numbers on leaves and stems in the spring, and causes them to assume an unhealthy appearance, and frequently to fall prematurely. The mites multiply very rapidly, hot, dry seasons being favourable to their increase. Kerosene emulsion should be employed, taking care that foliage and bark (more especially in old trees) are thoroughly reached. Carbolic soft soap in solution (1oz. to a gallon of water) will prove effectual if persisted in, using it hot, say 120deg. to 140deg., and on a bright day, but before the sun gets too powerful to burn the foliage.

A species of Mildew (*Microsphaera grossulariæ*) asserts itself upon the foliage and does some damage. This may be stayed by dusting powdered sulphur over the leaves or else by spraying with potassium sulphide.

Grapes.

IN THE OPEN.—Really delicious Grapes may be grown outside if the vines are planted against south walls that are sheltered from cold, cutting winds, and if a little care is taken in regulating the growth during the summer. Only a few varieties, however, are worth planting, and the following have proved the most reliable: Moore's Early, a small but delicious black sort, setting its fruit freely, and one of the first to ripen, is strongly

recommended. Miller's Burgundy is a purple variety, of good flavour, and very suitable for outside culture. Black Cluster is a sweet, black variety, and sets very freely. Chasselas Vibert also answers in very warm situations, and is of extra good flavour.

The best time to plant vines outside is early in April, just as new growth is commencing, preparing the site first by mixing some good fibrous loam and wood-ashes or lime refuse with the ordinary soil. In this the vine should be planted without disturbing the roots at all. It should not be planted deeply; if the ball of roots is only an inch or so below the surface that will suffice. The soil should be made firm round the roots, and a good soaking of water applied immediately after planting, afterwards putting a mulch of litter over the soil to retain moisture. Every effort should be made to encourage growth by watering thoroughly if the weather is dry, and after bright, sunny days a sprinkling overhead with the syringe will do good.

No liquid manure must be given for a year or two, as it would do more harm than good; in fact, if the vines are planted in moderately rich soil, no manure of any kind is necessary until they commence to fruit, when it may be applied with good results. As many shoots as may be requisite to cover the space at command may be trained on the wall, allowing 3ft. between each permanent shoot; in later years each of these shoots or main branches will emit side-shoots, or laterals, and these should be about 15in. apart on each side of the main branches, or "rods," as they are termed by gardeners. The laterals should be trained in the 3ft. space between the rods, and when they have made about 18in. of growth, the point should be cut out; or, if bunches are on the laterals, the point should be taken out one leaf beyond the bunch. Over-cropping must be avoided, and when the foliage has all dropped, the laterals should be cut back to two eyes, these forming spurs. Should more than one lateral start from a spur, all but the strongest ought to be rubbed off while small.

UNDER GLASS.—Grape-culture under glass has made such enormous strides during the past twenty years, and so much glass has been erected for the production of this nourishing and delicious fruit, that many large growers now send tons to market every week in the season, lowering the prices so greatly, compared with what used to be realised, that it has become a serious matter to many of the smaller men, whose produce cannot be termed first-rate. However, in spite of the magnitude of the quantity put on the market and the low price, the private grower very rightly prefers to grow his own; not only are they fresh, but also of better appearance, and far more wholesome than Grapes which have been exposed to the dust, &c., of the market.

By the aid of modern appliances the skilful gardener has now no difficulty in providing a daily supply of good Grapes for his employer's table all the year round. For first supplies (ripe in April or early in May) *Pot Vines* (Fig. 654) are desirable.



FIG. 654.—FRUITING VINE IN POT.

Fruiting canes are sold by the leading nurserymen. These are best potted into larger pots having perforated sides (taking care to disturb the roots as little as possible in potting) and placed on slabs in a well-heated, span-roofed house early in November. Underneath the slabs or staging should be hot-water pipes to supply bottom-heat. All round the pots turf or fibrous loam should be tightly packed to a width of about 6in., and all the vacant space on the slabs or beds filled up firmly with fresh leaves or litter. These will generate a nice gentle heat, that will be maintained by the pipes underneath, and the roots of the vines will pass into the loam through the perforated sides of the pots, and should ensure a heavy crop of fine Grapes.

A temperature of 50deg. will be high enough to start the vines in, thoroughly moistening the canes, floors, &c., on the mornings of bright days, and as the canes break or commence growing gradually increasing the temperature up to 65deg., with a slight fall at night. When the plants begin to flower, syringing should cease, and a little drier atmosphere should be maintained, with a slightly higher temperature, only damping the paths, bed, &c., on the mornings of bright days. About mid-day the canes ought to be given a sharp rap with the hand to distribute the pollen and thus aid the flowers to set. When the set is complete, more atmospheric moisture may be given, the grower being guided as to the amount by the state of the weather—if dull, giving little or none, and if bright, then giving freely in

the mornings, so that all excess of moisture may settle before night.

Pot vines, as a rule, make only moderate growth, and one shoot from an eye is plenty. If too many shoots appear, all that are not required should be rubbed off when only 1in. or 2in. long, leaving the permanent shoots about 1ft. apart on each side of the cane or rod. When the shoots are about 15in. long, they should have the points pinched out, and those carrying bunches, at two leaves beyond the bunch. Any sub-laterals forming on the shoots should be pinched back to one leaf while small, thus conserving all the vigour. If the vines are 3ft. apart, and trained about 15in. from the glass, it may easily be calculated how many plants the house will contain. As far as possible the growth should be allowed to cover the roof or trellis. Good strong, healthy pot vines ought to carry from six to eight bunches of good Grapes if liberally supplied with diluted liquid manure, or occasionally surface-dressed with a reliable chemical manure. Directly the Grapes commence changing colour, feeding should be gradually reduced and a little more air be admitted on favourable days. When all the Grapes have been gathered, the vines are best thrown away, as they are little good afterwards, and the house may then be employed to grow a late crop of Melons, &c.

Black Hamburgh is the best variety of Grape for pot culture, being early and excellent in every way. If a white variety is desired, Foster's Seedling is a very good one. Thinning of the bunches is fully described further on.

In most private gardens the *Vineries* are in the form of a range, and are often built as lean-to's against a wall. Other forms of vinery are the three-quarter span and the span-roofed; but in whatever form they are constructed, the heating principle is the same, those most distant from the boiler being for the late Grapes, as it would obviously be a waste of fuel and boiler power to have the vinery requiring the greatest heat the furthest removed. Equally as important as the erection and heating of the vineries are the drainage and formation of borders. On some soils really first-class Grapes are grown without any prepared borders, but in few private gardens is it possible to do this, and it proves most economical in the end to do the work thoroughly in the first place, by excavating the soil to the depth of 3½ft. to 4ft. and the width of the house, laying in a drain to carry away all surplus water, and putting in broken bricks over the bottom to a depth of 1ft. On this should be laid 2½ft. of good fibrous loam fresh from a pasture, with mortar rubble or plaster refuse and a little bone-meal added; a good border will then be made. No farmyard manure should be incorporated, nor should the turf be broken up, as the fibre then lasts longer, and the soil does not congest or set together so closely. This 4ft. border being inside, the vines may be planted at almost any

time of the year. If put in while dormant, it is an excellent plan to take the plants out of the pots at night, and to allow the ball of soil to stand all night in water; in the morning it is an easy matter to shake all the soil away, and the roots may then be disentangled and spread out evenly in the border, taking care not to plant deeply. Vines may also be planted very successfully while in growth, first giving the roots a good soaking with water, and then planting the vine without disturbing the root at all, but packing the soil firmly round the ball, and giving a good watering to settle all about the roots. In a week or so another thorough watering should be given, to keep the ball of the roots moist, otherwise it may become dry and no progress will be made. If a mulch of strawy manure is applied immediately after the first planting, the moisture will not evaporate so rapidly, nor will weeds be so troublesome. The usual distance between vines is 3ft., but if extra fine exhibition bunches are desired 4ft. apart will be better. Every two or three years another 2ft. may be added to the border until the inside space is filled up; then if the vinery walls are built on arches, as they should be (except the early vinery), the same process could go on outside until that space was filled up. With mid-season and late Grapes this system of inside and outside borders has many advantages, the chief being that if the vines show signs of debility one of the borders may be taken out in the winter and a new one put in without risk of losing a crop: another lease of life is thus given to the vines. In taking out an exhausted border all roots should be carefully preserved and wrapped in wet mats or sacking, keeping them wet until they can be laid afresh in the new border, into which they will quickly spread.

For the earliest vinery, Black Hamburgh, Foster's Seedling, Madresfield Court, and the exquisite Muscat Hamburgh, are all excellent. The last-named is somewhat fickle, but where it can be grown well it is the finest flavoured of all black Grapes. Sometimes Madresfield Court splits its berries when ripening; to prevent this it should be planted in the airiest position in the house. For mid-season or late supplies, Alicante, Muscat of Alexandria, Gros Maroc, Gros Colman, Mrs. Pearson, Mrs. Pince, Chasselas Napoleon, Lady Downes, and West's St. Peter's, are all very good varieties, and, when well grown, will hold their own on the exhibition-table if necessary. Lady Downes, Mrs. Pearson, Alicante, Mrs. Pince, Muscat of Alexandria, and Gros Colman, will keep sound until May if well ripened and stored in a suitable Grape-room.

In all vineries a somewhat low temperature should be given when first starting the plants—45deg. to 50deg. will be high enough, gradually raising it as the vines advance, as already mentioned for pot vines. The late vines may be allowed to

start naturally, *i.e.*, without the aid of artificial heat; but when once the rods have commenced to break into growth, a gentle fire-heat, coupled with copious syringing early in the morning, and again early in the afternoon, is advisable. The house should be shut up with a good sun-heat and plenty of moisture in the atmosphere; this is secured by well damping the rods, paths, borders, and walls. The heat and moisture thus derived will prove highly beneficial to the vines and their growth. When they are in flower, syringing of the plants should cease until all the Grapes have been cut. For all Muscat varieties of Grapes a rather high temperature may be given with a slightly reduced amount of moisture in the house. If the vines are in good health a good set will be secured by simply shaking the rods vigorously about mid-day. With shy-setting varieties, like Muscat of Alexandria, some gardeners introduce pollen from other sorts such as Alicante, but this is seldom necessary if the weather is bright at the flowering period.

Before describing the process of thinning Grapes it should be mentioned how important are disbudding and the stopping of the laterals. From nearly all spurs on the rods more shoots will show than it is advisable to permit to grow. No hard-and-fast rule can be laid down as to how many shoots should proceed from each spur, but sufficient should be left to cover all the roof without overcrowding the foliage. The best should be selected, rubbing off all the worst placed and weakest ones while small, thus avoiding any check to the vines. As the shoots lengthen to 15 in. or a little less, the points should be nipped out with the finger and thumb; or if the shoot, or lateral, as it is called, is carrying a bunch, the point should be taken out one or two leaves beyond where the bunch is showing. All this "stopping," as gardeners term it, is best done early, while the growth is tender, and while the operation can be effected with the finger and thumb. After the first stopping, "sub-laterals" will quickly form. As these appear, no time must be lost in stopping them at the first leaf, unless a shoot is wanted to cover a vacant space on the roof. With young vines, the leading shoot may be allowed to grow on unchecked. One of the worst mistakes it is possible to make is to neglect promptly attending to stopping, yet it frequently happens; the consequence is that a mass of useless growth is made, and to reduce this to reasonable limits the knife is freely employed in cutting out or cutting back the shoots. A great check is thus given the vines, followed by badly-coloured, shanked, or inferior flavoured Grapes. There should be none of this weakening of the vines if high-class Grapes are wanted for home use or exhibition, or even for market. All bunches not desired for the crop should be cut off early, say immediately after setting; indeed, with free-setting varieties, surplus bunches may with advantage be cut off before they blossom.

The question of how many bunches a vine may carry will depend very much on local circumstances. One pound of fruit to every foot length of rod is a safe crop for healthy, well-fed vines. Market-growers often obtain double and treble that weight, but their vines seldom last many years. Again, some varieties like Black Hamburgh, Alicante, and Gros Colman will ripen and finish up a much heavier crop annually than Muscat of Alexandria. Very large-bunched varieties of the Gros Guillaume or White Nice type should not be permitted to bear many bunches; while the delicious but small Frontignan sorts will ripen a bunch on almost every lateral if the vines are strong. Unfortunately, in the rage for appearance, the Frontignan varieties have almost vanished, but the Grizzly, Black, White, and Primavis Frontignans are worthy of a place in gardens where richly-flavoured Grapes are appreciated.



FIG. 655.—BUNCH OF GRAPES
AFTER THINNING.

Thinning of the bunches (Fig. 655) can scarcely be done too soon after the Grapes are set, more especially with free-setting varieties like Alicante. Immediately the berries can be cut out, all the inner ones should first be removed with a sharp pair of Grape-scissors, and the outer ones also thinned out according to the variety. Large-berried sorts like Gros Colman will have none too much room for full development with in. between the berries, while small-berried sorts like the Frontignans will not require half that space to swell up. Sorts which have large "shoulders" should have them tied up with twisted strips of raffia. The grower should always avoid touching the small berries with the

hands or head; otherwise the bloom may be injured, or rust may set in on the fruit. Muscats should be thinned latest to enable the grower to distinguish which of the berries are stoneless: these should be all cut away, as they will never swell to any respectable size. Figs. 656 and 657 show respectively a properly and an improperly thinned bunch at maturity.

Ventilation must be done judiciously, admitting air early on bright mornings when the temperature rises a little above 70deg., gradually increasing the ventilation as the day becomes warmer, and closing in the afternoon with a good sun-heat. On dull or cold windy mornings air should be admitted very cautiously, or a check may be given to the growth, followed by Mildew, cracked berries, or other evils.

Feeding the roots with either chemical or natural manures ought not to be practised until the vines are cropping. Stimulants are then useful if properly applied, bearing in mind always that weak and frequent feedings are more serviceable than concentrated applications. Experience has taught us that chemical manures used in conjunction with natural manures are really the most effectual in producing the best results, although first-class Grapes are grown every year by both kinds of manure, employed separately.

Pruning of vines is a simple matter if once the principle is understood. With young vines the leading rod may be allowed 3ft. to 4ft. of growth each season, cutting in all laterals to one or two eyes. In older vines the same system of pruning the laterals holds good,

with one or two exceptions; these are Black Monukka, Gros Guillaume, and Buckland Sweet-

water, which will not fruit freely if very closely pruned, and therefore three or four eyes should be left when pruning the laterals.

Propagation is easily effected by means of eyes cut with an inch or so of wood on each side of the bud, and placed in gentle bottom-heat, or even by pieces of young wood, several inches long, placed in heat, as the vine roots readily. Even pieces stuck in the soil outside will root freely.

In many private gardens Grapes must be kept for as long a period as possible. To achieve this object the bunches are cut with a good piece of young wood attached; this wood is put in a bottle of water with a little charcoal added, and the bottle hung by its neck, or placed in a proper Grape-rack, at such an angle that

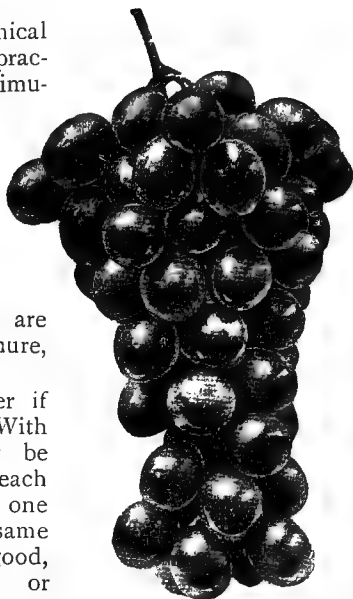


FIG. 656. — PROPERLY THINNED BUNCH OF MADRESFIELD COURT GRAPES MATURED.

(Much reduced.)

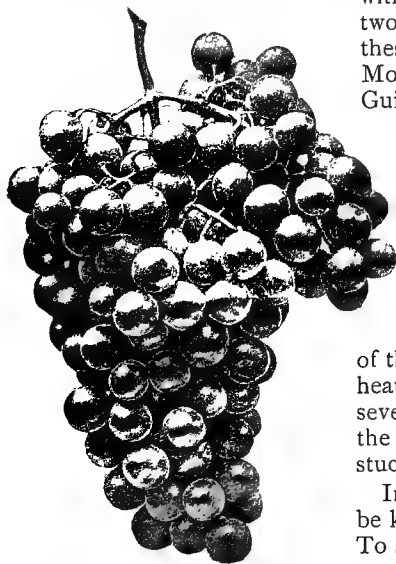


FIG. 657. — IMPROPERLY THINNED BUNCH OF BLACK HAMBURGH GRAPES.

(Much reduced.)

the bunch hangs clear of the side of the bottle (as in Fig. 658). Strict attention must be paid to the early removal of any decayed berries, and also to the replenishing of the bottles with water as often as may be necessary. An even temperature of 40deg. to

45deg., with as dry an atmosphere as possible, will be suitable for keeping the Grapes plump and sound. Any great fluctuations are always bad for the keeping of this fruit.

Of the pests affecting the Grape the most to be dreaded is the Vine Louse

(*Phylloxera vastatrix*).

Much has been done of late years towards keeping it at bay by the use of stocks

that are practically proof against the attacks of the insects, which are near relatives of the *Aphides*. As in the case of the American Blight there are both root- and leaf-feeders, the latter being distinguished by the tubercles found upon the adults. The former are the most difficult to deal with, as they are out of the reach of most insecticides. The galls due to their attacks on both roots and foliage are shown at Fig. 659. Kerosene emulsion has given excellent results in America: it has been used for both foliage and

roots. In the latter case the border of the infested vine has been opened, and from 3gals. to 10gals. of the insecticide poured on the roots. To every gallon of concentrated emulsion some 9gals. of water should be added, and the mixture is best applied hot.

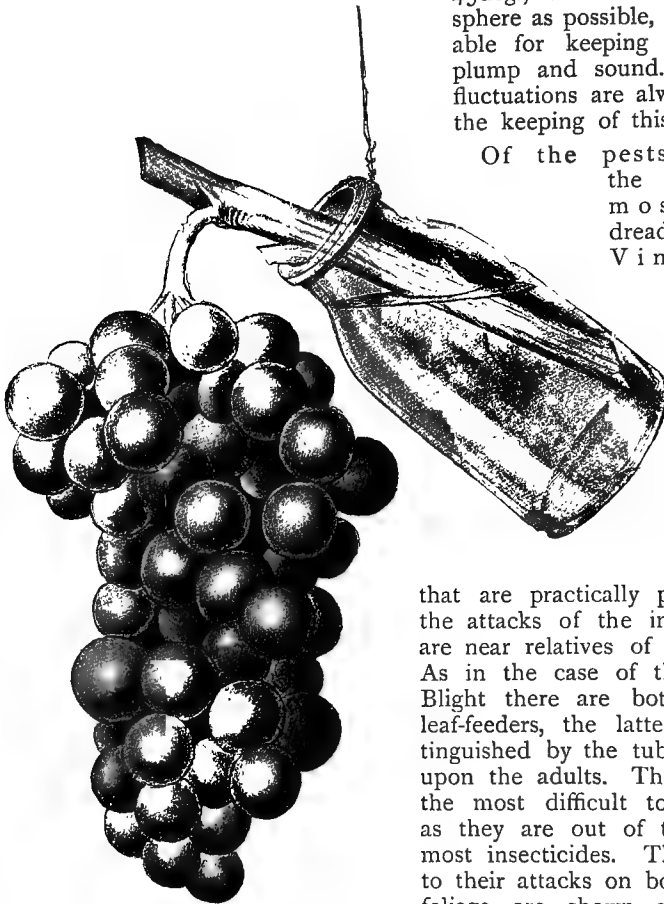


FIG. 658.—MODE OF FIXING BOTTLES FOR GRAPES.

Red Spider, Thrips, Weevils of several sorts, and Wasps, amongst other animals, cause the grower not a little anxiety. They are, however, easily disposed of as compared with the Phylloxera, and methods for successfully dealing with them will be given under their respective headings in the Chapter "On Pests Generally."

Fungoid diseases are also fairly numerous and correspondingly harmful. Powdery Mildew (*Uncinula spiralis*—*Oidium Tuckeri*) is one on the commonest, and the symptoms of attack are so well marked they should be readily seen. The patches of greyish Mildew upon the upper surface of the foliage are very characteristic. Less frequently the fruit itself is attacked, turns brown, and cracks. Flowers of sulphur, distributed with the bellows, will get rid of the disease if applied as directed by the well-known authority on plant diseases, Mr. Galloway. He advises the first application ten or twelve days before the flowers open, and



FIG. 659.—STEM AND LEAF OF VINE ATTACKED BY PHYLLOXERA VASTATRIX.

a second when they are in full blossom, the thermometer at the same time registering from 80deg. to 100deg. Fahr.

Sclerotinia Fuckeliana is far more destructive than the Mildew: it attacks all parts of the plant, which are covered with a greenish mould. So soon as the disease is noted, the affected parts of the vine should be cut off and burned; while spraying with potassium sulphide ($\frac{1}{2}$ oz. to the gallon of water) should be resorted to. Next season spraying with the latter should again be employed as a preventive measure.

Gleosporium ampelophagum, known popularly as Bird's Eye Rot and Grape Anthracnose, is a very undesirable visitor in a vinery. The popular names are well bestowed, as the "spots" on the fruit have a fanciful resemblance to eyes. They consist of a greyish nearly circular patch, with brown margins, whose edges are of a bright red. Shoots, leaves, and fruits are all attacked, and the last-named shrivel and drop. All the parts affected should be cut out and burned. The vines should be dusted with the ordinary flowers of sulphur, leaving more

radical treatment until it can more safely be performed. What is known as the copperas treatment has found considerable favour both in America and in France. It consists in "washing" the vines when completely at rest with iron sulphate, 6lb.; water, 14gals.; prepared in a tub.

Medlar.

IN THE OPEN.—These highly-ornamental trees are a great success upon both the Pear and the Whitethorn stocks, flowering freely and bearing huge crops of fruit on fairly good soil that is well drained. The Dutch (Monstrous) is the largest-fruited variety; the tree has a spreading habit as compared with the more compact-growing Nottingham, which is considered by connoisseurs to be the richest flavoured variety; its fruit is small and produced abundantly. The Royal has a distinct and somewhat sharp flavour; the fruit is of moderate



FIG. 660.—FRUITING BRANCH OF ROYAL MEDLAR.

size (Fig. 660), and the tree is a good bearer. Medlars should not be gathered until they separate readily from the tree; they should then be spread out thinly in a cool, airy room, and eaten as they become decayed.

Melons.

UNDER GLASS.—The Melon can scarcely be termed "highly remunerative" for market, but its fine delicious flavour causes it to take a prominent position on both dessert and exhibition tables. The finest fruit is unquestionably obtained from low houses or pits,

having bottom-heat for the roots as well as a good top heat for the plants; the bottom-heat may be furnished by fermenting material such as litter from stables, or by hot-water pipes underneath slates or slabs on which the soil is placed. The soil for Melons should, if possible, be rather heavy and possess plenty of fibre; and if it is placed on the slabs or fermenting material a day or two prior to the time for planting, it will become thoroughly warmed through, and be in a correct condition for the young plants that have been raised in pots from seed. A mistake is frequently made in putting the young plants deeply in the soil: as little as possible of the stems should be buried, otherwise Canker will most probably set in, and the whole crop be in danger. A moist growing atmosphere is desirable, with a night temperature of 65deg., rising 5deg. or 10deg. by day.

Prompt attention should be given to tying the growths to the trellis on the roof, avoiding any congestion of growth by removing surplus shoots with the finger and thumb as they appear. When the young fruit is forming, the point of the shoot is best pinched out one leaf beyond the embryo fruit, and while the female flowers are open, a rather drier atmosphere ought to be given, as this will assist in securing a good set. In the early part of the year all the female flowers should be fertilised with the pollen of the male flowers; later on bees and insects will perform the work. When it is seen that there is a good set, all fruits, except four of the best and most even in size, should be cut away; those remaining will be ample for the plant to carry. Plenty of atmospheric moisture is desirable, and every effort should be made to swell the fruit to a large size by means of weak liquid manure; measures should also be adopted to support the fruit by strings or other means when it is about the size of a small Orange. Immediately the fruit shows signs of ripening by the aroma given, syringing should cease, water at the roots should be supplied sparingly, and more air admitted on all suitable occasions. This will improve the flavour, and prevent splitting of the fruit. When there is a small crack all round the stem of the fruit, it is ready for cutting, and, after being in the fruit-room a few days, it will soften and be in prime condition for dessert. Hero of Lockinge, Golden Perfection, and William Tillery are three good green- or white-fleshed varieties; and Blenheim Orange and Gunton Scarlet are two excellent scarlet-fleshed ones.

Mulberries.

IN THE OPEN.—All the Mulberries enjoy a warm position and good soil. With these aids they are very fine, and by some people the fruit is much esteemed. The large Black, White, and the Weeping Russian White Mulberry are all excellent; the last-named makes a very handsome tree on the lawn.

Nectarines.

IN THE OPEN.—Of late years a very marked advance has been made in these delicious fruits. New varieties have been introduced by Messrs. Rivers and Sons, Sawbridgeworth, and also one by Messrs. J. Veitch and Sons, Chelsea, which enable the cultivator to pick ripe fruit outside on open walls at the end of June or early in July, thus prolonging the season for several weeks. The chief points essential to success are a warm situation, good drainage, suitable soil, a correct method of pruning and training the trees, and perfect cleanliness. In some parts of the North really excellent crops of Nectarines are grown; but unless the situation is very favourable indeed, the planting of trees outside cannot be recommended very far north of the Trent. Further South there should be little difficulty in growing both trees and fruit to perfection; providing the points already enumerated receive requisite attention. Walls facing the south or south-west, and sheltered from cutting draughts of wind, are the most suitable aspects for Nectarines (these remarks also apply to Peaches), and such sites are available in almost every garden of any extent.

Having decided on which wall the trees are to be trained, the first operation should be to see that the drainage is in good order. If the soil is resting on gravel, no artificial drainage will be necessary, as all surplus water will quickly disappear. But if on rock of any kind, it may prove too wet for the good health of the trees, and it will be better to make quite sure by putting in a drain a few feet from the wall. Again, where the sub-soil is of a clayey nature, it is wise to drain; in fact, the importance of good drainage for fruit-trees can scarcely be over-estimated, especially when of a tender disposition, like the one under notice. Soil properly drained is much warmer in winter and cooler in summer than undrained ground, and therefore the former is a more suitable rooting medium. Soil varies so much in different gardens, that the local conditions must rule what should be done to make it in a proper state for the future welfare of the trees. If very light, the addition of marl or heavy loam is desirable, as Nectarines enjoy a moderately heavy soil. On the other hand, if it is tenacious or heavy, the addition of burnt garden refuse, road-scrapings, or parings is beneficial. In each case the new soil should, if possible, be of a fibrous character. Deep borders should be avoided. If only about 2ft. deep they will be all the better for the trees, and every effort should be made to retain the roots in the 2ft. border; when they descend in quantity to a lower depth they are beyond solar influences, and often get into something more or less injurious, causing gumming or unripened wood. In thousands of instances no great care has been taken to prepare any border whatever, but there has been naturally a good situation, or if not the trees have succeeded very well for a few years and

then gone into a state of collapse ; therefore, unless it is assured that no improvement is necessary, it will prove more satisfactory to do the work well in the first instance.

When the trees arrive for planting, all wounded or jagged roots should be cut back. When planting, the roots ought to be spread out evenly and within a few inches of the surface, deep planting being always avoided. No manure should be incorporated with the soil ; but if this is heavy, a little lime-rubble or plaster refuse may with advantage be mixed with it when planting, making all thoroughly firm about the roots. Loose soil frequently induces a sappy growth, which does not mature, and is followed by losses of wood from frost, while fruit is afterwards conspicuous by its absence. On the other hand, a firm root-run means solid wood, well matured, and bristling with fruit-buds that usually set in abundance. After planting, a mulch of strawy manure will conserve moisture and assist the formation of new roots. The best time to plant is the end of October, but in many cases this is impossible, owing to conditions over which the grower has no control. If the trees cannot be planted in the autumn, it is better to defer the operation until February : mid-winter planting is seldom advisable unless the weather is open and the soil in a good, free-working condition.

A great mistake is often made in feeding the trees too early with natural or chemical manures, provoking a rampant growth and rendering root-pruning necessary to bring them into a fruitful condition. No manure of any kind is necessary until they have commenced to fruit, and even then weak applications are best, strong doses doing more harm than good.

The training of the Nectarine-tree, in its young stage particularly, requires a certain amount of care, as unless a good foundation is laid in the first instance, a poor and ill-shaped tree is the result. The first and most important point is to form the lower part of the tree by training the lower limbs, or branches, and leaving the middle open ; the centre of the tree will always fill up later. If undue vigour is shown by any of the branches while growing, such should have their points removed once or twice during the summer ; this will act as a check on their vigour, and also assist to keep the tree in balance, *i.e.*, to retain each side of it of similar size. In the spring many more shoots will appear than it is possible or advisable to allow to remain, rendering it necessary to disbud the trees. This system of disbudding should be done gradually ; if the buds were removed all at once a check would be given to the tree. All the worst-placed buds should be rubbed off first, especially those that face outwards, for if left these would make fore-right shoots that would eventually have to be cut out. Gradually the other buds or shoots should be removed, leaving only those necessary to fill up blank spaces on the wall, or to increase the size of the

tree. Another point is to take care that buds are left in the middle of the tree to cover bare wood; in fact, they should be arranged that young wood is evenly distributed over the whole of the tree without overcrowding in any part—about 6 in. between the young shoots will be ample space. A little judgment and experience will soon enable anyone to understand disbudding. For the benefit of novices, however, it may be

stated that this operation is usually performed immediately after the fruit is set, and when the young shoots are from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in length. As the young shoots elongate they must be carefully fastened in proper positions to prevent breakage.

Thinning of the fruit ought to receive early attention, first taking off all the worst-placed fruit when about the size of peas, and leaving the most prominent ones that are in a position to swell up to a large size without hindrance, to get all the sun and light possible. No further thinning of the fruit is desirable until after the "stoning" period; then, if the tree is not very vigorous, a few more fruits may be removed. The

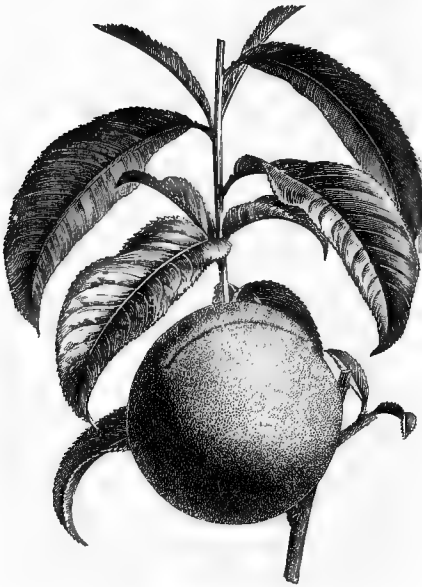


FIG. 661.—FRUIT OF NECTARINE.

stoning season is sometimes an anxious one, for if the trees are not in good health they are apt to cast a proportion of their crop; while if in vigorous condition little, if any, of the fruit (Fig. 661) will fall.

The pruning of Nectarines is, in our opinion, best done in the autumn, soon after the fruit is gathered, and when all further growth is stopped for the season, cutting away all very weak or exhausted wood, and bearing in mind the importance of retaining and encouraging young wood near the centre of the tree. By cutting back a long shoot or branch to a young piece springing from its base, it is a comparatively easy matter to keep plenty of young wood all over the tree; but if once the centre of the tree become bare of young growth it will be a most difficult task to get it filled again. Some growers cut back their trees

severely during the winter pruning, and no doubt they could defend their policy; but in these days cultivation is carried on at express speed, and it is remarkable how quickly a tree may be developed into a large and fruitful object by adopting what is termed the "extension" system. In this method very little cutting back is practised—only what is absolutely necessary to keep the tree in form—the aim of the grower being to cover as much wall space in as little time as possible with good, solid, well-ripened wood. In this way big trees that will produce a large crop of fine fruit are obtained in a few years.

In our fickle climate some kind of protection is necessary when the Nectarines are in blossom, especially if the flowers are at all damp, for they are then much sooner injured by frost than when perfectly dry. Ordinary fish-netting, doubled or trebled in thickness, and hung from the top of the wall, and 1ft. or 2ft. from the trees, affords great protection; scrim canvas, calico, Frigi Domo, and tiffany are also excellent. The glass copings, that project about 2ft., are very serviceable, but whatever is employed no coddling should be permitted, and no covering be used unless really required to protect from frost. Much harm is done by mistaken zeal in covering the trees in all weathers while in blossom. In fact the object of the grower is defeated, as the air and light requisite to secure the distribution of the pollen and a good set of fruit are prevented by the shade made by the protecting material.

In warm localities and against a south wall the new Early Rivers is one of the earliest and best of Nectarines to plant; it possesses a good constitution in addition to being a free bearer of fruits of excellent flavour. A still later new early variety is Cardinal, a splendid sort for culture under glass, but uncertain outside; it is likely to prove valuable for early forcing. Lord Napier is well known as a sterling variety for outside culture, being early, large, handsome, of fairly good flavour, and an abundant bearer. Goldoni is another early sort, of great excellence in every respect, and follows the two last-named in order of ripening. Dryden is a mid-season variety, very handsome, of delicious flavour, a free bearer, and with a strong, vigorous habit; it can be highly recommended. Elruge is such a well-known and excellent variety, that scarcely any praise of it is needed; like the last-named, it is a mid-season sort. Humboldt is a very fine successor to Elruge; it is a hardy and prolific variety, of fine colour and flavour. Pineapple is probably the richest-flavoured variety in cultivation; when planted in good soil and in a warm, sunny position, the fruit is large and of a beautiful colour, and the tree is a great cropper. Spencer and Victoria are two very late sorts: the former is a reliable variety on most soils, and of good quality; the latter is first-rate in every respect on some soils, and a complete failure on others, and for that

reason it will be advisable to plant it cautiously. The above are in their order of ripening.

Here it may be remarked that Nectarines should not be surfeited with either liquid or solid manure, natural or chemical. What they most enjoy are rather weak applications, frequently repeated; the roots can then take up the plant-food supplied with advantage to the trees and crop, and there is no waste of fertilising matter. Potash, bone-meal, and superphosphate are all beneficial, and are a welcome change from farmyard manures.

UNDER GLASS.—Nectarines under glass require to be treated exactly as for Peaches, which *see*.

Nuts.

IN THE OPEN.—Both the Cob and the Filbert are of the easiest possible culture, and will grow and fruit freely on heavy or light, deep or shallow soil, with very little attention. They are free in growth, and bear moderately good crops of Nuts when planted in shrubberies, or on the margins of plantations or woods of forest trees; in fact, it would be difficult to state on what soils and situations they would refuse to grow, provided that they had fair drainage. Unsightly banks could be planted with Nuts very profitably in many parts of the country where squirrels are not numerous. Rats and mice are troublesome; it is astonishing how many of the Nuts these animals will not only spoil but carry to their nests: hence, if planting land with Cobs or Filberts with a view to remuneration on the outlay, steps should be taken to keep down the numbers of such animal depredators. It must not be imagined that poor soil is most suited to Nut culture; for though they will pay almost better than any other crop on poor land, yet they thoroughly appreciate rich soil and generous treatment, as is proved by the great crops of fine Nuts borne under those conditions. However, in many large and small gardens space is so valuable that it is most economical to plant the Nuts in one corner or in some other out-of-the-way place where no other trees would be useful; and there can be no question that this plan has much to recommend it.

Frequently the query is put, What is the difference between a Filbert and a Cob Nut? The answer is that a Filbert is quite covered by the outer husk, while the Cob Nut is not entirely covered, the husk, as a rule, only reaching about three-fourths of the way over the Nut. Opinions differ very much as to which—the Cob or the Filbert—is the better to grow for crop and flavour. Probably the well-known Kentish Cob is the heaviest bearer, and it succeeds admirably either as a bush or standard tree, consequently it is a favourite market variety. Cosford is another excellent free-bearing Cob; so also

is Merveille de Bollwyller, the latter having very thick shells, and being one of the best for keeping. In Filberts Lamberts is a very good variety, producing its large clusters in great abundance. Prolific, or Frizzled Filbert, is another remarkably free sort, the flavour being very good; it is always liked on the dessert-table. The Purple Filbert is a very attractive sort; its large, deep purple foliage and fruit make it one of the most ornamental denizens of the shrubbery, and the fruit is of good quality, though not so freely produced as on some other varieties.

The distance apart to plant Nut-trees will depend a great deal on the soil. If this is thin and of poor quality 10ft. apart each way will be ample, but if it is rich and fairly deep 14ft. apart will be a very suitable distance. In all cases it is advisable to break up the ground well, to thoroughly cleanse it of weeds, and to have the ground ready for planting in October. Of course, circumstances may prevent such early planting, and in such cases the operation may be undertaken at any period between the end of October and the end of February, selecting a time when the soil is in good working condition and does not adhere to the tools. It is best to purchase trees on a leg, or stem, thus avoiding innumerable suckers from the base, and this also permits of hoeing, &c., under the trees. Immediately after planting a mulch of strawy manure should be placed over the roots; nothing in the form of strong manure should be applied until the trees are well established and producing good crops of Nuts, when it is most efficacious if given as a mulch, and not dug in amongst the best fibrous roots, as is only too frequently done.

The formation of the tree requires a little judgment. In order to get the head well proportioned, about ten or twelve main branches should be encouraged to radiate from the leg, or stem, at as nearly even distances as possible from each other. If one or more branches outgrow the others, and are likely to throw the head on one side—to make it, as gardeners say, “lop-sided”—the offending shoots should have their points cut away: this will check them, and add to the strength of the weaker branches. When the main branches are fairly well developed, a twiggy growth ought to be encouraged from them, not overcrowding the small wood, as it is on this that most of the crop is produced. The middle of the tree should be kept open, so that plenty of light and air can penetrate to all parts. Most fruit-bearing trees are pruned during the late autumn and winter, but this is never advisable with Nuts. The object of late pruning is that there may be an abundance of male catkins to produce pollen to fertilise the female flowers. If the trees were pruned during the winter, very possibly there would be a scarcity of male flowers, and the trees would be barren through a lack of

pollen. The flowers are quite separate and distinct; the male flower is produced earlier than the female, which is quite small, red, and in the form of a small tuft, rising from a semi-globular growth on the twiggy shoots. No doubt the proper and best time to prune is towards the end of March. It consists in keeping the head not only within the necessary bounds, but also free and open, removing growth where congested, and shortening back the young wood if unduly long. Any useless or exhausted wood should be cut away, and all suckers promptly removed, unless required to increase the number of trees. Opinions vary as to which make the best trees—those raised from suckers or those from layers. Our experience is that suckers make the largest trees in the shortest period, but that layers make by far the most fruitful trees. Large shoots or branches may, if desired, be layered, simply notching the shoots on the under-side or making a cut half-way through the wood, and then pegging the same 2in. or 3in. deep into the soil. In a year or so the layers will be well rooted, and may be planted out in permanent positions, or in nursery quarters until wanted for other purposes.

One of the best modes of keeping nuts fresh and plump is that advised in "Fruit Culture for Amateurs,"* as follows: "It is requisite to allow the Nuts to become thoroughly ripe and brown. Then gather them, and lay thinly on dry shelves with plenty of air playing on them. In a week or ten days the

husks will be quite dead and dry, and the Nuts will then be fit to place in jars with a little salt mingled with them, fastened down airtight, and stood in a cool, dry place. They will keep fresh and good for months."

Nut-trees have comparatively few pests. The commonest is the Nut Weevil, whose well-nourished grub must

be familiar to everyone who partakes of Nuts. Scientifically it is known as *Balaninus nucum* (Fig. 662). The female Beetle bores a hole into the young fruits and deposits therein a single egg, which eventually hatches out into the grub referred to above.



FIG. 662.—NUT WEEVIL AND GRUB.

* "Fruit Culture for Amateurs" (L. Upcott Gill). By S. T. Wright. With Chapters on Insect and other Fruit Pests by W. D. Drury. Second Edition. Illustrated. In cloth gilt, price 3s. 6d.

This feeds upon the kernel, the Nut usually falls, and the maggot escapes in the way shown in Fig. 662, and pupates in the soil. Tar should be spread upon boards or stiff paper and placed beneath the trees towards the end of May. The trees should then be shaken, and the fallen Beetles destroyed. All unsound Nuts should be burned, and a dressing of quicklime placed beneath the tree as the Beetles were about to emerge from the soil would be useful.

Phytoptus Avellanæ, a relative of the Currant Bud Mite, gives trouble, and the only plan is to hand-pick the abnormal buds and burn them. There is also a bluish-green and yellow Sawfly caterpillar (*Cræsus septentrionalis*), which soon defoliates a tree if left alone. It is fairly abundant in early summer, and pupates in the soil. For remedies, see "Sawflies" in Chapter "On Pests Generally."

Peaches.

IN THE OPEN.—As the culture and treatment of the Peach is exactly similar to that advised for Nectarines, it is here only necessary to give a description of the best varieties, placed in their order of ripening. Waterloo is probably the best early Peach we have, being hardy, setting its fruit well, large, handsome, of good flavour; it ripens outside against a warm wall in the third week in July. Amsden June and Early Alexander are only a few days behind the first-named, and also succeed very well outside. There are several other very early varieties, but they will not compare at all favourably with the three above-mentioned. As a successor, Hales' Early is a very large, handsome, and delicious fruit, and an abundant bearer. Condor closely follows in ripening its large handsome fruit, which is of exquisite flavour. Rivers' Early York is another grand variety in use about the same time as Condor; both are free bearers. Dagmar is usually a few days later, and is a large fruit with a brilliant colour, and of first rate quality; the trees always bear well. Crimson Galande is another highly-coloured variety of the finest flavour, large, and a free bearer. Violette Hâtive is in use about the same season as the last-named, and is a most reliable variety, bearing heavy crops of large, well-flavoured handsome fruit. Royal George is a well known and popular Peach; unfortunately, on heavy soils it is subject to Mildew, consequently, it should only be planted in warm soils that are well drained, when it proves one of the best varieties in commerce. Barrington is a really magnificent sort when true, and is hardy and prolific, with large fruit of the first size and quality. Bellegarde is a magnificent late Peach, of high colour and exquisite flavour; a great cropper, and quite hardy. Late Devonian is a new variety that promises to be a decided acquisition, being large, handsome, and of delicious flavour. The Nectarine Peach and Walburton Admirable are two very good late varieties of proved merit, and rich flavour.

There are several other late Peaches, Sea Eagle, for instance, that grow well and produce excellent crops of fruit; but the quality can scarcely be termed good by anyone, and for that reason alone they are not included here.

UNDER GLASS.—The system of disbudding and pruning the trees is exactly the same as that already advised for trees outside. The same advice also applies to the thinning of the fruit. Peaches and Nectarines in pots are annually becoming more popular in the gardens of the wealthy, as very fine fruit can be forced on such plants, and when the crop is all gathered the plants can be stood outside, and a late crop of Tomatoes grown in the house before it is wanted for Peaches again. The varieties already named as succeeding outside are equally suitable for inside culture.

A compost of good fibrous loam, with a little bone-meal and oyster-shells broken up, or mortar rubble, thoroughly mixed, will suit the trees admirably. Only moderate-sized pots should be used; in fact, large ones, except for trees of considerable size, are a disadvantage. In potting the drainage should be free and good, and the compost rammed firm about the ball of soil and roots, as a firm root-run is essential to success with all stone fruits.

If early Peaches and Nectarines are desired from planted-out trees, the house should preferably be in the form of a sharp lean-to against a south wall, with four rows of hot-water pipes; in such a structure the cost of heating is not very great, owing to the comparatively small area. Later houses may, with advantage, be more imposing erections, and in the form of a lean-to with raised front, or the roof of curvilinear form, the trees being trained on a trellis up the roof. Very good fruit indeed is also grown on bush-trees planted out in a span-roofed orchard-house, provided due attention is paid to disbudding, eradicating insect pests, &c.

In whatever style the trees are grown, and whether forced very early or not, it is very important to start them gradually, or they will cast their buds. A temperature of 45deg. at night, rising 5deg. by day, will suffice until the trees commence to unfold their buds; then it may be gradually raised 10deg. Syringing with tepid water in the morning and again early in the afternoon should be practised on all bright days, also damping all the border, and especially near the hot-water pipes; for unless this is done Red Spider is almost sure to appear. Syringing of the trees ought to cease when they are in blossom; but immediately the fruit is properly set, syringing well both over and under the foliage is necessary, maintaining a genial atmosphere, and ventilating carefully on warm days, as the heat in the houses rises, but always closing with a good sun-heat in the afternoon. When the fruit is ripening syringing must cease, but it should be resumed when all the fruit is gathered, and all ventilation possible

given. Manure in a diluted form from the farmyard, or the chemical manures now on the market, are all very good and essential when the trees are bearing good crops.

Peach Curl is a very common disease due to the fungus *Exoascus deformans*. As the specific name implies, it deforms the parts affected. The leaves are curled, blackened, and frequently distorted, but the branches also participate, and the trees generally are much injured. Apart from the characteristics above noted, the leaves affected assume a yellowish or red colour, and fall. The disease manifests itself in spring, and both infested leaves and shoots should be removed and burnt. Spraying with a weak solution of Bordeaux Mixture should be used to prevent the spores which are disseminated, from germinating, and thus increasing the area of infection.

Pears.

IN THE OPEN.—For market purposes the Pear is one of the most uncertain fruits that are grown in this country; but for private consumption it is essential that some trees should be planted, the actual number of course depending on the size of the garden and the requirements of the family. The old idea that Pears are such a long time in arriving at a bearing state is now quite exploded. Really good Pears are produced the second year after planting; indeed, many trees will bear the first year, but it is never advisable to permit this, as it weakens them before becoming well established, and so induces a stunted habit that will cling to the trees for years.

As already mentioned in another part, gardens are so different in their soil, &c., that no hard and fast rule can be laid down as correct for all alike; local conditions must determine not only the best form of trees and the most suitable stocks, but also to some extent even the varieties, otherwise mistakes may be made that would have a very evil influence on future results. The question of stocks for Pears is a very serious one, and careful consideration as to the one likely to prove most serviceable on the soil in hand, and the form of tree best adapted to the position, is essential. On a light, shallow, or very hot soil, the Quince is nearly always a failure, for even though it frequently succeeds admirably for a few years, it is practically certain to fail eventually and drag on a miserable existence; one or two dry, hot seasons will so cripple the trees, in spite of watering or mulching, that they will be of little value afterwards. If we could always depend on moist summers the Quince stock might be employed; but as we have no control of climatic or atmospheric conditions it will be best to purchase trees worked upon the Pear stock for the hot soils named, as the roots of this stock extend further and penetrate more deeply than the Quince roots, consequently they do not suffer from drought to the same extent. On deep, rich

soils the Quince stock is much the best for *all* dwarf or restricted trees, as the roots only extend to a limited area ; therefore the growth is moderate and fruitful. If the trees were on the Pear stock in rich soil there would always be trouble in preventing strong, rampant wood and foliage, with little or no fruit. Standards should, however, always be on the Pear stock to obtain large trees.

The advice already given in the section on Apples as to drainage, time of planting, pruning, &c., is also equally applicable to Pears, and for that reason only descriptions of the varieties that answer the best on the different forms of trees are here necessary.

Cordon-Trees.—When it becomes more generally known how admirably Pears succeed as cordon-trees against walls they will be planted on a much larger scale than at present. Not only do the trees produce abundant crops, but the fruit is also large, of fine colour and quality, and therefore valuable for home use or for exhibition. In fact, some of the most noted Pear exhibitors obtain their prize fruit from cordon-trees. The following varieties crop freely if planted 18in. apart and are properly attended to afterwards, as advised for Cordon-Apples: Alexandre Lambré, a medium-sized Pear of very good quality on most soils, and usually a great bearer; ripe about the middle of November. Baron Leroy is a new and very promising variety of large size and good colour; ripe at the same time as the last-named, and should prove a fine exhibition sort. Beacon

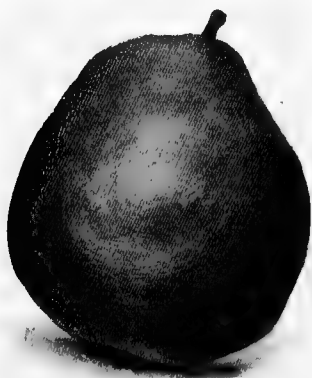


FIG. 663.—PEAR THOMPSON'S.

is a large and very handsome variety, of fair quality; middle of August. Beurré Alexandre Lucas and Beurré Fouqueray are two large handsome varieties of fine flavour, and when better known will be in demand for exhibition. Beurré Baltet Père is usually a grand Pear on cordon-trees, being very large, highly-coloured, and of rich flavour; end of November. Beurré Hardy is very fine on all forms of trees, excellent as a cordon, and of fine quality; October. Beurré Mortillet is a new variety, a good grower and bearer, of first-rate flavour, very large, and is sure to be largely grown in the future; September. Beurré Superfin is a well-known delicious and prolific variety; November. Bon Chrétien (Williams), a well-known favourite, ripe in August; but to get it at its best the fruit should be picked a little before it is

fully ripe, and placed in a fruit-room to finish—not on a vinery or greenhouse shelf, as is frequently done. Clapp's Favourite cannot be termed first-class in flavour, but it is useful for its earliness, large size, splendid appearance, and free-bearing; August. Directeur Hardy is a new variety that is said to be of superior merit and a great bearer of large fruit; November. Doyenné du Comice is probably the finest Pear in cultivation, surpassing the well-known Marie Louise, and may be strongly recommended as a cordon or trained tree against a wall, producing heavy crops of large, handsome fruit; November. Duchesse d'Angoulême is only valuable for exhibition purposes; the fruit is very large, and freely produced, but decidedly second-rate in flavour; November. Durondeau is a very handsome Pear, of good size, delicious flavour, and a great cropper; October. Glou Morceau is a valuable variety, and should be left on the tree until beginning to fall; it will then afford a supply of fruit of excellent quality about Christmas and the New Year. Le Lectier is a new variety, promising to be a great acquisition; small cordon-trees have borne large fruit, of fine flavour, ready for use in February. Louise Bonne de Jersey is a well-known and reliable variety, and though it bears profusely as a cordon, we consider it best flavoured from bush or standard trees; October. Marie Louise is another universal favourite, succeeding well as a cordon; November. Marie Benoist is a large, fine-flavoured variety, fruiting abundantly; December. Magnate, a large, handsome variety, a good grower and bearer; October. Marguerite Marrillat, a new, very large, handsome variety, of delicious flavour; September. Nouvelle Fulvie is large, but not handsome, of good flavour, and a heavy cropper; January and February. Pit-maston Duchess, of enormous size on cordon-trees, fine golden

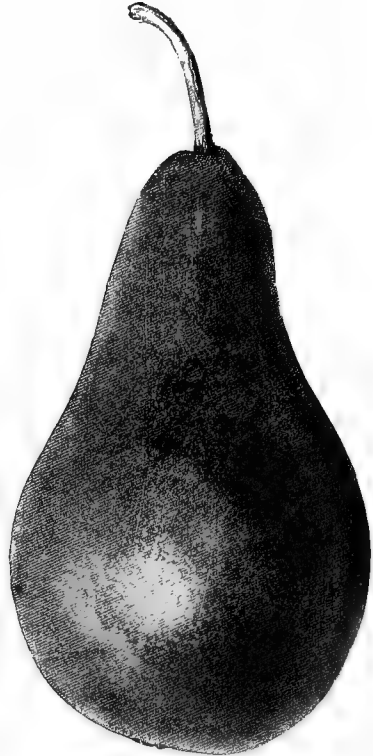


FIG. 664.—PEAR CONFERENCE.

yellow, of good shape, and fairly rich flavour, indispensable for exhibition; October and November. *Souvenir du Congrès*, a very large, handsome variety, of first-class flavour; August. All the above answer admirably as cordon or any other form of trained trees planted against a wall, and are free bearers of large, handsome fruit, suited for exhibition. To have the fruit thoroughly developed, all deformed or badly-placed fruit should be pulled off while small, taking care not to over-crop, and

feeding the bearing trees occasionally with diluted liquid manure or some of the prepared manures advertised.

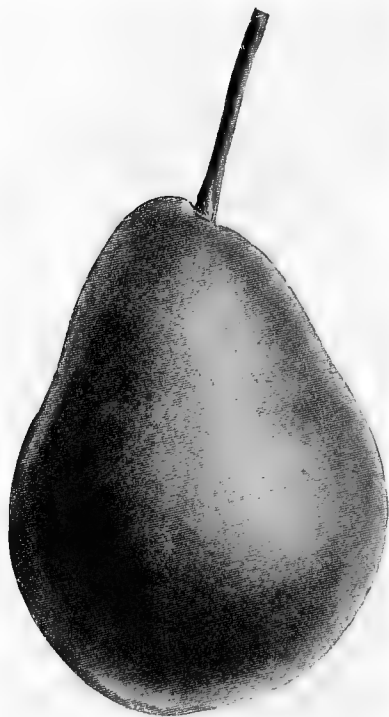


FIG. 665.—PEAR LEON LECLERC.

The following are smaller varieties of excellent quality succeeding on cordon or trained trees. *Baronne de Mello*, a delicious November Pear, a great bearer. *Beurré Giffard*, a rich flavoured variety, ready for use early in August. *Beurré d'Amanlis*, large under good culture, of excellent flavour, and a free bearer; September and October. *Beurré Goubault*, an enormous cropper and of good flavour; September. *Doyenne d'Été*, a delicious little variety; ripe in July, and should always be eaten from the tree, for if kept a few days the fruit is mealy in taste. *Fondante d'Automne*, a very fine October Pear of the highest quality, and a heavy cropper. *Jargonelle*, a delicious variety

in its season, but not suitable to grow as a cordon. *Josephine de Malines*, one of the most valuable Pears. The tree bears most profusely in all forms, and the fruit is rich and late, generally in use about February or March. *Knight's Monarch* is first rate on many soils, and is in use at the same time as the last-named. *Seckle* is an exquisite little variety, but more suited for bush or standard trees. *Thompson's* (Fig. 663) is a grand variety when against a warm wall, the flavour being very rich and distinct; November. *Winter Nelis* is a valuable mid-winter variety;

the tree should have a warm position, when the fruit is of the highest quality.

All the varieties mentioned will succeed not only as cordon or other trained trees, but also as bushes or pyramids, except those recommended to be planted against a warm wall; these would be doubtful as trees in the open, unless the locality were specially favourable. The warmest and most sheltered position in the garden should be chosen for the bush or pyramid Pear-trees, as they are easily injured by cold winds and frost, and every effort should be made to keep the trees healthy and vigorous without grossness.

Standards.—In many parts of the country, Pears make large and prolific trees when planted as standards, and where this is the case, they might with advantage be dotted about the pleasure-grounds or park as isolated specimens, or arranged in clumps. Regarded merely as objects of beauty, they are magnificent when in full blossom, and in many seasons they produce immense crops of fruit. *Stewing Pear* have been much neglected by planters, yet the well-known and excellent stewing variety, *Catillac*, makes a large tree as a standard; it is one of the hardiest and most fruitful sorts that can be grown, and should be much more extensively planted. And not only is it the best stewing Pear, but it also keeps well into March. *Verulam* is another stewing variety in use up to the end of March. The tree is a strong grower, hardy, and prolific.



FIG. 666.—PEAR BEURRÉ ANJOU.

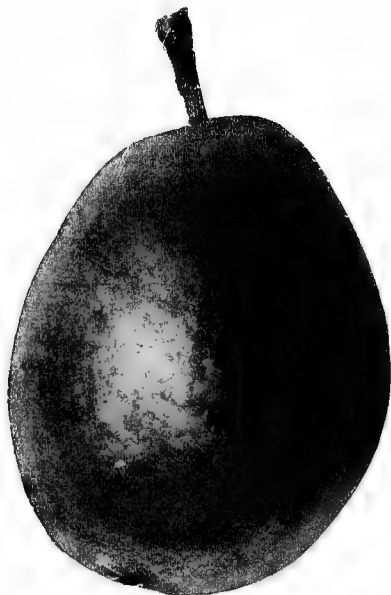


FIG. 667.—PEAR EMILE D'HEYST.

The following are *Dessert* kinds that succeed admirably as standards on good soils: Beacon makes a good tree, and crops



FIG. 668.—PEAR DES DEUX SŒURS.

freely; when the Pears are ripe in August, the tree is very effective, most of the fruit being highly coloured. Belle Julie is not a very handsome or a large fruit, but the tree is a free bearer, and the fruit of very pleasing flavour. Beurré d'Amanlis is excellent in flavour, and quickly develops into a large, spreading tree on good soil. Clapp's Favourite is a tremendous cropper on standard trees, and is much improved in flavour when in an open situation. Colmar d'Éte is another great bearer; the fruit is small but of exquisite quality. Dr. Jules Guyot is, like the last-named, a September Pear, but large, handsome, and a continuous bearer. Durondeau makes a splendid and fruitful tree, and should always be selected. Eye-wood Bergamot is another really first-rate variety, being hardy, strong, and a great bearer; its delicious fruit is ready about November. Elton is a September or October variety; the tree is hardy and vigorous, and the fruit of rich flavour. Louise Bonne de Jersey and Marie Louise d'Uccle are two October varieties, and are heavy bearers of large, handsome fruit. On warm soils Ne Plus Meuris is a desirable variety as a standard, fruiting freely, and ripening in February. The delicious little Seckle is a most productive variety, and well worth planting. Aston Town is an old but now somewhat rare variety of the highest quality; it ripens in September, and is one of the greatest bearers.



FIG. 669.—PEAR MARIE GUISE.

Other good varieties for bush, wall, or standard trees are: Conference (October) (Fig. 664), Leon Leclerc (December) (Fig. 665), Beurré Anjou (November) (Fig. 666), Emile d'Heyst (November) (Fig. 667), Des Deux Sœurs (October) (Fig. 668), and Marie Guise (February and March) (Fig. 669).

With few exceptions the animal pests of Pears and Apples are identical. Of those which may be considered peculiar to the former is the Pear Midge (*Diplosis pyrivora*) and the Pear-leaf Blister Mite, responsible for the blisters (Fig. 670) which damage

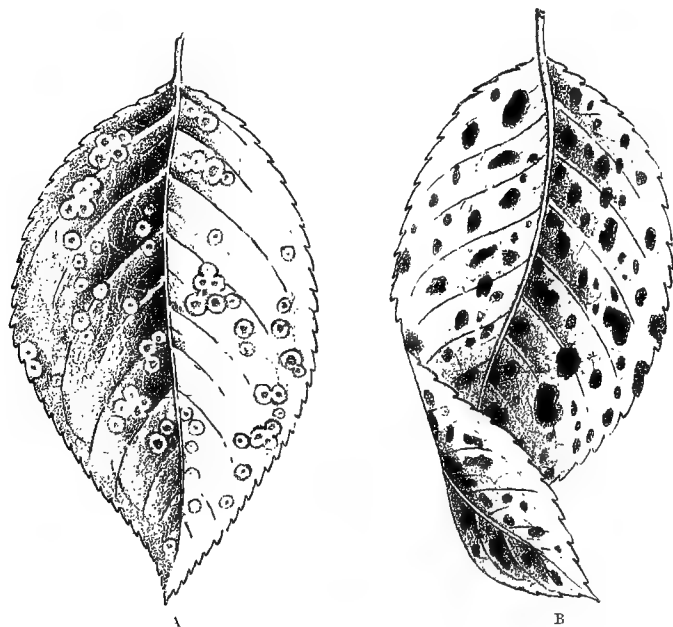


FIG. 670.—LEAVES OF PEAR ATTACKED BY BLISTER MITE.

(A) Leaf recently attacked; (B) Leaf with Old Galls.

the foliage. Each of these blisters has a minute hole in the centre below. At first the discolorations are red, but ultimately they are black. Removal of the infested leaves in spring and burning them is a laborious but certain method of lessening the attack another season, especially if this be followed early in the next year by spraying with a solution of kerosene emulsion—using one part of this to six parts of water.

Diplosis pyrivora is a dipterous gnat-like fly, which appears in the early spring, the females depositing their eggs in the

unexpanded blossoms. The larvæ when hatched enter the young fruit, hindering its growth, causing it to be deformed, to crack, and eventually to fall. The pupal state is assumed in the soil, and the insect passes the winter in that condition. Spraying with arsenite is not of much good, as to do so when the fruit-trees are in blossom would be to sacrifice the whole crop; while, once the insects are in the young fruits, they are perfectly safe from insecticides. Preventive measures consist in the collection of the fallen fruits which show signs of infestation, and burning them before the larvæ can enter the ground to pupate. In America, kainit, as a dressing under the trees in late summer, has been found of service, using it at the rate of half a ton per acre. The gnat is only 2mm. long, and the larva also about 2mm., yellowish, and footless. These larvæ are very lively, and move by a series of jerks and bends much after the fashion of the aquatic larvæ of certain relatives. Infested fruits which are hanging might readily be shaken on to sheets laid under the trees.

Gymnosporangium sabinae is a heteroecious fungus responsible for a peculiar disease, characterised by blotches of a yellowish-red colour in autumn. This is but one stage in the life-cycle. The dark-reddish teleutospores are developed on certain species of *Juniper* (of which the common kind is one) in spring. In combating this disease the difficulty lies in discovering the whereabouts of this host-plant. It may be in the garden of a neighbour, who might object to having his trees destroyed for what he may regard as a fad. The Pear-tree stage is sometimes known as Pear-leaf Rust (*Roestelia cancellata*).

Plums and Damsons.

IN THE OPEN.—Wherever the common Bullace will fruit, Plums and Damsons will also succeed; in fact, when the drainage is good, almost any soil will grow them well, although some varieties of Plums will not prove satisfactory in cold or exposed situations; all the Gage class require a fairly warm soil and position. Others are reliable even in cold localities, and of these hardy varieties Dove Bank is a very good one. The Czar, White Magnum Bonum, Victoria, Orleans, and Sultan have all proved hardy and fruitful under what may be termed unfavourable conditions. Again, in Apple-growing counties, when old orchards are exhausted, it is a well-known fact that Apple-trees do not follow Apple-trees well; but Plum-trees thrive splendidly after Apples, and also after Pears. Some growers even plant their Plum-trees between the Apples and Pears a few years before they abolish the latter, and in this way the Plums are in a bearing state by the time the other trees are cut down. It is unnecessary to state the distance that the trees should be apart, as the advice given as to how Apples should be planted is applicable

to Plums. Here it will suffice to state that standard Plums are useful trees to plant in the park or grounds for effect—not to the same extent as Apple-trees, but a few in clumps form a pretty group when in flower.

The following varieties are excellent as standard trees for the above purpose or for planting in orchards: Belle de Louvain, an upright-growing, free-bearing variety, with very large, reddish-violet fruit; it should prove a valuable market Plum, ripe in September. Cox's Emperor (Denbigh Seedling), a large, roundish, dull-red fruit, borne in profusion on strong, vigorous trees; September. Early Prolific, a small, blue-black variety, very hardy, vigorous, and a great cropper; July. Monarch, a comparatively new variety, with very large black fruit, and promises to be a valuable kind on all forms of trees. Pond's Seedling, one of the largest-fruited varieties; the trees are strong, hardy, and produce good crops of beautiful red fruit; end of September. The popular old Victoria is a capital variety as a standard, always cropping well unless the seasons are very bad; its large, reddish-pink fruits are alike valuable for home use or for market.

Cordons.—Very few people are aware how wonderfully well the Plum succeeds as a cordon-tree, and what beautiful fruit is produced; the bloom on the ripe fruit gathered from cordon-trees trained against a wall has an appearance like that seen on hot-house Grapes, and it is against walls or wooden fences that we would specially suggest planting cordon-trees, particularly those of the Gage class, amongst which the following are superb: Bonne Bouche, Bryanston Gage, Comte de Atthems, Denniston's Superb, New Early Transparent, New Late Transparent, Oullin's Golden, Reine Claude de Bavay, and Reine Claude Rouge. All the other sorts of Plums will also answer as cordon-trees, but those named above are the most deserving and richly flavoured.

Bush or Pyramid Trees.—For these the under-mentioned varieties are very reliable on most soils; they are placed in their order of ripening: Early Prolific, Czar, Early Orleans, The Sultan, Denniston's Superb, Belgian Purple, Transparent Gage, Victoria, Washington, Jefferson, Kirke's, Pond's Seedling, Monarch, Grand Duke, Coe's Golden Drop (on warm soils), and Wyedale. All the varieties of Plums named for cordon-, bush-, or pyramid-trees will answer famously as fan or other trained form of trees against walls.

DAMSONS are very fruitful, whether as standards, half-standards, or bushes, and are of great service in forming shelter round the outskirts of the garden or fruit-plantation. Bradley's King (King of the Damsons), Hereford Prune, Frogmore Damson, Crittenden, and Shropshire Prune are all remarkably prolific varieties on any form of trees; the first-named is perhaps the largest-fruited sort, but all are excellent.

The pruning of Plums or bush Damsons should first be done a little before the fruit commences to colour, thinning out the growth where congested, and cutting back to about five eyes any shoots that are not required to enlarge or develop the tree. The shoots left may remain nearly their full length unless very strong and likely to throw the head out of balance; in that case they should be cut out entirely or shortened back. Plums on walls should have all fore-right shoots cut in to three or four buds, and the leading ones nailed in two or three times in the season. Plums or Damsons, in whatever form, are best finally pruned for the year immediately after all the fruit has been gathered; in fact, all stone-fruit trees are better pruned then, as much gumming is caused by late pruning.

Silver Leaf is a most puzzling disease, doubtless of fungoid origin, found upon Plums, Greengages, Peaches, Sloes, Birdcherries, and Portugal Laurels. It is most destructive. The foliage of the affected trees turn silvery on their upper surface, and somewhat sickly-looking, yellowish, on the under-surface. Very frequently the upper cuticle separates from the other leaf portions. The fruits become brown, and are shed in large quantities, and the disease seems to spread rather rapidly. The specific fungus responsible for the mischief has yet to be discovered, but it is believed to be a near relative of *Exoascus deformans*, already referred to under Peaches. The treatment found of most avail is to lift the trees at the proper season—when inactive—and dress the soil with sulphate of iron; or the affected portions may be cut out. Root-pruning has also in certain cases proved beneficial. In this latter case the “wood” must be the guide to the gardener.

Though these fruits have many animal foes, few of those that may fairly be entitled to be classed as pests are identified only with the Plum; the majority, in fact, are general feeders. The very locally distributed *Xyleborus dispar* is now and again reported to tunnel into Plum-trees in this country, but the writer (though an old coleopterist) has never yet met with the creature in either orchards or gardens. Kollar refers to its ravages on the Continent, calls it the Apple Bark Beetle, and describes it under the generic name of *Bostrichus*.

Closely allied to the Codlin Moth is a species known as the Plum Moth, or Plum Tortrix (*Opadia funebrana*). The Moth is barely $\frac{3}{4}$ in. in width, and is on the wing in summer. The eggs are laid upon the young fruits, and, when the larvæ hatch out, they burrow into the Plums, causing them to colour immaturely and to fall. The larvæ are of a pale-reddish colour, with a black head; they escape from the fruit, and pass the winter under the bark, pupating in the following spring. Insecticides are useless unless they are sprayed on before the pests have entered the fruit. Prevention is best; and the grower should

carefully collect and burn all fruits which fall early in the season. He should also shake the trees to dislodge any fruit attacked which are holding on. The bark should be carefully treated when the trees are at rest in winter, using caustic potash and soda, as elsewhere advised.

Though the Brindle Beauty Moth (*Biston hirtarius*, Fig. 671) is usually regarded as partial to Oak and to Elm, yet it now and

again appears as a pest to Plum- and less often to Pear-growers. The Moth has greyish-brown forewings, with irregular transverse markings and slightly paler hindwings. The larva is reddish-brown or purplish-brown, relieved

by a yellowish-brown band and yellowish dots. It is found in early summer. Spraying with Paris Green is the best remedy, as the caterpillars are voracious eaters. They

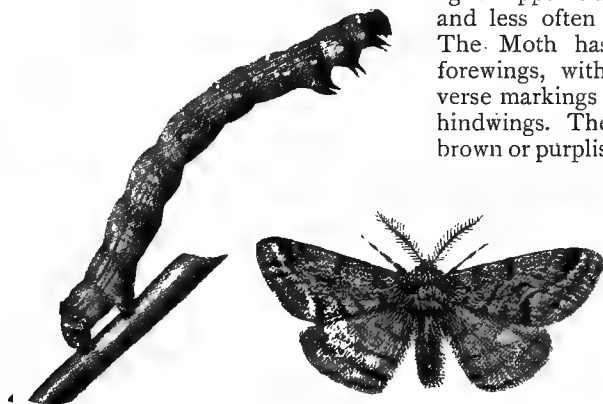


FIG. 671.—CATERPILLAR AND PERFECT INSECT OF BRINDLE BEAUTY MOTH.

pupate beneath the soil and remain there until the next season.

Belonging to the genus *Exoascus*, one species of which has already been noticed as injurious to Peach-trees, causing Leaf-Curl, is a fruit-deforming kind, *E. pruni*. This is responsible for the Pocket Plums or Bladder Plums. The latter is a most appropriate name, as affected Plums resemble a blown-out bladder. The disease attacks the young fruit, which undergoes modifications quite deforming it and rendering it useless. Such Bladder Plums are tough, wrinkled, greenish-yellow, or reddish and stoneless, and in late summer are covered with a glaucous powdery substance, by means of which the disease is spread. Unfortunately, the mycelium is of perennial duration, and therefore it is not sufficient to destroy the Bladder Plums. Professor Marshall Ward recommends, in his excellent little work upon "Plant Diseases," to prune back to the old wood. Spraying with Bordeaux Mixture two or three times at intervals early in the season would act as a preventive to this and many other fungoid diseases.

Quinces.

IN THE OPEN.—Unlike most fruit trees, the Quince succeeds best in moist soils or situations, and is therefore at home by the

sides of lakes or streams. The best varieties are the Apple-Shaped, Pear-Shaped, and Meech's Prolific. Champion and Reay's Mammoth are new varieties that cannot be recommended until they have been tested for a few more years.

Raspberries.

IN THE OPEN.—In many gardens Raspberries are not the success they should be, owing to the natural character of the soil, or to their being planted in too hot and dry a position. To get the best results, it is essential that the situation be cool and moist, yet not waterlogged, at the roots; for that reason the plants make better growth, and the fruit is larger and borne in greater profusion on somewhat heavy soils than on light, hot, sandy ones. The plants also quickly become exhausted on thin, hot soils, unless annually mulched with good farmyard manure; and, even then, it is wise to make a new plantation every four or five years, selecting fresh soil for the plants.

Before planting, the ground should be thoroughly cleansed of all noxious weeds, such as Couch-Grass or *Convolvulus*, and the ground deeply worked. Planting may be done at any time between the end of October and the middle of March, when the soil is in a good working condition. The canes or stools should be placed in clumps of three (if single canes) in the form of a triangle, and there should be 5ft. each way between the clumps. In March the canes should all be cut down to within 6in. of the soil; this may appear a drastic measure, but it is a wise one, as unless it is done, weak canes are produced, and a whole season is practically lost. On the other hand, by cutting down the canes as advised, stout vigorous ones are made that will yield an abundant crop of fruit the following year. It should always be borne in mind that the Raspberry is a surface-rooting plant, and to dig amongst the canes destroys a large quantity of the finest and best roots, indirectly acting detrimentally on the health and vigour of the canes; therefore only the surface-hoeing necessary to keep down weeds is advisable. A mulch of farmyard manure should be applied annually in the spring, to feed the surface roots and thus maintain the strength of the plants; this mulch and the frequent use of the Dutch hoe will also assist materially in conserving moisture in the soil, and the hoeing will expose the larvæ of insect foes to the keen eyes of birds or poultry.

The pruning should, if possible, be done immediately after the fruit has been picked, cutting out all the old fruiting canes and most of the weak ones, and leaving only about seven of the strongest canes to each stool or clump. If more are permitted to remain, the growth becomes congested in the following season, and the fruit is neither so fine nor so plentiful. Market-growers do not stake their canes, but simply shorten them back a little, and as they always liberally manure, their canes are strong and able

to support a crop of fruit without the aid of stakes, &c.—an example that might be imitated by private growers in many instances.

In selecting varieties to plant, the comparatively new sort, Superlative, is a great acquisition; not only are the canes practically self-supporting by reason of their stoutness, but the variety is an abundant bearer of large, handsome fruit of excellent quality. For small gardens, or where tall-growing Raspberries are objectionable, Carter's Prolific is a most desirable sort, the canes being of moderate height, strong, and bearing heavy crops of large, sweet fruit. Norwich Wonder is a favourite variety with market people, being a strong-growing and remarkably fruitful sort, and seldom failing to produce good crops of large, highly-coloured fruit. Northumberland Fillbasket is another sterling variety very similar to the last-named, and alike valuable for home use or market purposes. Semper Fidelis is a rather later fruiting variety than any of the above, and is only useful for cooking, not being sweet enough for dessert, but it is a good bearer. Yellow Antwerp and White Magnum Bonum are in use with the varieties already named, but except for giving a change in the colour of the fruit for dessert, they are not worth planting, as they never carry such good crops as the red-fruited varieties.

Where autumn Raspberries are appreciated, the variety named Four Seasons is the best to plant; in November, 1897, we frequently picked good dishes of fine sweet fruit. These autumn-fruited kinds bear on the young wood of the current year's growth. All the very weak, useless canes should be cut out early in the season, and the vigour thrown into the best and stoutest canes, thus inducing them to produce large fruit freely.

The Raspberry Beetle (*Byturus tomentosus*) is most troublesome to the grower. The damage is twofold, the Beetle eating the flowers and the larvæ the fruit. The Beetle is $\frac{1}{16}$ in. long and reddish or brownish, and intensely downy (Fig. 672); the larvæ is yellowish, with a paler head. Little can be done in the case of the larvæ; but the Beetles, on a dull day, may be shaken from the trees on to tarred boards or paper, and afterwards collected and destroyed. Careful search should also be made for the cocoons which are in the bark. All infested fruit should be burnt, as should all old canes removed at pruning time.

Lampronia rubiella (Raspberry Moth) also does much damage alike to young fruits and shoots. The Moths are under $\frac{1}{2}$ in. in stretch of wings, and brown with yellowish dots and spots. The



FIG. 672.—RASPBERRY BEETLE.

eggs are laid in summer in the flowers of the Raspberry, and the red larvæ live in the fruit until they are full-fed, when they spin a cocoon for themselves in which they remain all the winter, coming out in spring to wage war upon the young buds and shoots. The only way to combat the pest is to pick off all drooping shoots and promptly burn them. Insecticides are useless.

Raspberry Rust (*Phragmidium rubi-idaei*) is fairly common in spring on the upper surfaces of the leaves. These are covered with yellowish dots, which eventually become almost black. Dusting with flowers of sulphur is useful. The disease, however, is not usually regarded as of a very destructive character.

Strawberries.

IN THE OPEN.—Perhaps no kind of fruit is more universally grown than the Strawberry, as it accommodates itself to all sorts and conditions of soil, and always rewards the cultivator for any special attention bestowed upon it. Even on light, hot soils, gardeners are, by careful management and judicious manuring, able to obtain more or less satisfactory crops of delicious fruit. On good, rich, loamy soil it is an easy matter to grow really magnificent fruit with a minimum of trouble; but on light soils the case is different, and close attention must be paid to the plants at all times in order to procure full crops of luscious fruit. In the first place the land must be deeply dug, and manure of a heavy nature (such as cowdung in a fresh state) worked in while digging. Sewage, sludge, or marl, are all useful to dig in, as they are close, and help to make the soil heavier and more retentive of moisture. Stable manure is not advisable (unless no other is procurable), as being light and porous, it has a tendency to make the soil still lighter. On tenacious, heavy soil the conditions are reversed, and strawy manure (such as that from stables) is the best to dig or trench in, as it assists to lighten the soil and render it more friable and porous, while adhesive manure, like that from cows, would have a contrary effect. Nothing will equal the good judgment of the cultivator in deciding which manure is the most suitable for his particular soil, but of whatever character it may be, trenching or deep-digging is advisable. The manure should not be spared. On light, thin soils the beds will be exhausted in two or three years, and on deep, heavy good land they will remain satisfactory for six or seven years.

Every effort should be made to plant new beds as early in August as young plants can be procured, as then they have sufficient time to form good crowns during the autumn, and a crop of large berries is produced the next season. If this operation is postponed, the plants have not time to become properly rooted before winter sets in, and no fruit is borne the following

year. The distance apart at which to plant varies a little with the nature of the soil: if light and hot the rows may be 2ft. apart, and the plants 18in. from each other in the rows; on deep and rich soil the rows should be 2½ft. to 3ft. apart, and there should be 18in. between the plants. Care must be taken not to plant too deeply, simply inserting the runners up to the lower leaves without burying the crown, and making the soil thoroughly firm about the plant. If the weather or soil is dry a good soaking of water should be given after planting, to settle the soil about the roots and give the plants a start. All runners that form should be promptly removed, and weeds should be kept down with a Dutch hoe during the autumn months.

In spring, when new growth is being made, a good mulch or strawy manure is advisable; this will conserve moisture, feed the roots, and also prove a very suitable material for the runners to strike roots in—that is if required to increase the stock—otherwise all runners should be cut off, as they rob the plant and fruit. Immediately the fruit is set, diluted liquid manure or a little nitrate of soda put between the rows will act beneficially on the plants and swell the fruit considerably; but all stimulants should cease when the fruit commences to colour or the flavour will be impaired. The above method should be carried out annually until the beds exhibit signs of being worn out. A fresh plantation should then be made on land that has not had the same fruit on it for some years, as Strawberries should on no account follow Strawberries on the same ground: it is only courting failure through disease and insect foes.

There are quite a host of varieties to select from. Many of them are of no value, while others are excellent in every respect. Amongst the latter, Royal Sovereign is a magnificent and early sort, bearing very heavy crops of large and delicious fruit. Countess is a rare variety of the finest flavour on light soils, but not so good on cold soils; where it succeeds it is one of the best Strawberries. President, though an old variety, is still first-rate, and worthy of a position in every garden by reason of its heavy crops of richly-flavoured fruit. Sir Joseph Paxton is a favourite mid-season variety, and well maintains its good reputation. British Queen is well known for its exquisite flavour, but it is not always a success, as it requires a good warm soil to grow it well. Veitch's Perfection is a new variety of the richest flavour and will supersede Waterloo as a late variety, being more fruitful and of better colour and flavour.

Alpine Strawberries.—It is somewhat remarkable that the sweet and extremely useful Alpine Strawberry is not more extensively grown, more especially in the gardens of the wealthy, as the fruit comes into use at a season when Strawberries are very rare—viz., the late autumn—and thus provides a welcome change in the dessert. Seed may be purchased from several of the

leading seed firms—notably Messrs. Sutton and Sons, of Reading—and should be sown early in March in boxes of light, rich soil in gentle heat. When the germination is well advanced, the seedlings should be gradually removed to a cold frame, and early in May should be planted out, 1ft. apart, in good soil on a somewhat shaded border, encouraging growth by copious supplies of water overhead and at the roots during dry or hot weather.



FIG. 673.—FORCED STRAWBERRY PLANTS IN FLOWER

Failing the possession of glass to raise the seedlings early, the seed may be sown on a warm border early in April, and the seedlings planted out when large enough to handle. In the autumn many dishes of pleasing and refreshing fruit will be forthcoming. It is advisable to throw away the old plants when they have done fruiting, and to raise fresh stock from seed every year: much finer and better fruit is thus produced.

UNDER GLASS.—To force Strawberries early it is essential to propagate the plants as early as possible in the summer by means of runners. The first plant formed on the runner should be pegged into a small "sixty" pot of rich soil, and the point of the runner nipped out to throw all the energy into the embryo plant. Watering must be daily attended to, and every encouragement given to the little plant to induce it to grow well and fill its pot with roots. When it is seen that the plant has rooted well it should be transferred to its fruiting-pot—one 6in. in diameter is plenty large enough—employing a compost of three parts good fibrous loam and one part spent horse-droppings, with



FIG. 674.—FORCED STRAWBERRY PLANTS IN FRUIT.

a little fine bone-meal added, the whole being thoroughly mixed. The pots must be well drained—a few inverted oyster-shells are excellent, if covered with a little moss or leaves to prevent the drainage from choking. If a pinch of soot is thrown in at the same time worms will not prove troublesome. Firm potting is essential to insure good crowns and full crops, leaving a space of about $\frac{1}{2}$ in. at the top of the pot for water. When potted, the plants should have a sunny, open position, and if stood on boards, so much the better; they should be watered carefully, extremes of dryness or wetness being avoided. A good syringing overhead after a hot day will benefit the plants, and assist in keeping insects at bay. On the approach

of frost it is an excellent plan to plunge the pots up to their rims in coal-ashes in cold frames. Some growers do not trouble much about watering the plants when thus plunged, but it is a mistake to allow the soil to become dry and separated from the pots, the result being that the plants are weakened and the trusses of flowers lack vigour. When required for starting, the pots should be washed and placed as near the glass as possible



FIG. 675.—FORCED STRAWBERRIES WITH FOLIAGE REMOVED ON ACCOUNT OF RED SPIDER ATTACK.

in a temperature not exceeding 45deg.; indeed, this should not be much raised by means of fire-heat until the flower-spikes appear. Then 5deg. or 10deg. more may be given, but as much air as possible should be admitted without causing a draught or lowering the temperature below 50deg. when in flower (Fig. 673): this will assist in obtaining a good set of fruit. Immediately the fruit is set, more heat may be given, maintaining a

growing atmosphere, feeding the roots with liquid manure, and keeping down insect pests by syringing freely at all times except when the plants are in flower. Aphides may be kept at bay while the fruit is ripening by means of fumigation. When the fruit is ripening (Fig. 674) supplies of liquid manure should cease.

Red Spider is one of the greatest foes to contend against in forcing Strawberries, and unless checked by frequent syringings it will ruin the foliage. This is shown in Fig. 675, where all the leaves have had to be removed.

Strawberries outside are attacked by two or three species of voracious Ground-Beetles, which, forsaking for a time their carnivorous diet, feast upon the ripening fruit. *Harpalus ruficornis*, a very common Beetle, is one that is found in enormous numbers in Strawberry-beds, the mulching usually provided affording it a safe harbourage in the daytime. It feeds at night. The insect is about $\frac{1}{2}$ in. long, flattish, and dark as to colour. Indeed, the head and thorax are quite black, and the only relief to its general sombre colouring are the red legs, antennæ, and the down upon its wing-cases. The larval state is passed beneath the soil. This insect is winged, contrary to what is usual in the Ground-Beetles found in this country.

Pterostichus (Steropus) madidus (Fig. 676) is even commoner than the *Harpalus*, and is altogether a larger insect, reaching $\frac{3}{4}$ in. long. It is shiny black, ovate, convex, with a distinct furrow in the back, and much streaked. The legs of this insect are sometimes red. The Beetle is very common in gardens and is wingless. Equally common is *Calathus cisteloides*, another wingless insect, but swift of foot. It is black, approaches $\frac{1}{2}$ in. in length, and is very fond of sheltering beneath stones and fallen leaves. The above, with perhaps *Zabrus gibbus* and a few of the Sunshiners (*Amara*) are the exceptions in the family *Carabidæ* to those feeding exclusively upon flesh.

In the case of a small garden the Beetles may be hand-picked by dislodging them from their hiding-places during the day; but where there are acres of the fruit under cultivation something less laborious would necessarily have to be adopted. The paste known as the Magic, if properly distributed, soon thins them down; or Ramsden's Beetle Paste may be employed.

The other animal pests are those which feed upon other crops as well, and will be dealt with separately.



FIG. 676.—PTEROSTICHUS MADIDUS.

Several fungoid diseases affect the Strawberry, one of the commonest being the Leaf-Spot (*Sphaerella fragariæ*). The common name gives a clue to the chief characteristic of the disease—the spots on the foliage. These occur on the upper surface, and increase in size and colour as the different stages are reached; usually they coalesce. They are at first dark purplish; then the central portion lightens until it is nearly white, and the blotches by this time are of large size, and practically the whole leaf-surface is discoloured. When this is the case, the foliage is shed, and in very bad cases the plants die. In America the somewhat heroic treatment of mowing the plantation after the crop has been gathered, and then firing the tops by the aid of straw, is adopted; but the remedy when suggested here was regarded as worse than the disease. There seems, however, to be little doubt as to its efficacy, and it is well worthy of a trial, followed the next season by spraying with Bordeaux Mixture. In America the disease is called the Strawberry Leaf Blight, and those who would like to peep farther into its life-history should read Prof. Scribner's article in the Report of the United States Department of Agriculture.

Vines.—See "Grapes."

Walnuts.

IN THE OPEN.—Almost all soils will grow Walnuts. Unfortunately our ancestors did not always plant the best varieties, as some of the large trees about the country produce nuts of small size, with very thick, hard shells. Noyer à Bijou is a variety with large nuts, having thin shells, and of good flavour. Thin-shelled is another fine sort, and a heavy cropper; Franquette is also excellent on deep, warm soils. All the above develop into large and beautiful trees; but if a small-growing Walnut is desired, Dwarf Prolific will supply the need, for, as its name indicates, it is dwarf and prolific, and makes a fruitful bush.



LACKEY MOTH.



24.—On Vegetable

By
TREVOR MONMOUTH.

Culture.

To obtain tender vegetables of a sufficiently high quality to give perfect satisfaction at home, or to win prizes at horticultural exhibitions, the soil must in the first instance be properly prepared by deep digging or *trenching* and liberal treatment with good manure. As regards trenching, the mode in which it ought to be done depends almost entirely on the character of the soil and sub-soil. With a heavy soil and a cold, tenacious sub-soil, *bastard trenching* is the best: this consists of turning over the lower spit and mixing therewith strawy manure, road-scrappings, or vegetable refuse. Such treatment will improve its character, and make it more porous, while the surface soil is still retained on the top, leaving it as rough as possible. On soil of a loamy nature several feet deep it is a good plan to turn the whole right over to the depth of 2ft., *i.e.*, bringing the bottom to the surface and placing the surface soil at the bottom, incorporating manure at the same time. In this way a fine root-run is provided for the vegetables, the drainage is improved,

and vegetables of all kinds thrive famously in wet or dry seasons. When the ground is dug one spit deep year after year the root-run is very limited, owing to the hard pan formed, which is impervious to the descent or ascent of water, and there is nothing to marvel at in the crops being unsatisfactory or collapsing entirely. If one-fourth of the garden is trenched every winter, the labour will scarcely be felt, and in four years the whole will have been done, and another commencement can be made. The results will amply repay for the extra labour, and the produce will be of such a high order that it may be relied upon not to disgrace the grower anywhere. Next in importance to deep cultivation is the constant moving of the surface soil during the growing season. All vegetables seem to heartily enjoy this form of cultivation: not only are weeds kept down, but moisture is conserved, and the soil kept in the most favourable condition for root action. By the above system the writer has secured honours at leading shows in all parts of the kingdom and supplied large establishments with daily supplies of vegetables in considerable variety at a moderate outlay in seeds and labour.

Artichokes.

Globe Artichokes (Fig. 677) are easily propagated by seeds sown in deeply-worked and rich soil in March or early in

April. Select a well-drained sunny site, and sow the seed very thinly. Four feet apart is a suitable distance between the plants, and to that distance

the young plants should be thinned.

Keep down weeds, and give one or two soakings of liquid manure during the summer. On the approach of frosty weather the base of the



FIG. 677.—GLOBE ARTICHOKE.

plants should have some coal-ashes or litter placed close up to the hearts to protect them. removing the same in spring. There is little difference between the Green Globe and the Purple Globe, both varieties being satisfactory when well grown.

Jerusalem Artichokes (Fig. 678) are seldom the success they could be made if better cultivated. As a rule, they are planted in the worst part of the garden, but when given an open, sunny position, with sufficient room for development, and a rich soil, the tubers are not only freely produced, but are also large and of superior flavour.

To grow them well, the ground should be deeply dug and well manured in the autumn or winter, incorporating fresh or green manure, and leaving the soil on the surface as rough as possible. At the end of February or early in March, when the soil is in good working order, the tubers should be planted in

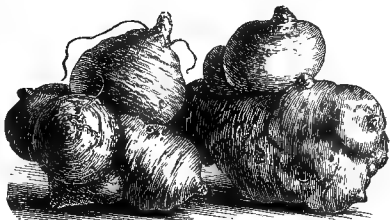


FIG. 678.—JERUSALEM ARTICHOKEs.

lines 3ft. apart, allowing 18in. between the tubers in the lines. When about 8in. high, the plants should have the soil drawn up to them, as with Potatoes, and weeds should be kept down during the summer. When the tops die back in the autumn all the tubers may be carefully lifted and stored in a cool, frost-proof shed, the same as other root crops.

Asparagus.

It is now well known that very fine Asparagus may be grown without going to the expense formerly incurred in taking out soil to the depth of several feet and replacing with expensive compost. Providing the drainage is good, any fairly porous soil can be made to grow Asparagus as easily as any other vegetable. If the soil is sandy or a good porous loam, deep digging and liberal manuring in the autumn or winter will be preparation enough. When the soil is clayey or tenacious, however, the addition of material to make it more porous is essential—sand, road-scrapings or parings, ashes from burnt rubbish, and strawy manure, are all excellent. In digging or trenching, the surface soil should be left as rough as possible, thus fully exposing it to the action of the weather. By the end of March the soil will be in a nice crumbly condition, and in capital order for seed-sowing. Beds may be made 5ft. wide, a drill being drawn down the centre, and on each side another drill should be drawn 18in. from the middle one, or 1ft. from the side. Thin sowing is advisable, as the plants ought to be thinned out to 18in. apart in the rows when large enough. The after-treatment consists in keeping

down weeds by hand and in giving an occasional dressing of salt or kainit at the rate of 2oz. to the square yard during the growing season. Another method is to sow in drills $1\frac{1}{2}$ ft. or 2ft. apart on level ground, without any beds or alleys, thinning out the plants as above advised when large enough. In the spring a mulch of rich farmyard manure applied to the bed or plantation exercises a powerful influence on the growth, and conserves moisture in the soil during hot weather. Some growers apply the mulch in the autumn, after the tops have died and been cleared away, but there is no doubt that spring mulching is more beneficial.

If new beds are to be made by planting, and not from seed, the best time to start is when new shoots have been made 1in. or 2in. in length, taking care that the roots are kept moist while out of the soil, spreading them out evenly in planting, and giving a thorough soaking of water immediately afterwards if the soil or weather is dry. No shoots or "grass" should be cut from plants raised from seed before the third year after sowing, and even then the cutting should be light.

For growing outside or for forcing few varieties will equal Conner's Colossal, which is closely followed by Argenteuil Giant. The latter is largely grown in France, much of the "grass" finding its way to our markets.

Asparagus cultivators are seriously troubled by the attacks of a small ($\frac{1}{4}$ in.) but very handsome Beetle (*Crioceris asparagi*) and its larvæ. The Beetle is bluish-black or greenish, bordered with red; the thorax is red, and the wing-cases have a black cross formed by the suture and a branch on either side, and three yellowish spots at their margins. The perfect insects are found in summer, and the females deposit their eggs on the stems of the plants. The larvæ are greyish or greenish, and have black feet and head. Both grub and perfect insect are destructive. Hand-picking is best for the former, and a kerosene emulsion for the latter. *After* the season is over, powdered hellebore may be dusted on the plants.

Beans.

Although Broad Beans will thrive on almost all soils, that which is somewhat heavy is best suited for the production of heavy crops and the finest pods; consequently the heaviest portion of the garden should be selected for them. Ground that has been moderately or well manured during the winter will be in good condition for the reception of the seed. Sow the first crop early in February, and at intervals of three weeks up to the end of March for successional supplies; after that date it is little good sowing, as the weather is unfavourable to good produce. The seed should be sown in drills about 3in. deep,

in double lines, and the rows 3ft. apart, with 6in. between the seeds. This is ample space between the rows, whether double or single. As the plants progress, soil should be drawn up to them on each side of the row. Immediately it is seen that the flowers are set, and embryo pods formed, it is an excellent plan to pinch out the points of the plants. This assists the pods to swell, and keeps Black Fly in check. If exhibition pods are wanted, the plants ought not only to be fed with liquid or solid farmyard manure, but also staked, and each permitted to carry only about three of the straightest and longest pods. The Long-pod section has much the longest pods, Veitch's Exhibition, Leviathan, and the Early Long-pod being the best, in the order named, for home or exhibition purposes. If extra good flavour is desired, the shorter-podded Green Windsor is the best of all.

Dwarf or French Kidney Beans.— This most productive vegetable should be sown in drills and at the same distances apart as advised for Broad Beans on any rich and deeply-worked soil. Make the first sowing in the middle of April, and another sowing a month later, selecting such a variety as Ne Plus Ultra for the first, and Canadian Wonder for the second sowing. These are great croppers, the pods being long, handsome, and tender, and very suitable for home use or for exhibition. As these Beans are both gross feeders and heavy bearers, frequent applications of diluted liquid manure are very sustaining to the plant when cropping; but what is of as much or more importance is the careful removal of all pods when large enough for use. When once the pods have commenced to form seeds, the whole energy of the plant is devoted to reproduction, and no further crop is obtainable.

Scarlet or Runner Beans.—To obtain heavy crops of this universally esteemed vegetable the ground should be deeply dug and heavily manured; or shallow trenches should be prepared, in which place a layer about 6in. deep of well-decayed farmyard manure, with several inches of good soil on the manure. On this the seeds may be arranged about 6in. apart in double lines in the row, and the rows at least 6ft. apart; or if possible it is better to isolate the rows, thus giving more light to both sides. It is seldom safe to sow the seed before the end of April, and as it germinates the young growth should be protected from Slugs by dusting the soil with soot or air-slaked lime, otherwise all the plants will probably disappear. Soil should also be drawn up to each side of the row when the plants are large enough, and stout sticks put in for the growth to cling to. If the flowers seem to set badly, or the plants appear to languish, a thorough soaking of liquid manure in a diluted form will put matters right, providing the pods are not allowed to go to seed. Chelsea Giant White, Hill's Prize

Exhibition, and Neal's Ne Plus Ultra are all abundant croppers, with long, handsome pods, first-rate for home use or exhibition purposes.

Broad Beans are virulently attacked by Black Fly (*see* "Aphides" in Chapter "On Pests Generally"); while occasionally Kidney Beans are infested with what is known as Bean Anthracnose (*Colletotrichum Lindemuthianum*). On the Continent and in America this disease is far more prevalent. It is characterised by a spotting of the leaves, stems, and also of the pods. The spots are brown, with reddish margins, and depressed. They are small at first, but usually coalesce. The seeds are sometimes involved, and, on this account, it is injudicious to save those from infected quarters. They have dark sunken spots. If the disease is noted early, spraying with weak Bordeaux Mixture will prevent it from spreading. Affected pods and leaves should all be removed and burned.

Beet.

Frequently this most useful vegetable or salad is too big and coarse for home purposes, owing to too early sowing or to recent heavy manuring. The soil most suited to Beet is land which has been manured for a previous crop, such as Celery or Onions, as fresh manure causes the roots to become forked or coarse. If the soil is dug up roughly in the early winter, it will be in a nice friable state by the end of April or early in May, which is a suitable time to sow for moderate-sized and tender roots. Make the drills about 1ft. apart and 1in. deep, and level all down evenly when covering the seeds. As the plants appear in the rows, they should be thinned out to about 6in. or 8in. apart, and afterwards kept free from weeds by hoeing. In the autumn, before sharp frost can touch the plants, all the roots should be lifted, taking special care not to injure or break them, otherwise they will "bleed" and be of bad colour when cooked. The tops should not be cut off too closely—1in. from the crown is advisable—and the roots should then be stored away in a frost-proof shed in sand or fine ashes, using as wanted. Cheltenham Green-top and Middleton Park are two of the finest varieties for all purposes. The Perpetual or Spinach Beet is grown for its foliage, which is cooked and eaten the same as Spinach.

One of the Carrion Beetles (*Silpha opaca*) forsakes its ordinary flesh diet, at least in the grub stage, for a vegetarian one—the Beet. The grubs do much damage to the crops at certain seasons. The Beetle itself is nearly $\frac{1}{2}$ in. long, flattish, and black; this is also the colour of the grub, which is Woodlouse-shaped (asiliform). The insects are nocturnal, and must either be hand-picked or treated to a weak solution of kerosene emulsion. By way of prevention, animal manures, such as butcher's offal, should be avoided.

Beet Rust (*Uromyces betae*) attacks both Garden and Field Beet, the latter more especially. Usually the disease is not noticed until its third and final stage (teleutospore) is reached, and the blackish spots are in evidence on the leaves. Long ere this the accidium-stage was passed, probably in Seed-Beet, or even upon the Wild Beet. This was followed by the uredo-stage, when the brown spores were dispersed, increasing the area of the disease. Finally, the teleutospores already alluded to were produced, and these tide the disease over the winter. Sulphide of potassium should be sprayed upon the crop by way of prevention in early summer, and all leaves which decay or are removed from the plants at harvest-time should be burned.

Borecole, or Kale.

For cold or exposed gardens Borecole is indispensable, being remarkably hardy, tender, of good flavour, and affording a supply of vegetables when they are scarcest, viz., from Christmas until late spring. Good, firm soil, that has been deeply worked and liberally manured, whether heavy or light, will grow all the varieties well. In March, when the soil and weather are favourable, the seed may be sown thinly in beds of rich, firm soil, merely covering it to its own thickness and protecting the bed from birds (which are very fond of all Brassica seeds) with nets. Immediately the seedlings are large enough to handle, showery weather should be watched for, and the plants then put out 2½ft. apart each way on ground prepared for them. In the course of a few weeks, they may have soil drawn up to them in the same manner as Potatoes; this will prevent their rocking about by wind, and also, by loosening the surface soil, will ensure their thriving and growing rapidly. If the land is rich and has been deeply worked, the growth of the plants will be so rapid as to meet each other and smother all weeds. The Lapland, Asparagus, and Ragged Jack Kales are all specially hardy varieties, withstanding our severest winters. The Matchless Curled and Dwarf Green Curled are also very hardy and handsomer than the first-named, though no better in quality. Where large quantities of Parsley (or a substitute) are required for garnishing, the Variegated Kale is very serviceable, especially in winter, when Parsley is scarce.

Broccoli.

A deeply-dug and firm, rich soil is essential for the production of this useful winter vegetable. If the soil is very loose the plants make large leaves, wanting in solidity, and when severe weather sets in they collapse and rot. For first supplies to cut, say, from the beginning of October to Christmas, the following in their order of coming into use are varieties of proved merit: Veitch's Self-Protecting Autumn (when true to

name this is a most valuable sort), Walcheren, Early White, and Snow's Winter White. All the above should be sown thinly in rich soil early in April, and planted out from the seed-bed in rows 2ft. apart, with a similar distance between the plants in the rows, arranging them so that each plant comes between two others in the next rows. This is what gardeners term "planting alternately," and an excellent system it is. For later supplies in spring or early summer we can recommend Knight's Protecting, Improved Wilcove, Model, and Late Queen. The last two are very useful to the professional gardener, as they come into use in May and early June, before the Peas and Cauliflowers are ready, and are a great boon in keeping up an unbroken supply of vegetables. The seeds of these later varieties should be sown about the end of April, and the seedlings planted out the same distance apart as mentioned above. On the approach of bad weather, such as much wet, snow, or sharp frost, it is advisable to tie up the leaves over the centre of all plants forming heads, thus throwing off wet or snow, and protecting them from frost, which would otherwise spoil the heads. If there are indications of much and continued frost, it is an excellent plan to take up carefully, with a good ball of soil attached to the roots, all those plants exhibiting signs of forming heads, and to place these close together in pits or frames, or even in sheds from which frost can be excluded. In the hard winters of 1894 and 1895 we did this, and were able to keep up a supply of small, tender Broccoli daily for weeks, while all the other Broccoli outside, except Model and Late Queen varieties, were killed by the severity of the weather. Another plan is to bend on their sides all the plants facing north, before bad weather arrives; but this method is not so safe as that of lifting and storing under cover.

Brussels Sprouts.

This highly productive vegetable is deservedly esteemed everywhere, and to procure large, firm sprouts the seeds should be sown and the plants grown on as advised for Borecole, or Kale. If such varieties as Rosebery or Imported are selected, 2½ft. each way for the plants will be plenty of room; but if extra fine stems, with very large sprouts, are wanted for exhibition, another foot each way should be allowed, choosing Sutton's or Veitch's Exhibition or the new President Carnot, which has proved excellent for exhibitors of late years. One of the greatest mistakes made with Brussels Sprouts is to pick or cut off the top first when commencing to use them. The top ought to be left until last; when taken off first, it causes all or most of the sprouts on the stem to open and start growing, and so become less valuable than they would be if close and firm.

Cabbages.

For convenience of reference this section is treated under three headings—viz., Autumn-sown, Spring-sown, and Red, or Pickling Cabbage.

Taking the *Autumn-sown* first, some judgment must be exercised as to the best time to sow. In the North and in other cold districts the third week in July will be a suitable time; while in the South and warmer parts of the country, from the beginning to the middle of August will be the best time. If sown before, the Cabbages would be apt to mature too early, especially if the autumn and winter proved mild and favourable to growth. The seed may be sown either in beds or in drills thinly, in an open sunny situation; thence the plants should be planted out in rich soil, 18in. apart each way, the position, if possible, being a warm and sheltered one. Drawing the soil up well to the plants when large enough is very beneficial, and to some extent acts as a gentle protector to their bases. In the spring—say about March—an application of 1oz. of nitrate of soda to each square yard will hasten development considerably; in fact, that fertiliser is of great assistance to all this family when the plants are in active growth. Earliest of All, Mein's No. 1, and Ellam's Dwarf Spring, are most reliable varieties for sowing in the autumn.

Spring-sown. In some establishments Cabbages are required during the summer and autumn months. Where this is the case, a first sowing should be made about the middle of March of such varieties as Earliest of All and Improved Nonpareil, followed a month later by Christmas Drumhead or London Market. All these varieties should be treated as recommended for the autumn-sown Cabbage, except that the last two should have a little more room between the plants. If only one variety is desired, Christmas Drumhead should have the choice, being a most useful and fine-flavoured variety, and of good constitution.

Red, or Pickling. The Red Dutch Pickling is probably the best and richest-coloured variety of this class. It should be sown and planted out as advised for autumn-sown Cabbage, the only difference being that the plants should have twice the distance between them when planted out—*i.e.*, 3ft.

Savoy.—See page 1073.

The Large White Butterfly (*Pieris brassicæ*), or, rather, its larva (Fig. 679), is one of the worst pests of the Cabbage—indeed, of the entire *Brassica* family. The butterfly itself is too well known to need description, while its bluish-green caterpillar should be almost equally familiar. The pupa-stage is passed either on or very near its food-plant, such as under walls, eaves of outhouses, palings, and the like. It is of the shape shown in the illustration. The insect is double-brooded, appearing first

in late spring and again in July. Lime and soot, in the proportion of three parts of the former to one of the latter, should be distributed over the patches in June. Hand-picking should also be resorted to, while all pupæ and perfect insects should be destroyed. Were it not for the good offices of several Ichneumon Flies these pests would be even still more numerous. Ichneumoned larvæ should never be interfered with; they are readily told by the groups of yellowish-white cocoons surrounding the unfortunate host.

Another lepidopterous pest is the Cabbage Moth (*Mamestra brassicæ*) Caterpillar, which eats into the hearts of Cabbages in summer, rendering them disgusting. Hand-picking is the only remedy. The Cabbage Fly (*Anthomyia brassicæ*) and the Cabbage Aphis (*Aphis brassicæ*) are also troublesome. The grub

of the former penetrates the stem if not prevented by liberal dressings of soot and lime; and the latter infests the under-surfaces of the foliage, from which they should be washed with a soft soap solution. Then there is the Snowy Fly (*Aleyrodes proletella*), which also infests the under-surfaces of the leaves. These insects are very minute and have powdery wings. They should be treated to a soft soap solution, or in very bad cases the infested leaves should be removed and burnt. At the roots there are Wireworm (see Chapter "On Pests Generally") and the Cabbage and Turnip Gall Weevil (*Ceuthorrhynchus sulcicollis*), whose yellowish footless grubs set up irritation in the roots, causing them to "gall" and eventually to rot. Gas-lime at the rate of one ton per acre should be applied to destroy the pests left in the soil after the crop has been lifted, and the ground then allowed to remain fallow for a time. Neither Cabbages nor Turnips should be grown the following season, and any cruciferous weeds should be promptly eradicated.

Galls of another kind on the roots are due to the presence of one of the Slime Fungi (*Plasmodiophora brassicæ*), giving rise to the disease known as Finger and Toe, Anbury, &c. Quicklime is the remedy, and should be applied at the rate of thirty bushels to the acre. The disease is readily spread by workmen carrying the soil from an infected into a non-infected area either on their boots or on the wheels of farm-carts.



FIG. 679.—PUPA AND LARVA OF
PIERIS BRASSICÆ.

Anbury does not confine its attention to Cabbage, but attacks other well-known vegetables, including Turnips and Radishes. All cruciferous weeds should be burnt, as should all infected Cabbage-stumps.

Capsicums and Chillies.

In some few gardens these are grown for exhibiting in collections of vegetables, or for use in the house. If for the former purpose, Bull's Nose or Elephant's Trunk are the best; if for home use or ornament, Prince of Wales, Celestial Pepper, and Little Gem are beautiful varieties. The seed should be sown in March in gentle heat, and the seedlings, when large enough to handle, should be potted singly in small pots, using a compost of fibrous loam, with a little decayed leaf-mould and silver-sand added, keeping the plants in a light position and preventing insect pests by fumigating. As the pots become filled with roots the plants should be shifted into larger pots, using a rich and fibrous compost, and always draining the pots well. Towards the end of May the plants will thrive very well in a cold frame, syringing them well in the afternoon and closing with a nice sun-heat. When they are in 6in. or 7in. pots, they will not require potting again, but may be fed liberally with diluted liquid manure two or three times weekly.

Carrots.

By means of a hot-bed made up of stable litter trodden firmly, the litter covered with 4in. or 5in. of fine soil, and a frame placed over, fine early Carrots may be quickly obtained. Sow in January French Horn, or Early Scarlet Nantes Horn, over the bed, and cover very lightly with soil. In a few days the seeds will germinate, and air must be carefully admitted on all favourable occasions. The same varieties may be sown outside in the middle of February on a warm and sheltered border in drills 1ft. apart. As these Carrots are drawn while small for flavouring, &c., no other thinning of the plants is necessary. The ground for the main crop should have been well manured for a former crop, and deeply dug during the winter. Before levelling down at the end of March or early in April, a dressing of ashes from a burnt rubbish-heap, or a light application of soot, spread over the ground, is an advantage. In the process of levelling and preparing the soil, this dressing becomes thoroughly incorporated, and makes the soil better for germination. The drills may be drawn 1ft. apart and 1in. deep; in these the seeds should be sown thinly, and lightly covered with soil. New Intermediate and Red Elephant are good varieties. In showery weather the seedlings should be thinned out to 6in. apart, and when Carrots are wanted every alternate one may be

drawn. In the autumn the roots should be carefully lifted and stored away as advised for Beet.

By far the most destructive of Carrot pests is the Carrot Fly (*Psila rosæ*), whose larvæ penetrate the roots, causing them to decay, and rendering them unfit for market by reason of their rust-spotted appearance. The eggs are laid in early summer beneath the soil, and the resulting larvæ are yellowish-white footless grubs about $\frac{1}{4}$ in. long. They tunnel the Carrots in an upward direction, and make in the process several exit-holes. Carrots whose foliage turns yellowish-brown and withers should be lifted, and if the grubs are noted all such sickly roots should be removed and burned. Kerosene emulsion might be sprayed upon the plants in

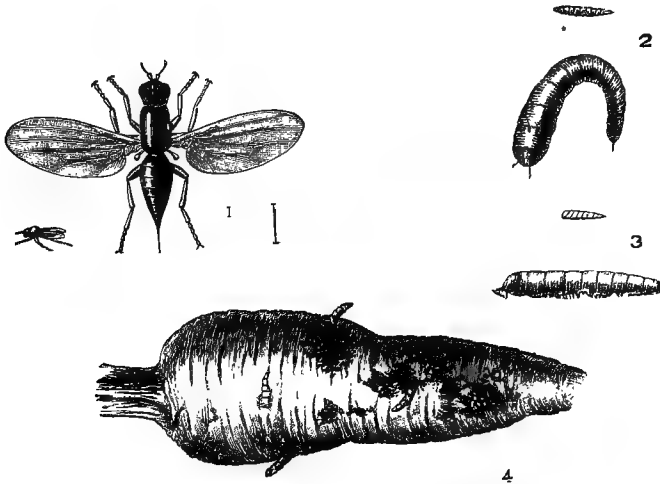


FIG. 680.—CARROT-FLY: 1, PERFECT INSECT; 2, GRUB; 3, PUPA; ALL SHOWN NAT. SIZE AS WELL AS MUCH MAGNIFIED; AND '4, "RUSTY" CARROT.

(By permission of the Board of Agriculture.)

May with a view to prevent egg-laying. Parsnips are also attacked. There are several broods. Soot and lime top-dressings are also beneficial. Fig. 680 shows the perfect insect, grub, and pupa, natural size and magnified, together with a Carrot exhibiting the characteristic rusty spots.

Cauliflowers.

In most large gardens Early London or Dwarf Erfurt is sown in cold frames about the middle of August for the production of early Cauliflowers the following year. Another excellent variety for autumn sowing is Autumn Giant. No coddling should be given to the plants; they should be kept

as hardy and sturdy as possible by removing the lights daily, except when there is much wet, snow, or severe frost. By the end of March they may be transferred to rich soil on a warm border, planting the two first-named 2oin. apart each way. The plants of the Autumn Giant variety will be best in a more open quarter of the garden, arranged 2ft. apart each way. The two early varieties first-named should be ready to cut early in June, and the last-named will form a valuable succession for a month or more; in fact, if the first spring-sown plants fail, as they often do, the Autumn Giants are doubly valuable in keeping up an unbroken supply.

Early in February a small sowing should be made in gentle heat of Extra Early Forcing, and as the seedlings become large enough, they should be pricked out in a frame or boxes, afterwards transplanting to good soil, in a warm position, 18in. or 2oin. apart. About the middle of March, Early London, Eclipse, and Autumn Giant should be sown in beds of fine rich soil, avoiding overcrowding in the seed-bed; and when the plants are large enough they should be planted out 2ft. apart each way, in good, deeply-worked, and heavily-manured soil. As they get established and attain a height of 8in. or so, soil should be drawn up to them on each side of the row. Later on, if extra close and large heads are wanted for exhibition or other purposes, liquid manure, or 1oz. of nitrate of soda per square yard, will impart vigour to the plants, and act beneficially on the heads. Whether required for exhibition or not, it is always advisable to tie up the leaves over the heads when forming, or to break a few of the outer leaves over the heart of the plant: this gives the heads that beautiful white appearance so much admired in well-grown Cauliflowers. After the head has been cut, the plants should be promptly pulled up, as they then only drag the fertility out of the soil to no purpose. It may be remarked that Slugs are very fond of Cauliflowers when first planted out; therefore air-slaked lime or soot should surround them for protection until all danger is past.

Celery.

Except for very early requirements the white varieties of Celery are not to be compared with the pink or the red forms; but where very early Celery must be grown, Incomparable Dwarf White is one of the best, being thick, crisp, and of good flavour. Leicester Red, Wright's Grove Red, and Wright's Grove Pink are all first-class for main or late crops. For first crops seed should be sown thinly in boxes in gentle heat in February, and for main or late crops about the middle of March. When the seed has germinated freely, the plants should be well exposed to the light to prevent their becoming drawn or leggy; and when 1in. or so high, they should be pricked out in boxes or

in frames, with a gentle heat, gradually hardening them off ready to plant out in trenches when they are about 6in. high. The trenches are usually 18in. deep, the same in width, and 4ft. apart; at the bottom of the trench should be placed 6in. of good well-rotted manure, covering this with 2in. of soil. In these the Celery should be planted in two lines, the plants being about 1ft. apart and arranged alternately, thus giving them more room for development than if directly opposite each other in the rows. Showery or dull weather is best for planting out, and at no time—from the period of sowing onwards—should Celery suffer for want of water. If it does, the plants are liable to “bolt,” or run to seed, and thus prove worthless. When once well established in the trenches, diluted liquid manure, kainit, or agricultural salt, at the rate of 2oz. to the yard run of trench, will be beneficial, as Celery is a gross feeder.

A mistake is often made in earthing up too soon, and also by carelessness in the operation. Before earthing all suckers should be removed, and all the leaves of the plant tied up together with a piece of matting or raffia; then the earth should be placed carefully round the plants, but not in sufficient quantities to smother the centre or growth part. Usually, about three such earthings are sufficient, but the final earthing should be brought close up to the points of the plants, as the object is to throw all the water from the plants and prevent rotting. Many successful exhibitors tie up the plants in layers of stout brown paper, instead of earthing; the Celery is thus beautifully clean and well blanched.

A leaf-mining insect, the grub of the Celery Fly (*Tephritis oenopordinis*), attacks the foliage of both Celery and Parsnips. Its attack is denoted by a sickly appearance of the leaves and the presence of yellowish patches. The best remedy is to crush the grubs between the finger and thumb before they can escape from the leaves and pupate. There are two or three broods in a season. In very bad cases the leaves had better be removed and burned. This is also known as Parsnip Fly.

Very destructive also is the Celery Stem Fly (*Piophilina apii*). The larva of this insect bores into the stem above the earthing-line, and works towards the centre as well as to the base. Its galleries are frequently disclosed when the vegetable is being prepared for table. The fly is very minute ($\frac{1}{3}$ in. in wing-expanse) and inconspicuous. The larva is creamy-white and shiny, with two dark spiracles at the hinder extremity. There are several broods, and the larval and pupal states may be passed in either the Celery stems or the earth. The pests are difficult to deal with; but their attacks may be minimised by syringing or spraying Anti-Pest on the stems to render them disagreeable to any larvæ hatched out. Where Celery is seen to be attacked the plants should be lifted and burned, and after the crop has

been raised the quarters should be dressed with gas-lime, left for a time, and then forked in. Celery badly attacked practically rots away.

Chicory.

In many gardens Chicory is much appreciated as a salading during the winter months, especially if quickly and properly grown. The seed should be sown at the end of May or in June, in drills 1ft apart, in a sunny, open position. When the seedlings are large enough to handle, they should be thinned out to 8in. apart in the rows, and afterwards kept free from weeds with a Dutch hoe. At the end of October or early in November, the roots may be taken up carefully and stored in soil in sheds or in the open ground, protecting from frost with litter. By placing a quantity of the roots in a Mushroom-house or other dark, warm structure at intervals of three weeks, a daily supply of tender and beautifully-blanchéd leaves for salad may be picked.

Cucumbers.

The heaviest crops and most beautiful Cucumbers are produced on plants in pits or houses, where they can be trained on a trellis fixed about 1ft. from the glass. Seed may be sown in January or February in pots or pans, with a nice gentle bottom-heat and a top temperature of 70deg. or thereabouts, which should not be allowed to fall below 60deg. at night. When the seedlings begin to form the first rough leaf they should be transferred singly into thumb-pots, using two-thirds of fibrous loam and one-third of leaf-mould as a compost. In a fortnight or so the plants will be ready to transfer to mounds of loam, 3ft. apart, with a little leaf-mould or spent horse-droppings added. A stake reaching to the trellis should be fixed to each plant, which should be tied loosely thereto. Cucumbers rejoice in a good moist heat, and if the thermometer runs up to 90deg. or more by the help of sun-heat, with plenty of moisture in the atmosphere, the plants will enjoy it and grow rapidly. When the roots appear through the mound, a very light mulch of soil should be given—just enough to cover all the roots—repeating this weekly, and also giving frequent applications of diluted liquid manure. By this means the strength of the plant will be maintained, and continuous supplies of fine tender Cucumbers forthcoming.

The training of the plant is a simple matter, merely stopping the shoots one leaf beyond the fruits, and pinching out any useless growth, also the weekly removal of any exhausted shoots, taking care never to cut out much growth and foliage at once. If the plants are looked over twice a week no check is given, but if left for two or three weeks, and then severely pruned to

keep them within bounds, there is not only a check but a great loss of fruit.

Very fair crops of Cucumbers are grown in frames placed on hot-beds made of stable litter trodden firm, and several inches of good soil arranged thereon. It is seldom wise to make up a hot-bed before the end of March or early in April. If snow falls in quantity it seems to take the heat out of the bed, and all the plants in the frame are killed or seriously crippled. About three seeds may be sown in the centre of each light, pulling one plant out if they all germinate, keeping a moist growing atmosphere, and always closing the frame with a good sun-heat and plenty of moisture early in the afternoon. Insect pests will not be troublesome if this is followed out, but should Aphides appear fumigation will oust them.

For either house, pit, or frame culture Telegraph and Lockie's Perfection are the most desirable; Stockwood Long Ridge is the best for outside, being quite hardy if sown in May.

Care should be taken in making up soil for Cucumbers that it does not contain any of the pests popularly known as Eelworms. These are very destructive, and when once they attack nothing will save the plants. If plants are found to be doing badly (stunted) without any apparent cause, one should be lifted, and if wart-like growths are found upon the roots then the grower will be aware of the existence of Eelworms, which are found very abundantly in some soils, feeding upon the roots of grasses. They are therefore readily transported in potting and other composts. See "Eelworms" in the Chapter "On Pests Generally."

A Mildew scientifically known as *Peronospora cubensis*, occasionally is found upon the leaves of Cucumbers and their allies, and its progress is rather difficult to arrest. Spraying with potassium sulphide in the proportion generally recommended may be tried.

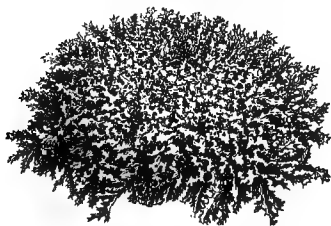


FIG. 681.—CURLLED-LEAVED
ENDIVE.

Endive.

Endive is seldom in great demand until the supply of Lettuce is exhausted, and, like Chicory, it is most useful for winter salading. If very early Endive is required, viz., in the autumn, seed may be sown in May thinly in drills 1ft. apart, in rich, porous soil, and the plants afterwards thinned out to 1ft. apart in the rows. For main crops or winter supplies, the middle of July is a suitable time to sow, thinning out the young plants as stated above, and encouraging rapid growth by frequent moving of the surface-soil and an occasional soaking with weak liquid manure. Various systems

winter supplies, the middle of July is a suitable time to sow, thinning out the young plants as stated above, and encouraging rapid growth by frequent moving of the surface-soil and an occasional soaking with weak liquid manure. Various systems

of blanching Endive are adopted. One of the most primitive is to place an inverted flower-pot over the plant, plugging up the drainage hole to exclude light. Another is to place two boards together like an inverted V over the rows of plants. But where there is a Mushroom-house that can be utilised, it is far the best plan to take up the plants with a good ball of soil attached and place them close together, taking care not to give too much water, or the foliage will rot.



FIG. 682.—BROAD-LEAVED ENDIVE.

In this way white and tender Endive is obtained. Successional batches may be placed in the Mushroom-house as often and in such quantities as may be necessary for requirements. The difference between the Curled- and Broad-leaved varieties is shown in Figs. 681 and 682. Extra Green Curled and Improved Round-leaved Batavian are the best varieties.

Herbs.

No vegetable garden is complete without its herb-bed, and as nearly all kinds may be easily raised from seed there is no difficulty in getting together a collection. The situation should be open, well-drained, and easy of access, so that the herbs may be got at without trampling over the beds. Early in April is a good time to sow, taking care to have the soil fine and in good working order. The distances between the drills for each kind will be determined by the height of the plants; for instance, Angelica should be in rows 6ft. apart, Fennel 3ft., and Marjoram 18in. As the seedlings appear, overcrowding should be guarded against by freely thinning. Nothing is gained—indeed, very much is lost—by congestion, not only in the case of herbs, but also with other plants in the garden.

Horse-Radish.

To grow this well the ground should be trenched 2ft. deep, and a good dressing of farmyard manure placed at the bottom of the trench; this will draw the roots straight down without forking. Pieces of root with a crown, or bud, at the top may be inserted a few inches from the surface and about 1ft. apart; in a year very fine, thick, straight stems will be ready for use.

Kale.—*See* “Borecole.”

Leeks.

The Leek is so hardy and useful as a winter vegetable that we are surprised it is not more frequently grown. At present

its culture is only given the proper attention by exhibitors, as fine, well-grown, and nicely blanched Leeks are always a telling dish in a collection of vegetables. To procure the magnificent specimens seen at horticultural exhibitions the seed should be sown early in January, in boxes, in gentle heat. The seedlings should be transferred into small pots when large enough, and planted out afterwards the same as recommended for Celery, adopting the same mode of blanching the growth, and giving copious supplies of diluted liquid manure when the plants are growing freely. For ordinary crops this seed may be sown in drills early in March, and when the plants are about 6in. or 7in. long they should be planted out in deeply-worked rich soil, using a dibber to make a good deep hole; at the bottom of the hole the plant should be placed with a little soil to cover the roots. As the plant grows, the hole should be gradually filled up with soil, thus giving a much greater length of blanched stem than is possible from plants put in on the level or surface. Dobbie's Champion and the old Musselburgh are two excellent and reliable varieties.

Lettuce.

Tastes differ as to which are the better Lettuce—Cos or Cabbage; but as a rule it is wise to grow some of both, sowing first a little seed of Early Paris Market (Cabbage) and Paris Green (Cos) in January, in gentle heat, pricking out the seedlings into boxes, and gradually hardening off to plant out in a warm, sheltered border early in April. In the middle of March a small bed may be sown, and as the plants get large enough they should be planted out 1ft. apart in rich soil. This operation of sowing and planting, if repeated every three weeks to the end of May, will keep up a constant succession of tender, crisp Lettuce. From the end of May to the end of July the seed should be sown thinly in drills, and the plants thinned out, not transplanted. If disturbed at the roots they are very liable to bolt or to run to seed without hearting. Plenty of moisture at the roots is essential to Lettuce in dry weather: the hearts are then large, solid, and very crisp. Paris Green and Paris White are splendid Cos varieties, while Continuity and Perfect Gem are equally good Cabbage sorts. Hicks' Hardy Winter Cos and All The Year Round Cabbage are two meritorious varieties for sowing in August to stand the winter, and for early spring cutting.

Several moth-caterpillars feed upon Lettuce, the most conspicuous being those of the Common Tiger Moth. These hairy caterpillars are taken by but very few birds, the Cuckoo being the greatest friend to the gardener in getting rid of them. Hand-picking must be resorted to. Surface Caterpillars are also troublesome. These must be dealt with according to the

methods suggested in the Chapter "On Pests Generally." A Mildew also asserts itself upon the leaves of Lettuce, both forced and grown outside, though chiefly upon the former. It is a species of *Peronospora*, and causes the plant to turn sickly and die. A well-ventilated house and a not too moist atmosphere will tend to keep it at bay.

Mushrooms.

These delicious vegetables, or fungi, are always appreciated, and when manure from horses fed on dry food can be obtained in quantity there is little trouble in growing Mushrooms all the year round. Manure from horses fed on roots, or receiving medicine, is of no use, Mushrooms absolutely refusing to grow in such droppings. It should be collected every morning, or oftener, and placed about 1ft. deep on the floor of an open shed, free from drip or wet, turning the droppings every morning, and working out all the long straw. This process of turning should be repeated daily, until there is sufficient manure to make a bed—large or small, according to requirements; then the whole should be thrown into a heap to heat thoroughly, and to eradicate any rankness. The heap ought to be turned thoroughly and well mixed daily for a few days or a week; it will then be in good condition to make up into a bed, say, 1ft. deep, which should be beaten firm. This bed will generate considerable heat, but when the heat has fallen to 75deg. or 80deg. it will be ready for spawning.

The spawn should be broken up into pieces about the size of a hen's egg, and inserted 2in. deep and about 1ft. apart over the whole of the bed, making the droppings firm again over the spawn. A coating of good fibrous loam 2in. deep, spread evenly over the bed and gently pressed with the back of a spade, will complete operations, taking care that the soil is neither too wet nor too dry, as no watering of the bed—unless it becomes very dry—should be done until the Mushrooms appear, which usually

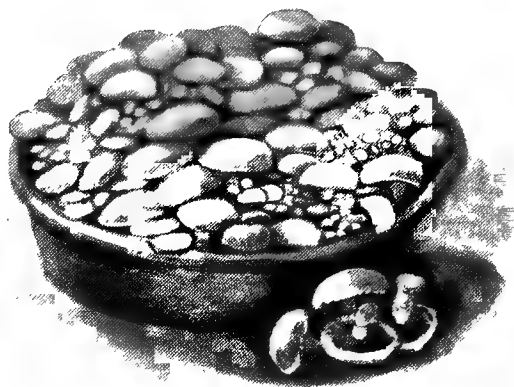


FIG. 683.—MUSHROOMS GROWN IN PANS.

occurs in six weeks from the time of spawning. A temperature of 55deg. is the most suitable, and ought not to be much exceeded. Maintain a moist atmosphere in the structure by damping the floors and walls—not the beds—every morning. When the Mushrooms appear, a good soaking with slightly-warmed water may be given, and as often afterwards as may seem necessary, giving weak liquid-manure, or a handful of salt in a 4gal. can of water when the bed exhibits signs of exhaustion.

When gathering the Mushrooms it is advisable to twist the stems round gently to detach them from the bed, filling the hole made in the bed with a little soil. If the stems are cut and left in the bed they cause the spawn to decay.

Very good Mushrooms are often grown in pasture fields by inserting lumps of spawn under the turf at the end of April or early in May, and beating the turf firm over the spawn; in favourable seasons, and on suitable land, the crop is often enormous. Mushrooms may also be grown in pans (Fig. 683).

Woodlice are the chief pests of the Mushroom cultivator, and they are best trapped by half-filling pots with hay and laying them on their sides. Each morning the Woodlice should be shaken out into a vessel of boiling water.

Mustard and Cress.

Mustard and Cress are usually employed together, and as their culture is exactly the same they are sown side by side. With a little gentle heat there is no difficulty in having a daily supply all the winter. Simply fill a few boxes with light, rich soil, press level the surface with a piece of board, and sow the seed on the surface, watering well, and not permitting the soil to become dry. By sowing one box of Mustard and another of Cress every three or four days a constant daily supply for a small family is secured. From the beginning of April to the end of September seed sown in the open ground will do very well.

Onions.

The ground for this crop should be deeply trenched and liberally manured in the autumn, leaving the surface as rough as possible, to be fully acted upon by the weather. In the early part of March a good sprinkling of soot or ashes from burnt refuse is beneficial, as either of these become well incorporated with the soil when levelling for sowing, which should be done as early in the month as the soil and weather will allow. For main crops the drills should be 1ft. apart, and not more than 1in. deep, sowing thinly the seed of such varieties as Ailsa Craig, Cranston's Excelsior, Bedfordshire Champion, and Carter's Record. When the seedlings have attained a height of

about 3in. they may be thinned out to 6in. apart in the rows, unless wanted for pickling, when they should be sown a month later than mentioned above, and will need no thinning. If

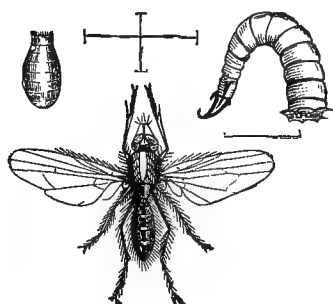


FIG. 684.—ONION FLY, LARVA, AND PUPA.

required for exhibition, it is necessary to sow the seed in heat early in January, and to transfer the seedlings when large enough into small pots, afterwards gradually hardening off, planting out 1ft. apart each way early in April, and feeding weekly with diluted liquid manure or 1oz. of nitrate of soda to each square yard; failing these some of the prepared artificial manures are valuable, but must not be allowed to fall on the foliage. In the autumn, when growth has ceased, the bulbs should all be lifted carefully and exposed to the

sun and wind for a week or so; they will then be ready to store away thinly in a cool, dry, frost-proof structure.

All the Tripoli section, and most of those varieties usually sown in spring, will succeed very well if sown in drills as advised above early in August, and the following March planted out in good deep rich soil 1ft. apart. Where the Onion Fly (Fig. 684) is very troublesome it is an excellent plan to sow in the autumn, as the pest very seldom troubles them, and such varieties as Ailsa Craig, James's Keeping (Fig. 685), and other sorts usually sown in spring, will produce large sound bulbs that will keep equally as long as spring-sown Onions. See also Shallots, page 1074.

Onion Mildew (*Peronospora Schleideni*) is a most debilitating disease. The fungus attacks the leaves, causing them to assume an unhealthy yellow appearance, and ultimately to die. If the leaves attacked are burned at once, and the other plants sprayed with liver of sulphur, the disease will be stayed; but if they are allowed to remain in the soil, spores will be distributed, increasing the gardener's trouble, as eventually winter spores will be developed.



FIG. 685.—ONION JAMES'S KEEPING.

Parsley.

In every garden this plant is indispensable, and to have a constant supply seed ought to be sown in March, and again

in June, thus ensuring both summer and winter supplies. The soil should be deeply worked and well manured some time prior to sowing, as Parsley always pays well for good culture. The drills may be drawn 1ft. apart, and not more than 1in. deep. The seeds should be sown thinly, and immediately the plants are large enough to handle they should be thinned out to 1ft. apart: this will appear a waste of space at the time of thinning, but the result will be proof to the contrary. In the great majority of gardens the plants are insufficiently thinned, and stifle each other. The Moss-Curled variety is one of the best for all requirements.

Parsnips.

The culture already advised for Beet and Carrots will also be suitable for Parsnips, viz., using deeply-worked soil that has been well manured for a previous crop. For general crops the seed should be sown at the end of February or early in March very thinly in drills 15in. apart, afterwards thinning the plants to 1ft. apart in the rows. As the Parsnip is a strong and rapid grower, no weeding will be necessary after the plants are thinned, if all weeds are pulled at that time. Unlike most root crops, the Parsnip is best taken up as wanted, and should not be lifted and stored in sheds or clamps. If a covering of straw or bracken is put over the bed before severe frost sets in, there will be no difficulty in digging up the roots at any time during the winter; the flavour will also be sweeter and far superior to roots which have been lifted in the autumn.

To obtain the long shapely roots seen at exhibitions, instead of sowing the seed in drills a crowbar is employed to make deep holes 18in. apart each way, working the bar about a little to enlarge the cavities, which are then filled with sand or sifted ashes from a burnt refuse-heap. Two or three seeds are placed on the top of this material, and if all germinate the strongest and most central one is left, and the others are pulled. In this way long, straight, handsome roots are obtained. For exhibition purposes few, if any, varieties will equal Dobbie's Selected, as it combines length and thickness with colour and fine form. For main or general crops, The Student and Elcombe's Improved are two fine varieties of excellent flavour.

Peas.

An open sunny position and soil that has been deeply trenched and well manured the previous autumn are best suited for this esteemed vegetable. Very little is gained by sowing seed in November, or by sowing in January in heat, and transplanting out in March. A few days may be gained in picking the pods, as compared with those sown outside, but these coddled plants are seldom very productive; one or two gatherings are

secured, and then the plants are useless. For all ordinary purposes seeds should be sown as early in February as the weather will permit, selecting for the first crop William Hurst or Chelsea Gem, neither of which usually exceeds 18in. in height. They may be sown in rows that distance apart, taking care to protect the young plants from sparrows as they appear, and placing a few short sticks to them early, which will afford some little shelter from cold winds. Towards the end of February another sowing should be made of any of the following varieties: Gradus, Stratagem, Sutton's Early Giant (Fig. 686), and Exonian, all of which are excellent. The seed should not be sown quite so thickly as is frequently done, and should be in rows about 3ft. apart. From this period onwards it is advisable to make fresh sowings immediately the previous sowing pushes through the soil, repeating up to the end of May or early in June. The following varieties are about 3ft. high, and great bearers of fine handsome pods, first-rate for the dining or exhibition tables; the seed should be sown thinly in drills 5ft. apart: The Gladstone, Veitch's Perfection, Captain Cuttle, and Boston Unrivalled. For the last sowings, select Ne Plus Ultra or Carter's New Michaelmas; the first of these ought to be at least 6ft. from any other rows of Peas, as it is a tall, strong-growing variety. It is an excellent plan to place a mulch of strawy manure on either side of the rows of Peas immediately after staking; this keeps the soil cool and moist, and causes the plants to remain vigorous and healthy, producing extra fine and well-filled pods. With the exception of the first two varieties named, all the others mentioned are suitable for exhibition, and, where this is an object, the seeds should be very thin in the rows, say 6in. apart, to allow the plants to grow up sturdy and branching, with correspondingly large and firm pods.



FIG. 686.—SUTTON'S EARLY GIANT PEA.

So numerous are the enemies to Peas that to describe them would need a page or two. Chief offenders, however, are the Pea Weevil (*Sitona lineatus*), a beetle about 5mm. in length, and greyish, with yellow stripes. This feeds upon the young foliage; while the grubs, which appear later, attack the roots. Dry weather

is favourable to the increase of these insects. Dustings of soot when the plants are wet tends to prevent an attack; while every effort should be made to keep the crop growing. Another Pea Beetle, *Bruchus pisi*, attacks the seeds. It is about the size of the Weevil already noted, but black in colour. Much might be done by way of prevention if all seed showing evidence of being "wormed" were kept in hot water at 125deg. Fahr. for an hour or more. Then there is also the objectionable Pea Moth (*Grapholitha nebritana*), whose pale green larvæ are frequently served up with the Peas, and thus vast numbers are destroyed. Little can be done to prevent attack. Thrips, Aphides, Wireworm, Slugs, and Cabbage Moth Caterpillars are all troublesome. The first two may be kept at bay by means of hot water; the Slugs and Wireworms must be trapped; and the caterpillars will have to be hand-picked.

Potatoes.

Few vegetables are of such an accommodating nature as regards soil, situation, &c., as the Potato, and for that reason it does not always receive the attention it deserves. Although most soils will grow the tubers more or less well, yet a fine, deeply-worked soil, that has been well manured for a previous crop and dug or ploughed up roughly in the winter, is the best for the production of Potatoes of medium size, good form, and that will cook well when tested (it must



FIG. 687.—RINGLEADER POTATO.

be acknowledged that really first-class Potatoes are too often spoiled by cooks). For first supplies Harbinger, Ring-leader (Fig. 687), and Improved Ash-leaf Kidney are second to none for quality, cropping, or earliness; they should be planted on a

warm border about the middle of March in rows 20in. apart and 1ft. between the tubers in the rows, drawing soil up to the tops when large enough. On light land Early Puritan and Beauty of Hebron are two early, heavy-cropping sorts, but, as a rule, are more suited for market than for the table. For mid-season requirements Sutton's Satisfaction and Sutton's Windsor Castle are splendid varieties; the tubers are of good size, very handsome, with prominent eyes, abundant 'croppers, of extra good

quality, and adapted for home, market, or exhibition purposes. For latest supplies Up-to-Date, Challenger, and The Bruce are all excellent, and, having full eyes, there is little waste in peeling. In the case of all the mid-season or late varieties there should be at least $2\frac{1}{2}$ ft. between the rows, and 15 in. between the tubers in the rows, and they should be planted as early in March as the weather and soil will permit. A great mistake is made in planting late Potatoes at the end of April or in May; not only is the quality impaired, but the crop is lighter, and is more subject to disease than are those planted in March. Immediately the tops are through the soil it is advisable to hoe between the rows and to give an application of 3 cwt. of superphosphate and 2 cwt. of kainit per acre. After this rapid progress in growth will be made, and the rows should be "earthed up" as soon as the tops are sufficiently high. Beyond pulling out weeds no further attention will be necessary until the tops decay, then the crop should be lifted, the tubers sorted into two sizes (viz., those for cooking and those for seed), and stored, if possible, in sheds, protecting them from frost by straw, and taking care to reject all diseased tubers, as these would spread the rot into others.

Of Potato pests, there is none so destructive as the fungus *Phytophthora infestans*, though even this is not so common as it was before the days of high (protective) moulding, the use of disease-resisting varieties, and spraying with the Bordeaux Mixture. The first indication to the gardener of the dreaded disease are the brownish spots upon the foliage (Fig. 688). The disease spreads with remarkable rapidity; hence the necessity for prompt measures—the rooting up and burning of infected plants and the spraying of the remainder. In gardens the spraying with Bordeaux Mixture or similar fungicide might be oftener adopted as a preventive measure. We should then hear less of such diseases as *Phytophthora infestans* and Leaf Curl (*Macrosporium solani*).

Of insects that may fairly be regarded as pests are the Wireworms, Leather-Jackets, and some of the Surface Caterpillars.



FIG. 688.—PHYTOPHTHORA INFESTANS.

These will be dealt with in the Chapter "On Pests Generally," as they are practically omnivorous.

Radishes.

Very early Radishes are obtained by sowing seed on a gentle hot-bed early in January, keeping the frame closed until the seed has germinated, and then admitting air with judgment on all favourable occasions, so as not to get the plants unduly drawn. The seed should not be sown too thickly for the same reason, otherwise the plants will be more conspicuous for their foliage than for their roots. From the middle of March sowings may be made every fortnight onwards, using very little seed each time, and protecting the same from birds, which are very partial to them. Rich soil and a nice, open sunny position are suitable for this salad, and the quicker the Radishes can be grown, the better and tenderer they are. Vilmorin and Co., Paris, have introduced a fine strain for frames; one of these is named Leafless, and, though it has very small foliage, it may be sown thickly and is very good. The same firm's Extra Early Forcing is also an acquisition. Other good varieties for frames or outside are French Breakfast, Long Scarlet, or the Turnip Radishes.

Rhubarb.

Owing to the untidy appearance presented by the foliage of Rhubarb during some portions of the year, it should be grown in a part of the garden where it will not be an eyesore, but will yet be fully exposed to sun and light. In preparing a site for a new plantation the ground should be dug to a depth of 3ft., and heavily manured during the winter. Planting should be done at the end of February or early in March, allowing a distance of 4ft. between each stool, and giving a mulch of strawy manure immediately afterwards to conserve moisture. Rhubarb may also be raised from seed sown early in March, thinning out the plants to the distance named above. These seedlings will make good plants for forcing in two years. By taking up roots, or clumps, in November with a good ball of earth attached, and placing them in a Mushroom-house or other warm, dark, moist structure, a plentiful supply of tender "sticks," or more properly, "stems," will be produced for Christmas and the New Year. Champagne, Monarch, and Victoria are three favourite varieties that succeed on all soils.

Salsafy and Scorzonera.

As the culture of both the above is similar, they are dealt with together, and in many establishments they are used together. The seed is best sown early in April in drills 15in. apart, on soil that has been deeply worked and well manured

for a previous crop. Thin out the plants to about 8in. apart in the rows, and protect and dig up as required for use, the same as recommended under Parsnips.

Savoys.

Very frequently this winter vegetable is sown too early; the consequence is that it is ready to cut in the early autumn, and the heads burst before they are wanted. For all general purposes, the first week in April is quite early enough, selecting an open situation for the bed and not sowing the seed very thickly. When the plants are large enough, they should be put out in good deeply dug soil, at 20in. apart for the large-growing varieties, and 15in. for the small-growing ones, if possible choosing showery weather, and protecting from Slugs by a circle of soot or air-slaked lime. When the plants have commenced to grow again freely, they will be all the better for being "earthed up," *i.e.*, having the soil drawn up to them on each side of the rows. If at any time during the summer the Savoys appear to cease growing, or to be turning a yellowish hue, an application of 1oz. of nitrate of soda to each square yard will impart new vigour. The flavour of Savoys is much improved by frost. Early Dwarf Ulm and King Coffee are two fine little Savoys, fit for a gentleman's table; for the servants' hall or for market the larger Drumhead or Dwarf Green Curled is most suitable.

Seakale.

This vegetable (Fig. 689) is practically indispensable in most gardens of any size, and a good supply of crowns for forcing is imperative. Seed sown thinly in rows 2ft. apart at the end of March will produce large crowns in two years, if the soil is good and the plants are thinned out to 15in. apart in the rows. By sowing annually a constant demand may be met without much trouble. In November the oldest plants may be lifted, sorting out all the strongest crowns or roots, and laying them in soil until wanted. These crowns should be placed in a Mushroom-house, or other dark place, every fortnight, in quantities according to requirements, the roots being plunged in soil up to the crown, and kept moist, also maintaining a moist atmosphere. The crowns will soon form nice heads beautifully blanched. If the first batch is planted in November, and this is

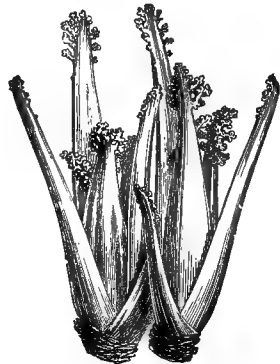


FIG. 689.—SEAKALE.

followed by other batches every fortnight to the middle of March, a constant supply of Seakale will be produced from Christmas to the end of April. The temperature advised for Mushrooms is also suitable for forcing Seakale.

Shallots.

Shallots are by many preferred to Onions, not only for culinary uses, but also for pickling, the contention being that they are milder in flavour. Any fairly good rich soil will grow this vegetable admirably. The bulbs should be planted singly 1ft. apart, and buried up to the neck; if the roots push the bulbs out of the soil, as they sometimes will, they ought to be pressed back again. Weeds, if troublesome, may be hand-pulled, or kept under by the Dutch hoe. In the autumn, when the tops decay, the bulbs should be lifted, allowed to dry thoroughly in the sun for ten days or so, and then stored away the same as Onions. Probably the best Shallot is Veitch's Exhibition Purple; it is large, firm, and handsome.

Spinach.

A moderately-deep, rich, friable soil is most suitable for this crop, which is always welcome, as it comes into use at a period when vegetables are none too plentiful. The first sowing may be made in February on a warm border in drills 1ft. apart, afterwards thinning the seedlings to 6in. apart; unless thinned, the plants crowd each other, and the foliage is much smaller than it otherwise would be. Later sowings may with advantage be made between rows of Peas, sowing both at the same time—one row of Spinach between two rows of Peas. In this way space in the garden is economised, and the Spinach crop is exhausted, and may be cleared away before it runs to seed and interferes with the Pea crop. It is little use sowing Spinach for summer supplies after the middle of May, as the hot, dry weather causes the seedling plants to rush to seed without making leaves large enough to pick. Early in August a portion of the garden that has been cleared of its crop, and is still in a fairly rich condition, may be levelled, and sown with Spinach in drills 1ft. apart; this will afford frequent gatherings during the winter and spring. For sowing in either spring or autumn the Victoria or Long-standing variety is the best, being equally capable of withstanding hot or cold weather.

Tomatoes.

The popularity of this vegetable has caused everyone with a garden to desire to have Tomatoes as early and for as long a period as possible. To attain this end seed should be sown in gentle heat early in January, keeping the plants close

to the glass at all times to ensure a strong, sturdy habit. When the seedlings have formed the first rough leaf, they should be transferred singly into small pots properly drained, using a compost of fibrous loam with a little leaf-mould and sharp sand added. As the little pots become full of roots, a shift into 4½ in. or 5 in. size should be given, using rather less leaf-mould and sand. They should not be potted again until the first truss of flower has appeared, and one or two fruits have set. After this the plants may be transferred into large pots, well drained, or planted out in beds of good soil, free from farmyard manure. Unless several stems or leaders are wanted to the plants, all side shoots are best removed as soon as they appear, thus throwing more strength into the main stem and its fruit. Ventilation requires considerable care, for on that important matter depends in a great measure the success or failure of the crop. A close, moist, stuffy atmosphere brings disease and other evils, and renders a good crop impossible. Plenty of air on all favourable occasions ought to be admitted, and all watering or washing of the floors should be done in the morning, so that the moisture may evaporate before night; in fact, a dry atmosphere should always be aimed at. Feeding, again, is a stumbling-block to novices. No feeding with natural or chemical manure is desirable until the plants have commenced fruiting. If done before, a gross growth is made, and fruit is rarely much in evidence; but when the plants have begun fruiting, stimulants in a diluted form are essential to maintain their strength.

For outside culture the seed should be sown early in March and grown on as above. By the end of May the plants will have formed and set a truss of fruit; they may then be turned out of the pots and planted against a warm wall or fence, training them to a single stem, and pinching out all side shoots at once as they form. In ordinary seasons a fair crop of fruit is produced.

For home or market purposes, Chemin Rouge, Comet, and Dobbie's Champion are all excellent for inside or outdoors. For exhibition, Golden Jubilee, Perfection, and Duke of York are all large, of perfect form, and fine colour; but to get them extra large the fruits should be thinned freely.

The pests which give serious trouble to the Tomato-grower are comparatively few; but fungoid diseases, like the common Black Spot (*Macrosporium tomato*) and the formidable Sleeping Disease (*Fusarium lycopersici*) are very destructive. Happily, the latter is not common in this country. The chief characteristic of the latter is the collapse of the plant attacked. Treatment is of no avail; and the only possible measures are precautionary—such as burning the diseased plants in their entirety, treatment of the soil by means of lime, thoroughly

cleansing the house, and avoiding, if possible, seed from an infected area.

Black Spot is a very well-marked disease. The common name gives a clue to its chief characteristic—the presence of dark-coloured spots. The disease usually manifests itself at the style end of the fruit. Plants so attacked should be burned, and the remainder be sprayed with sulphide of potassium (1oz. to 1gal. of water). Many growers spray as a precautionary measure, and do not wait until the disease asserts itself. The result is that Black Spot and Leaf-Rust (*Cladosporium fulvum*), the latter appearing as dark spots on the foliage, are nothing like so prevalent as formerly.

Turnips.

A rich, well-worked, and friable soil is desirable for the earliest sowing at the end of March or early in April, and a sheltered site should be selected for the first sowing; and in about three weeks another sowing may be made. Early Milan and Snowball are splendid varieties for sowing up to the beginning of May; and for use from then to the end of July, Veitch's



FIG. 690.—TURNIP FLEA-BEETLE.

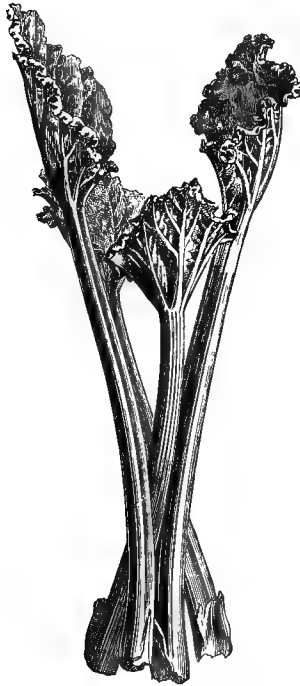
Red Globe, Model White, and Golden Ball are all of proved merit, the last two being specially valuable for exhibition. At the end of August, Chirk Castle will be a good variety to sow to stand the winter and supply Turnip greens in early spring; while bulbs may be drawn at any time if wanted. If the Turnip-Fly, or Turnip-Flea (*Phyllotreta nemorum*) (Fig. 690) prove

troublesome, a dusting with soot early in the morning while the dew is on the plants will check this enemy and give the plants a chance to grow away from it. If Turnips are required during the winter in quantity the roots may be lifted, and, after the tops have been cut off, stored the same as advised for Beet, Carrots, &c.

Vegetable Marrows.

Being a trailing subject this vegetable is best grown on old rubbish or manure-heaps unchecked, but cutting all the Marrows immediately they are of sufficient size to use, for if one or two begin seeding further production ceases. Seeds sown at the end of April will be early enough, as they quickly germinate and grow rapidly. When the seedlings have begun to form the first rough leaf they ought to be placed in 5in. pots, employing a compost of fibrous loam with a little decayed manure, and if necessary the plant supported with a neat stake as it

grows. About the middle of May they will be ready to plant out under hand-lights, or if they are not available, planting should be postponed to the end of the month. Beyond a thorough soaking of water in dry weather, no further attention is needed. *Gourds* may also be grown in the same manner. Moore's Vegetable Cream, Pen-y-Byd, and Custard Marrow are the best varieties of Vegetable Marrows, both for table qualities and for exhibition.



RHUBARB.



25.—On Pests

By
W. D. DRURY.

Generally.

So manifold are the foes of cultivated plants, and so complicated the life-histories of the majority, that when their numerical strength and peculiarities are seriously considered one wonders that the average garden yields such a good return as it does. In this country economic entomology and plant pathology are yet in their infancy, though there are evidences that a knowledge of them, elementary though it be, is not only eminently desirable but absolutely necessary to present-day gardeners. At one time comparatively little was heard of pests, and any falling off in crops was put down to errors in treatment, or oftener perhaps to certain weather influences which were popularly supposed to be conducive to "blight." Then, again, it must not be forgotten that fifty years or so ago the amount of garden land under cultivation was infinitesimal compared with what exists to-day.

America and several Continental nations are far ahead of us in their knowledge of pests and the best means of keeping them under control. We seem to suffer severely from that peculiar prejudice against anything new which is characteristic of many who till the soil, and until such has been broken down, or considerably modified, we shall continue to play second fiddle to more go-ahead nations. As an instance of this prejudice one has but to think of the cold water which was thrown upon the efforts of those teachers of a decade or so ago who ventured to suggest the use of arsenites in dealing with

some of our most noxious fruit-pests—the Codlin Moth to go no further. How, too, pictures of poisoned fruit-consumers and orchard live-stock were industriously conjured up by those whose business in life seems to be to condemn without trial anything which savours of a new-fangled notion. This, however, has been changed, and there are few fruit-growing centres to-day where the judicious use of such arsenites as Paris Green and London Purple is not in vogue, and gladly welcomed by those responsible for the cultivation of the crops.

To those even cursorily acquainted with the subject of this chapter it will be patent that to deal in detail with the section known as General Feeders will be a well-nigh impossible task in the restricted space at command. What is aimed at here is rather to enumerate what may be termed the chief offenders in both the Animal and the Vegetable sections of pests, and to give principles which may be applied practically. No hard and fast line can be laid down, as seasons and other local influences will have to be considered by those who are called upon to fight the pests. The most successful will be those who do not rely on a rule-of-thumb kind of way, but who bring their intelligence to bear in coping with the enemy to whichever section it belongs.

For purposes of this chapter pests may be divided into two broad but well-defined groups—Animal and Vegetable; for either to one or the other they undoubtedly belong. Of the former a great deal is known; but of the latter (plant parasites especially), many connecting links in the chain are wanting before they can be successfully controlled.

Animal Foes.

These are a host in themselves, though the majority belong to the class *Insecta*—a class which is so well defined that there is little excuse for the indiscriminate inclusion therein of such creatures as Red Spider, Woodlice, and the true Spiders. Insects may be discriminated in the adult state by the possession of a well-marked head, bearing one pair of feelers; a fore-body, or thorax, bearing three pairs of legs, and usually two pairs of wings; and a hind-body, or abdomen, without legs. Spiders proper, and Red Spiders, or Mites, having but two divisions to the body and eight legs (when adult), cannot be properly classed as insects.

Having determined the species of pest, the first question for the gardener's consideration is "How does it feed?" On the answer the treatment will practically depend. All plant-inhabiting animals

do not feed alike, and what therefore would be fatal to one would be quite harmless to another.

Let us take, for example, two of the commonest pests known to the fruit-gardener—Greenfly (Aphides) and the caterpillars of the abundant Gooseberry Moth (*Abraxas grossulariata*). The first is a sucking insect, the second a chewing one. Now, though the caterpillar may readily be controlled by systematically poisoning its food-plant, the Aphides would not be in the least affected, say, by covering the plants in which they were found with a solution of Paris Green or powdered hellebore, both of which are virulent poisons. This may be readily accounted for when the method of feeding adopted by the two insects is known. The Aphides derive their sustenance from the juices of the leaves, and before they commence to “suck” they first penetrate the poison-area with their beak-like mouth.

Then there are the borers—wood-feeding insects, say like the Currant Shoot Moth, whose larvæ feed on the shoots; the Common Goat Moth Caterpillars, which tunnel the trunks of many trees; or the lesser-known Wood Leopard Moth Caterpillars, which are found in the branches. Obviously these are without the reach of insecticides; so also are, after a time, those insects which enter the immature flowers and fruits, or feed between the leaf-surfaces like the leaf-miners.

Yet another section embraces such root-feeders like Grape Phylloxera; American Blight (in part); the troublesome Cabbage Gall Weevil, whose wart-like excrescences are only too well known to the vegetable cultivator; the much-dreaded Eelworms, so plentiful at the roots of grasses used as composts; and those omnivorous depredators the Wireworms. All of these call for special treatment. Trapping may be resorted to in the case of some, baking the soil in that of others, while alternate cropping in the case of Cabbages and such like will prove beneficial by freeing the soil of the objectionable animals.

Then there are a lot of very destructive insects—Moth-Caterpillars, certain Aphides, and Beetles which are leaf-twisters, or it may be case-makers, and though they feed upon the green parts of the plants, they are protected by the curled or twisted leaves, in which they feed comparatively secure from insecticides. Certain scales, again, are difficult to deal with because the exuded matter forming the outer covering of the pests is insoluble in anything which might with safety be employed.

While it is very desirable that all animal pests should be kept at bay, yet the crops which best pay for attention are fruit and vegetables, the former especially. The difference in price obtainable on the market between that which has been protected against insect and other pests and that which has been allowed to take its chance is so great as to be incredible. Even with crops which are required for home consumption, appearances

have to be considered by the gardener if he wishes to enjoy the confidence of his employer.

So far we have assumed that the pests have been confined to outdoor crops; but there are also indoor ones to be thought of, like greenhouse and stove plants, fruits under glass, &c. These, however, have been treated under the respective chapters.

For poisoning the food-plants in order to circumvent chewing insects like the larvæ of Moths, Butterflies, and Sawflies, the grubs of Beetles which feed exposed, as well as the Beetles themselves that lay the green parts of plants under contribution, Paris Green is best used in the proportion of 1oz. to 20gal. of water. Many growers also add 1oz. of lime to the above, as the last-named minimises the chances of the foliage being injured. The mixture should be kept stirred or the Paris Green will settle, and it should be distributed in a nice fine spray. With fruit-trees on no account should the preparation be employed when they are in blossom. So far as the fruit itself is concerned there is not the slightest danger to the consumer if the arsenite is used in the proportion stated. Manufacturing agricultural chemists, like Mackey and Mackey, Bermondsey, keep Paris Green Paste ready for making the insecticide; and this is preferable to having to mix the powder one's self. Hellebore (in powder) dusted or blown on to the trees in the early morning is also a capital insecticide, especially in the case of the Sawfly and Caterpillar grubs on Gooseberries. Although a strong poison, hellebore is soon rendered harmless by contact with the outside air, and must therefore be renewed.

For sucking animals, one of the best all-round preparations is kerosene emulsion. If properly made the kerosene does not separate and cause injury to the plants. It may be procured in this country of Messrs. Mackey and Mackey, in a concentrated form, and all that the user has to do is to dilute it to the proper proportions, which will vary somewhat with the kind of tree under treatment and the age of the leaves. The younger the foliage, the weaker the solution. The exact proportion may be determined by the gardener himself. These emulsions are best bought from firms with the machinery for making them.

A very good home-made preparation for similar insects consists of ordinary petroleum 1 wineglassful, and hot water 3gals. The difficulty about this solution is that the petroleum does not readily amalgamate, and constant stirring is necessary. It is a very good plan to put sufficient soft soap in the water to discolour it, as this has been found preferable to plain water. The soluble petroleum is preferable to the ordinary kind.

Again, it cannot be too widely known that hot water is a most useful insecticide, and we have found it especially so for Scale, applied at a temperature of 150deg. It has the merit, too, of being harmless to the plants under treatment—neither leaves,

flowers, nor fruits being affected. Aphides readily succumb to it, as will those other pests of the greenhouse and outdoor garden, Thrips. In the case of Cactuses suffering from insect pests—Mealy-bug, &c.—the hot-water treatment may be very successfully employed, first turning the plants on their sides.

For the larger borers, like Goat Moth and Wood Leopard Caterpillars, a piece of copper wire may be thrust up the holes made by the insects. Where, however, old trees are badly attacked by the first-named pests the galleries are so numerous, and have so many ramifications, that it is hopeless to attempt to kill the insects by such means, or even by injecting a powerful insecticide into their haunts.

Hard-bodied insects, like many of the Beetles, are difficult to cope with where they do not actually feed upon the green portions of the trees or plants, their horny wing-cases protecting

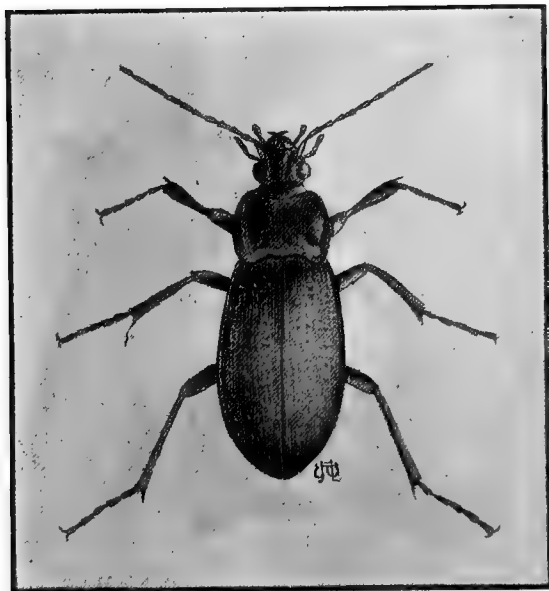


FIG. 692.—GROUND BEETLE (*CARABUS NEMORALIS*).
(twice natural size.)



FIG. 691.—LADYBIRD
LARVA.

them against the insecticides which kill by contact and that may be safely employed. Many of the most troublesome Weevils, all of which are night feeders, are best shaken on to a board thickly smeared with tar, and afterwards collected and destroyed.

Earwigs, Cockroaches, Ants, Wasps, and Woodlice are all most effectually dealt with by traps or poisoned food. Red

Spider (including the Bryobias) should be treated to an insecticide which kills by contact when on outdoor trees; while indoors they should be treated to XL All Insecticide.

The preceding are a few general rules to be observed for controlling certain well-known general pests. To exterminate any one of them is practically impossible. Nature has too well provided against such a contingency. She will, however, help man considerably to preserve the requisite balance by means of insectivorous birds—like the Cuckoos and the Redstarts—whose fondness for hairy Caterpillars is well known. Such insects are rejected by the majority of insect-eating birds, probably on account of the irritating hairs. Rooks, Starlings, Robins, Nightingales, Partridges, and numbers of others also do great service. Then there are working in the gardener's best interests the easily distinguished Ladybirds and their larvæ (Fig. 691); the majority of the Ground Beetles (of which Fig. 692 is *Carabus nemoralis*); the much-despised Cocktail, or Devil's Coach-Horse Beetle (Fig. 693), and many others of the same family characterised by short wing-cases; the gaily-coloured Tiger Beetle (Fig. 694) and its larva, which lurks in its underground retreat, just keeping its head above the soil, waiting for an unfortunate victim; the curious light-bearing Glow-Worm Beetle (Fig. 695), whose soft-bodied larviform female is frequently found in country gardens, making short work of destructive Snails and many noxious Beetles. Then there are



FIG. 693.—DEVIL'S COACH-HORSE BEETLE.

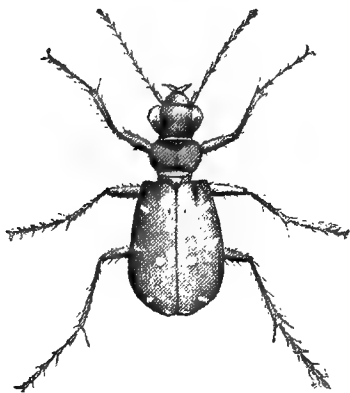


FIG. 694.—TIGER BEETLE.

the Hawkflies, or Hoverer Flies, whose grubs move leech-like upon Aphides-infested plants; the gauzy-winged Lace-Flies, or Golden Eyes; the *Hemerobiidae* (near relatives of the Lacewings) several species of which clothe themselves in the empty skins of their victims; and the Sand-Wasps and Ichneumon Flies, elsewhere alluded to. These are some of the friends of the gardener with which he should be equally as well acquainted as with his foes. We will now briefly discuss the more important feeders.

AMERICAN BLIGHT; OR WOOLLY APHIS (*Schizoneura lanigera*).—

Both Apple- and Pear-trees are affected with this pest, which is undoubtedly one of the worst against which growers have to contend. The insects are easily recognised by the tufts of wool

which are exuded, and may be found in little colonies distributed over the bark, in the crevices of which they feed. The injury done to young trees is very great, but the insect is usually more abundant on old and neglected ones, on which may be found soft, spongy growths caused by the irritation set up by the insect, and not infrequently deep cracks. Woolly Aphides

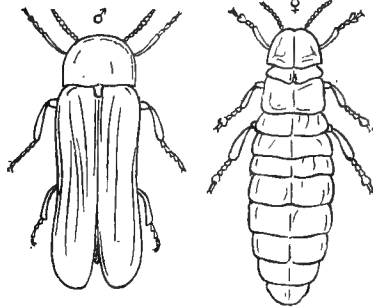


FIG. 695.—GLOW-WORM BEETLE.

are readily transmitted from tree to tree by the agency of wind alone. Intense cold does not appear to interfere with their comfort, and in order to cope with the enemy both summer and winter dressings are necessary. The insect is a sucking one, and besides being found upon the bark it also occasionally affects the roots.

Winter is the time to cleanse the trees, which should be thorough, and all old bark should be removed and burnt, as beneath it may be eggs or perfect insects. Kerosene emulsion should be sprayed on every part affected, taking care that it penetrates the crevices: this is best for old trees and for winter only.

For young and tender-barked trees soluble petroleum, a wine-glassful; soft soap, 1lb.; and water (hot), 1gal., with a handful of lime thrown in, will be found excellent. In summer soluble petroleum, 1 quart; and hot water, 4gals., may be used without injury to the trees. Kerosene emulsion in solution may also be applied to the roots in winter, should they be attacked.

ANTS.—Industrious but undesirable insects, so far as gardens are concerned. Outdoors they make unsightly heaps in paths and gardens, while they live on intimate terms with some of the worst kinds of Aphides (those which secrete honey-dew), and on that account alone they are to be condemned. Indoors they are also very troublesome to many flowering plants, as well as to ripe fruits, especially such soft kinds as Figs. In Peach-houses Ants not infrequently resort, and are responsible for much injury to the flowers, preventing them, in fact, from developing properly. Ants are social insects, and their mouth-parts are adapted for biting. Such parts, however, are peculiar, in that the mandibles are worked without the mouth itself being brought into play while the insects are feeding.

Outdoors the best method of destruction is by means of carbolic acid, &c., in solution, paraffin, or chloride of lime and water—that is, providing the nests are accessible—making

a sort of funnel-shaped receptacle out of clay. Sometimes the insects tunnel so deeply that they are not reached by insecticides. Then a good plan is to place a large inverted flower-pot, partly filled with leaves, and having the drainage-hole plugged up, over the nest. If the ground in the vicinity of the nest be watered pretty frequently the colony will take to the pot, when they may be readily destroyed by means of hot water.

Indoors traps of another sort are best. These may consist of large bones on which a little meat has been left, sponges soaked in a syrupy fluid, and treacle and arsenic in saucers (a very poisonous mixture). In the first two cases the traps will need to be examined and the insects dropped into boiling water. Spring is the best time to trap, as then there are the young to be fed and tended, and food must be found in abundance by the workers, and on their destruction by the queens. Ballikinrain is also a preparation that may be used with excellent effect in fruit-houses. *Lasius niger*, a small black species, is the one which gives most trouble in gardens.

APHIDES, PLANT LICE, or GREEN-FLY.—No insects are more familiar than these, or more difficult to keep in check, as they multiply by means of oviparous and viviparous females as well as parthenogenetically. The life-cycle is a complex one. All Aphides are soft-skinned sucking insects, and would therefore be readily destroyed by contact if they were always accessible. Unfortunately for the gardener they are not, frequently concealing themselves in the foliage, which, when badly attacked—as in the case of fruit- and rose-trees, &c.—has a tendency to curl. Then, again, there are root-feeders in the American Blight and in the destructive Phylloxera of the Grape; and gall-makers, like *Rhopalosiphum ribis*, a species found upon the Black and the Red Currant. Another peculiarity is that certain Aphides migrate from one plant to another. *Phorodon humuli*, for instance, which infests Plums in autumn and winter, betakes itself to the Hops in spring, and does immense damage.

Some of the most destructive and commonest species are the Black Fly, or Black Dolphin, upon Beans, the Cherry and Currant Aphis (*Myzus cerasi*), Apple Aphis (*Aphis mali*), Plum Aphis (*Aphis pruni*), Rose Aphis (*Aphis rosæ*), Peach Aphis (*Aphis amygdali*), and the Hop Aphis (*Phorodon humuli*) already alluded to.

Directly an attack of Aphis occurs, the trees or plants should be sprayed with either kerosene emulsion, or a quassia and soft soap solution made by boiling 1lb. of the former and adding the liquor to 1lb. of soft soap and 16gals. of water. Abol is also a thoroughly good remedy, and has been very successfully employed in keeping down the Plum and Hop Aphis. Popularly, all kinds of Aphides are called "Blight."

APPLE-BARK BEETLE (*Xyleborus dispar*).—Though associated in name with the Apple, this Beetle by no means restricts itself to that tree, but is found also upon Pears, Plums, and other trees. The insects are dark brown or almost black, and the females measure about 3mm. in length, the males being much smaller. The damage they inflict is by boring into the main stems or into the branches, and in the case of young stock the injury is frequently fatal, as the trees are completely tunnelled. The eggs are laid in late spring, and if the gardener later notices minute shot-like holes in the trees, he should suspect the presence of these insects. Such holes are really the exits from the galleries. In Canada, where the insects are plentiful, a wash made of soft soap and a strong solution of washing-soda, the whole of the consistency of paint, is applied on a warm, fine day. This, when dry, which takes place in a few hours, forms a tenacious coating. A peculiarity in connection with these insects is that in the galleries they make grows a peculiar fungus, known as Ambrosia, and upon this they feed.

COCKCHAFERS AND THEIR ALLIES.—Besides the Common May Bug, or Cockchafer (*Melolontha vulgaris*), the Lesser May Bug (*Phyllopertha horticola*) and the beautiful Rose-Beetle (*Cetonia aurata*), already noticed, are also destructive to many fruit trees and flowers. The first two are injurious in both the Beetle and grub state; but the last is a pest only as a Beetle. Rosaceous plants are most affected, and the Beetles feed upon the stamens and petals of the flowers of Apples, Pears, Strawberries, &c.; upon the fruits; and frequently upon the leaves. At any rate, this is so of both the May Bug and the Lesser May Bug.

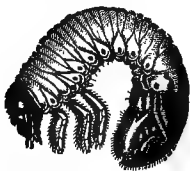


FIG. 696.—GRUB OF
COCKCHAFFER.

The larvæ of these two insects feed also upon the roots of Strawberries, grass, Fir-trees, and a number of other plants. The grubs of the Cockchafer when mature rest in the position shown at Fig. 696, though when young they are able to progress by crawling. They are most difficult to get rid of, as directly frost appears the pests work down in the soil to a place of safety. They live a long time as larvæ—three to four years—and even when they have arrived at the perfect insect stage they do not for some time afterwards emerge from their underground retreat.

In the case of the May Bugs, little can be done by way of remedies, except to shake the trees over boards covered with a sticky preparation, afterwards collecting and destroying the insects. Rooks, Starlings, and the domestic fowl all do an immense amount of good, though the first-named in the case of infested lawns tear up the grass to get at the aldermanic grubs.

The Rose Chafers are best hand-picked, though the process is laborious. Like all bright-coloured insects they are sun-lovers, and numbers may be captured with a net dexterously used; while others may be shaken from their food-plants during dull or rainy weather.

COCKROACHES are omnivorous pests, very destructive to indoor fruit and flowers. Shoots and footstalks of Vines and Pear-trees, flowers and roots of orchids, and many other plants are affected. At one time there was only one

species which caused serious trouble—*Stylophyga* (*Blatta*) *orientalis*. There are, however, four or five other illustrious foreigners recently introduced. *Periplaneta australasiæ* (Fig. 697) is now very common; it is a rich brown with yellow

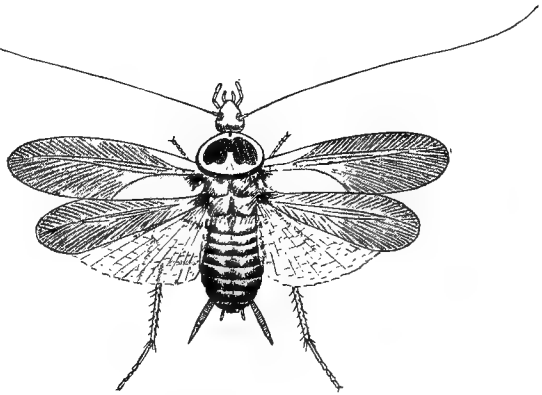


FIG. 697.—PERIPLANETA AUSTRALASIÆ.

streaks and margin. Then there are *P. americana* (Fig. 698), a larger insect, but lacking the yellow streaks and bordering; *Phyllodromia germanica* (Fig. 699); and *Leucophaea surinamensis*. These are best poisoned by means of phosphorus paste, Magic Paste, or the Ballikinrain preparation.

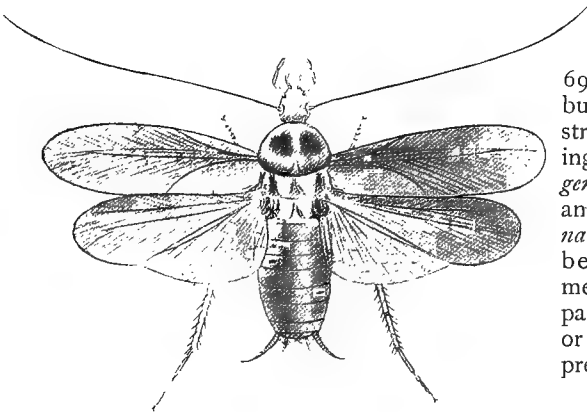


FIG. 698.—PERIPLANETA AMERICANA.

CODLIN MOTH (*Carpocapsa pomonella*).—This is one

of the most injurious of insects, and is remarkable alike for its wide geographical distribution and accommodating taste. Though it chiefly affects Apples, yet Pears, several of the stoned fruits,

and even Walnuts and Sweet Chestnuts, as well as *Pyrus aria* and other ornamental trees, occasionally harbour the pests. The caterpillar may be described as from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. long, pinkish with brown head, the whole body segments being black-dotted. The Moth is on the wing in late spring, and deposits

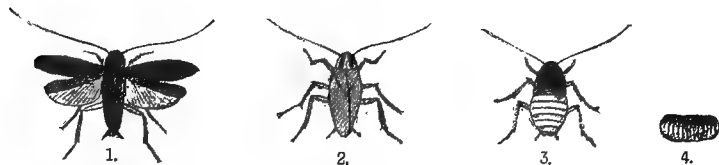


FIG. 699.—*PHYLLODROMIA GERMANICA*, SHOWING: 1, IMAGO (WINGS EXPANDED); 2, IMAGO (WINGS CLOSED); 3, IMMATURE; 4, OOTHECA.

her eggs in the vicinity of the blossoms. The larvæ when hatched out burrow into the embryo fruits from the calyx end and tunnel towards the stem, but not touching the core until they are nearly full-fed (Fig. 700), when the seeds are also eaten and the maggot then escapes. Prior to this most of the infested fruits have fallen, and the insects have made their way back to the trees and spun a cocoon in which they remain until next spring.

Paris Green (10z. to 20gals. of water), with 10z. of lime added, is the best insecticide. This should be sprayed on just after the fruit has set, and on a warm, sunny day. A second spraying may be necessary ten days or so after. By way of prevention,



FIG. 700.—CODLIN MOTH AND CATERPILLAR.

all "maggotty" fruit should be collected and burnt; the trees should receive a winter dressing of caustic soda (Greenbank's 98 per cent.), $\frac{1}{2}$ lb.; crude commercial potash, $\frac{1}{2}$ lb.; water, 5gals. This should be applied to the trees in mid-winter, the operator using gloves. Hay-bands placed round the trees (trunk and main branches) are also successfully employed in America. They serve as shelters for the larvæ, which escape from fallen and other fruits and are making their way up the trees for pupating, and should be examined periodically and the caterpillars destroyed.

The late Professor J. V. Riley advocated this plan for the United States of America, where the pest is double-brooded. The accompanying illustration (Fig. 700) shows the inconspicuous Moth and full-grown larvæ.

EARWIGS are too well known as to their general conformation to need any description. They are usually regarded as vegetarians, but they are also carnivorous, and in captivity they seem to show a preference for the latter dietary. Some little of the evil reputation they have acquired is due to the habit they have of concealing themselves in flowers, fruit, &c. For all that, they are addicted to gnawing the petals of many flowers, and of penetrating into fruits like Apples, Peaches, and Apricots; but whether or not they go there simply for shelter or for the purpose of partaking of the sweets, has not been satisfactorily determined. These insects are best trapped by means of flower-pots half filled with straw and placed on sticks; old hats, similarly treated; Broad Bean or other hollow stalks laid in their haunts; and pieces of paper loosely rolled and placed in the plants or trees affected. These traps should be examined each morning, and the insects consigned to a vessel of boiling water. Many Earwigs have the power of flight, though, as in the case of the common *Forficula auricularia* (Fig. 701), they do not often avail themselves of it. *Labia minor*, a much smaller insect, may frequently be found on the wing.



FIG. 701.—COMMON EARWIG—VARIETY WITH LONG FORCEPS.

(magnified about three diameters.)

EELWORMS.—By this popular name are known several species of Nematoid Worms which of late years have given gardeners considerable trouble. They belong to different genera and affect a large number of plants—Strawberries, Clover, Wheat, Potatoes, Cucumbers, Melons, Tomatoes, Vines, Onions, Hops, and Hyacinths, as well as Pasture Grasses and common way-side weeds. Eelworms are so readily introduced that the greatest care should be exercised when obtaining new potting soils, as this is a common source of trouble. The pests are barely visible to the naked eye, being only 1mm. long and whitish. They are pointed at either end.

Eelworms are found in large numbers; they pierce the tissues of their hosts, and extract therefrom the juices. The symptoms of attack vary with its severity, and a little with the species found. Melons, Cucumbers, and Tomatoes may collapse

altogether, and without apparent reason, if the plants are not lifted and examined; or, again, there may be wart-like excrescences on the roots; bulbs (like Onions) may show signs of decay; Vines sometimes have a "cankorous" growth just beneath the soil, and the bark just at the roots may be removed; while the roots and foliage of other plants may be distorted, stunted, and unhealthy-looking. When once a plant is badly attacked cure is practically out of the question. The soil should be removed and deeply buried, and a fresh compost should be employed, first charring it, or rendering it free from the pest by pouring over it boiling water. These remedies are only applicable when the disease is restricted, as for instance in the case of flowers, fruit, or vegetables under glass. Outside the pests are more difficult to control. Wherever kainit can be employed this is most beneficial. It should be used in conjunction with basic slag—two parts of the latter to one of the former. $2\frac{3}{4}$ lb. of the combination to the square yard, if well forked in, will not be any too much. By way of preventive measures, turfy loam, when used comparatively fresh from the land for pot-plants, should be baked or scalded, while all affected plants should be destroyed by fire. Turf stacked for future use should be treated between each layer to a dressing of mustard refuse as for Wireworms, using it plentifully. An alternation of crops should, wherever possible, be resorted to. Onions, for instance, should not follow Onions. Trenching Eelworm-infested soil would also help to get rid of the pests outdoors.

FRUIT-TREE BARK BEETLE (*Scolytus rugulosus*).—As the generic name suggests this pest is a relative of the Elm Bark Beetle. It infests many fruit-trees, but chiefly Apples, Pears, Plums, and Cherries. Though it has been so far most destructive to young and weak trees, yet its attacks are not confined to such. Probably the first signs that something is amiss with the trees that the gardener notices are the dying away of twigs. A more careful examination should reveal the holes in the bark, and if this be removed for a little way the holes in the wood will be found. The Beetles enter the tree in spring, and then form a short, narrow channel, in which they deposit their eggs. The grubs when hatched commence to tunnel away from the galleries made by the parent Beetle.

The Fruit-Tree Bark Beetle is scarcely $\frac{1}{8}$ in. long, furrowed, and of a dull black colour, relieved only by the reddish antennæ and legs. The grub, like that of all wood-feeding insects, is white. Insecticides are not of any use. All that the fruit-grower can do is to burn infested shoots and twigs; while in very bad cases, in which the tree has been considerably weakened, it will be better to uproot it altogether and burn it.

LACKEY MOTH (*Bombyx neustria*).—A common and destructive pest in gardens and pleasure-grounds. The caterpillars are very

conspicuous as to colour. The head is bluish-grey; the body is reddish-orange above, but greyish-blue on the sides; while the dorsal line is white, with a black edge. There is also a wavy orange line in the vicinity of the spiracles; and on several segments are a number of black spots. The whole insect is hairy.

Apple-trees are chiefly attacked amongst cultivated fruits; but, in the shrubbery Hawthorns are frequently infested. The caterpillars live in a common nest, to which they return after feeding. In wet or dull weather they do not venture forth, and then is the cultivator's opportunity for getting rid of the pests, by cutting out the nest and dropping it into a pail containing an insecticide. Towards the end of the larval life the caterpillars separate, and assume the pupal state on or near the food-plants. The Moths are on the wing in late summer, the females depositing their eggs in rings (Fig. 702). The insects are yellow of some shade, and have transverse bands upon the fore-wings, varying from pale yellow to brown.

Paris Green should be sprayed upon the trees, as the caterpillars are leaf-feeders. In winter the characteristic rings of eggs should be searched for and cut off, as this will prevent the tree from being attacked in the following spring, when in the ordinary way such eggs would hatch out.

LEATHER-JACKETS (*Tipula*).—An appropriate name for the tough larvæ of certain Crane Flies, or Daddy Long-Legs (Fig. 703). The perfect insects are so well characterised that no description is necessary. They are usually found skimming over lawns and gardens in autumn. The Leather-Jacket grubs are rather more than an inch long, and reddish, covered with tubercles, and with a black head. They are provided with biting jaws. The plants most attacked in the garden are the members of the Brassica family (Cabbages, Cauliflowers, &c.); lawns, especially if damp



FIG. 702.—EGGS OF LACKEY MOTH.



FIG. 703.—DADDY LONG-LEGS.

and badly drained; and cereal and grass crops. Insecticides are of no avail, and though trapping in the case of garden crops may be productive of a little good, it is not of much use with such

prolific insects. Dressing with gas-lime, where it can be followed, is excellent; while in the case of lawns, constant rolling will destroy vast numbers of the pests. Starlings and Rooks are exceedingly useful in clearing lawns and garden patches of the grubs, and should be encouraged.

MEALY-BUG (*Coccus adonidum*).—Though these pests infest numbers of plants, from the uninviting-looking Cactuses to the Grape-vine, yet it is on the latter that they inflict the greatest injury. The insect is a very near relation of the Scales, and is readily identified by the white meal-like covering over a red body. From Cactuses they are best removed by means of water of a temperature of 140deg. to 150deg. Fahr. Grape-vines, if badly infested, give an immense amount of trouble, as the insects hide away in cracks and crevices of walls until the vines are started. Winter dressings and washings help to keep the pest at bay, especially if the vinery itself is thoroughly cleansed. The best application at such a season is kerosene emulsion. When pruning, the loose old bark should be removed, as this serves as a hiding-place for many pests; and the rods should be treated to 3oz. of caustic soda and 3oz. of commercial potash dissolved in 2gals. of boiling water. Methylated spirit will kill at once all bugs that come in contact with it, and in very slight attacks on greenhouse and stove plants it may be useful to dip a camel-hair brush in a bottle of the spirit, and lightly touch the insects.

Many Grape-growers, when the pest is very troublesome, find it policy to remove the top soil in the borders, and bury it deeply, replacing it with fresh turfy loam. The XI. All Vaporising Insecticide is worthy of a trial, repeating it at an interval of about a fortnight. Muscat of Alexandria and Lady Downes Seedling are injured by the usual strength of XL, and should be used cautiously with these two varieties.

MILLIPEDES.—These are very abundant animals belonging to the *Myriapoda*, and are represented in practically every garden. By some they are called Wireworms, but this is an erroneous name for them. The true Wireworms are, as stated elsewhere, the larvæ of Click Beetles. Millipedes are all vegetable feeders, and of very cosmopolitan tastes—vegetable-roots, flower-roots, and fruit on the ground are all partaken of readily. In form



FIG. 704.—MILLIPEDE.

they are usually cylindrical (Fig. 704), though some few are flattened. They make an ingenious nest of earth below the surface of the ground, and in it deposit a number of eggs, sealing over the hole at the top. Though not as destructive as the pests with which they are often confused—Wireworms—yet they are very undesirable, and should be killed. Where the attack is severe, slices of Apple, or of Turnip, or

Carrot, should be deposited on the earth and examined each morning. The remedies suggested under "Wireworms" should also be of service.

Millipedes should not be confused with Centipedes, which are flatter, slenderer, and more active animals, with fewer legs. The latter are carnivorous, and of the greatest service to the gardener. They are found under garden rubbish, pots, &c. More than one species of Centipede is luminous, and on that account are confused with Glow-Worms.

MOTTLED UMBER MOTH (*Hybernia defoliaria*).—Caterpillars of this insect are very destructive to Oak, Beech, Birch, Hawthorn, as well as to fruit-trees generally. The female Moth is less often recognised, on account of being wingless and presenting a Spider-like appearance (Fig. 705).

The male is active enough, and found upon the wing in early autumn. He is variable as to colour, but usually whitish-ochreous as to fore-wings, which are traversed by two dark bands, near which is a dark discal spot. The hind-wings are lighter, and the discal spot is grey. Grease-bands put round the trees, as for Winter Moth, will

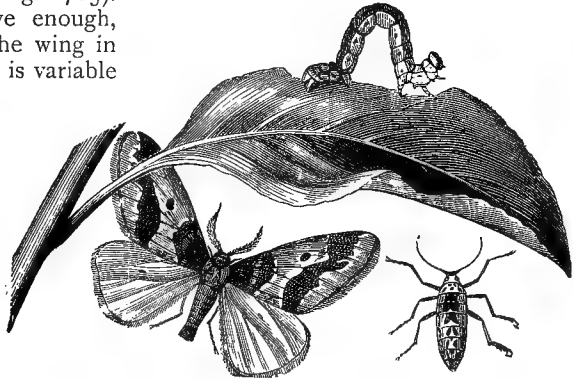


FIG. 705.—MALE, FEMALE, AND CATERPILLAR OF MOTTLED UMBER MOTH.

prevent the females from ascending, and they should be examined and the insects destroyed. The caterpillars are over 1in. long, dark grey, marked reddish-brown, with broad bright yellow stripes upon the sides, except in segment 13 and the head, which are orange-brown. The caterpillars become pupæ in the bark in early summer. They strip every part of the tree with the exception of the bark. Paris Green, as for Codlin Moth, should be employed when the caterpillars are on the feed, and to catch the stragglers which fall to the earth tarred boards should be placed beneath the tree.

RED SPIDER (*Tetranychus telarius*).—Alike under glass and in the open either this or a closely allied animal does considerable damage to a number of hardy trees and low-growing plants like Carnations and Violets; while its ravages in connection with the Hop are very well known. To many of our fruit-trees either Red Spider proper or a very near relative, in the Bryobias, is a great pest,

but more especially to Damsons, Plums, Gooseberries, &c. Not only does Red Spider injure its host-plants by continually sucking the juices from the foliage, but the web that it spins prevents the leaves from exercising their proper functions. The spinning apparatus is very well shown in the ventral view of a Red Spider illustrated at Fig. 706. The pest increases rapidly, and in very

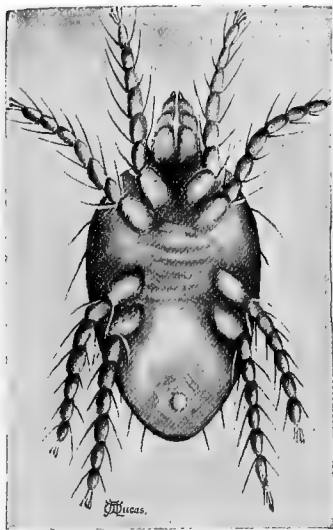


FIG. 706.—VENTRAL VIEW OF A RED SPIDER.

(magnified 130 diameters.)

—a stage in which they are often mistaken for Moth or Butterfly larvæ, though they differ from the latter in possessing a larger number of legs. They are chewing insects, and affect a variety of outdoor plants—Turnips, Apples, Pears, Nuts, Currants, Gooseberries, &c. Though their presence is soon betrayed, yet insects like those affecting Gooseberries are difficult to see, so closely do they approximate to the colour of their food-plant. The insects feed sometimes enclosed in a web like *Pamphilius flaviventris*, a common pest of Pears; curled up in the leaves of their food-plant, like *Cladius pyri*, which infest the Plum and the Pear; or exposed like the Nut Sawfly (*Cræsus septentrionalis*). Then their manner of attack varies. With some species it is usual to commence with the edge of the foliage; with others it is the epidermis only which is involved. All the common kinds enumerated are best poisoned through their food-plant, while as an additional precaution the soil beneath the trees may be

bad attacks the foliage assumes an unhealthy, yellow, blotched appearance, and falls. Paraffin emulsion is one of the best remedies for outdoor plants, and this should be repeated until all the pests are removed.

Indoors on Grape-vines the XL All Vaporising Insecticide should be resorted to. Many gardeners trust to sulphur in the evaporating-troughs or on the hot-water pipes, but this will not get rid of the pests. A dry atmosphere is conducive to Red Spider attacks, and the aim, therefore, of the grower must be to see that there is plenty of atmospheric moisture at the outset. If the Spider should appear in the early part of the season, syringing with clear rain-water through an elbowed nozzle will be productive of much good.

SAWFLIES are only destructive in the larval, or caterpillar, stage

taken up for a depth of 3in. or 4in. and deeply buried. Numbers, too, may be got rid of by jarring the trees, having first placed beneath sticky boards to catch those which drop.

SCALE INSECTS are found upon a variety of trees and plants, from decorative Palms to Apples, Pears, and Currants. They belong to many genera, and some are remarkable for the coverings which give rise to the popular name they bear—Scales. All the insects do not, however, form scales, which are in reality coverings for both eggs and larvæ. The scales as a rule are exudations of the female, and are of different forms. One for instance is known as the Mussel Scale (*Mytilaspis pomorum*), on account of its resemblance (Fig. 707) to that animal. This covering is not readily acted upon by outside influences, and is quite proof after a time against the ordinary insecticides. Again, Scale Insects are most in evidence at a time when radical measures cannot be adopted. Male Scales are active, often winged insects, but they are incapable of injuring plants, as when mature they have no mouth.

For fruit-trees, whether under glass or outside, an effort should be made to apply an insecticide before the "Scale" hardens. A recipe given by a Californian fruit-grower (Mr. Maxwell Heron) for a winter dressing is as follows: Unslacked lime, 25lb.; sulphur, 20lb.; salt, 15lb.; water, 60gals. Of this, place 10lb. of the lime and all the sulphur with 20gals. of water in a cauldron, and boil until all the sulphur is dissolved. Then take the remainder, slake it, and add enough water to make 60gals. in all. This should be kept stirred and applied warm; no injury to the growing buds is likely to result, we are told.

Gishurst Compound is a capital insecticide for Scale; while a ready-to-hand preparation is water at 150deg., applied preferably in winter or early spring.

SILVER Y-MOTH (*Plusia gamma*).—The caterpillars of this insect do immense damage in the garden, particularly to herbaceous plants and vegetables. Little by way of food seems to come amiss. Their presence upon a Cabbage patch may readily be discovered, but they are not so readily seen, being green with whitish lines, and sparsely hairy. They pupate in a slight web spun on the under-side of the food-plant. The Moth is very distinct by reason



FIG. 707.—MUSSEL SCALE.
(much magnified.)

of the Y-like markings on the wings. The pests are double-brooded. Wherever Paris Green may with safety be employed that is the best remedy. In the case of garden vegetables the caterpillars should be hand-picked.

SLUGS AND SNAILS are to be found in every garden, and they will attack almost any kind of plant outdoors or indoors, from a choice Orchid to the homely Cabbage or succulent Strawberry. Lime and soot plentifully distributed will tend to keep either at bay; but as traps for Slugs, either brewers' grains or bran laid in heaps are the most alluring. Lime should be applied on a dry day, and a second dressing should be given after dark. The first may be thrown off by the Slugs with the exuded slime; but the second usually sticks and proves fatal. Snails should be trapped by means of old boards slightly raised above the soil level. After their midnight revels they will seek shelter under the boards, from which they can be dislodged and killed. All Slugs, with the exception of the worm-eating *Testacella*

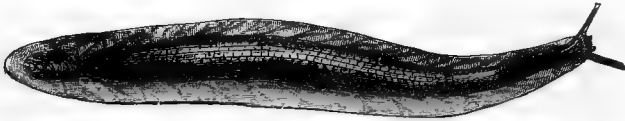


FIG. 708.—CARNIVOROUS SLUG (*TESTACELLA HALIOTIDEA*).
(natural size.)

haliotideia (Fig. 708), which is comparatively rare, are hurtful. The latter, however, feeds chiefly upon worms. It may be distinguished by the small ear-shaped shell on the hind extremity of its body, as well as by its size—2½ in. or thereabouts.

SURFACE CATERPILLARS.—This is a popular name bestowed upon the Caterpillars of certain Moths on account of their habit of feeding near the surface. All are destructive to garden plants, especially in spring, when the succulent new growths are laid under contribution. Roots, low-growing plants of all kinds, and seedlings, are especially attractive to the large Caterpillars, which frequently gnaw right through that portion of the plant-stem beneath the ground. Being night-feeders they are not very well known by sight, and even when looked for by the aid of a lantern they are difficult to see, by reason of their colour harmonising so well with their surroundings. The commonest of Surface Caterpillars are those of the well-known Turnip Moth (*Agrotis segetum*), the equally well-known Heart and Dart (*A. exclamationis*), the Garden Dart (*A. nigricans*), and the handsome Yellow Underwing (*A. Triphaena pronuba*). Soot and lime dusted round such plants as Auriculas, Primroses, Polyanthes, &c., will protect them from the marauders; while stirring the surface-soil with the hoe very frequently will help to get rid of the pests by exposing them to insectivorous birds.

THRIPS.—The very minute insects classed under this heading are found upon all sorts of plants, both outside and indoors. They are, as previously stated, disfiguring to Rose-blossoms; they also infest Peas amongst vegetable crops; while as fruit-pests they are chiefly notorious in connection with Grapes and Peaches. The insects are too small for their outward conformation to be visible to the naked eye. When viewed under a glass they are of the shape shown at Fig. 709, their narrow wings being delicately fringed with hairs, and their general colour being dark. They belong to the *Thysanoptera*, an order of insects about which little comparatively is known. Thrips may be got rid of by means of water used at a temperature of 150deg., or of a good vaporising insecticide.

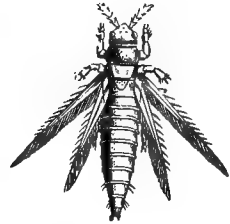


FIG. 709.—THRIP.
(much magnified.)

VAPOURER MOTH (*Orgyia antiqua*).—This is one of the commonest of garden pests, and there is scarcely any tree that comes amiss to its large, hairy, tufted caterpillars. Our London squares are infested with the pests, which attack any and every tree near—Hazels, Hawthorns, and Roses are favourites; but Maples and fruit-trees are badly infested. The caterpillars are strikingly beautiful. They are about 1½ in. long when full-fed; grey, with red spots in the dorsal region, and whitish hairs. The most remarkable parts of the caterpillar are the peculiar tufts on the body, which vary, with their disposition on the segments, from black to yellowish. The female Moth is incapable of flight, but her mate has ample wings, and may be seen flying in the daytime. He is 1 in. or more in wing-expanse, and is a combination of ochreous-brown and orange-brown. The eggs are deposited on the old cocoons, which are hairy, and usually spun upon the food-plant or in the vicinity. All eggs, females, and cocoons, should be destroyed. Trees and shrubs, where possible, should be sprayed with Paris Green. Very little assistance does the gardener get from the birds, which will not tackle such hairy caterpillars as those of the Vapourer Moth, they being very objectionable if not actually poisonous. Fortunately they are very conspicuous, and may therefore be hand-picked. This Moth is a near relative of the pest known as the Nun (*Psilura monacha*), which in Germany is exceedingly destructive to Conifers.

WASPS.—All the Social Wasps known to this country are more or less injurious in gardens where there is ripened or ripening fruit. They are too well known to need any description. The first thing that the gardener should do is to destroy all Queen-Wasps in spring, as these are the founders of the colonies

which give trouble later. Next all nests should be treated to cyanide of potassium when found. This is a deadly poison, but it is very effectual in stamping out Wasp-colonies. 1oz. of cyanide to half a pint of water will make a solution of sufficient strength. In this should be dipped something fairly absorbent—a piece of flannel—and this should be thrust well down the hole in the evening, when most of the Wasps are at home. Many other



FIG. 710.—BLACK VINE WEEVIL.

mixtures are advocated, but none are so effective as cyanide of potassium, which the gardener must take care not to inhale.

In fruit-houses, despite every precaution, Wasps manage to gain an entrance. If, however, a wide-mouthed bottle containing some syrupy liquid be hung in the vicinity of the ripening fruits, the Wasps are almost certain to be attracted thither, and be caught. Outdoors it will also pay to hang similar bottles in the trees.

There are yet other Wasps which are of the greatest service. Those, however, are Solitary, and are popularly known as Sand - Wasps. There are a number of species, all of which are smaller than their Social relatives, while the body is far more peg-top like. These are all carnivorous, and collect vast numbers of injurious caterpillars, &c., which, after paralyzing them, they take to their underground nests to furnish the young with food.

WEEVILS.—Belonging to several families of the *Rhynchophora* are three or four species more than ordinarily destructive, and popularly described as Weevils, a name which by coleopterists is reserved for the *Curculionidae* alone. The leading characters of the group are the prolongation of the head in front to form a snout or beak, and the four-jointed tarsi. The species calling for mention here by reason of their omnivorous propensities and their abundance are the Black Vine Weevil (*Otiorrhynchus sulcatus*, Fig. 710), Apricot Weevil (*O. tenebricosus*, Fig. 711), Clay-coloured Vine Weevil (*O. picipes*, Fig. 712), and the Apple Blossom Weevil.



FIG. 711.—APRICOT WEEVIL.

The first three have much in common, and will be dealt with together. *O. sulcatus* is the one most to be dreaded, as nothing seems to come amiss to it; in length it is about $\frac{1}{2}$ in., and black and furrowed. The perfect Beetle may be found upon a

variety of outdoor and indoor plants, feeding upon the leaves and shoots, while its grubs feed upon the roots, completing the work of destruction. *O. picipes* is a dark brown insect, with yellowish scales. It is somewhat smaller than the first-named and exhibits not quite such diversified tastes. On Vines, Raspberries, and many outdoor fruits it is found alike as a perfect insect and a grub. *O. tenebricosus* is commonly known as the Apricot Weevil, but, like the other species named, it also lays several other plants under contribution—Nectarines, Plums, Peaches, and Raspberries. In size it is about $\frac{1}{2}$ in., black, covered with yellowish down.



FIG. 712.—CLAY-COLOURED VINE WEEVIL.

These three Beetles are all night feeders. They are very wary; so that the greatest care must be exercised to trap them. Sheets of tar-covered white paper should be laid down beneath the infested trees at dusk. As soon as it is dark the trees should be visited, and tapped.

The Beetles will drop on to the sticky paper, from which they may be collected and destroyed. All holes in walls likely to afford shelter to the pests must be stopped up in winter.

So far as the grubs are concerned, little can be done except to remove the soil to a depth of several inches, and char it, replacing with fresh.

Anthonomus pomorum (Fig. 713) attacks both Apples and Pears: with the former, however, the insect is usually identified. The Beetles appear on the wing in early spring. They are about one fifth of an inch long, reddish-brown, with a somewhat irregular light band towards the base of the wing-cases. As will be seen in the illustration, there is the prolongation of the head into a beak-like organ. The females puncture the unexpanded flower-buds, and deposit therein an egg. The larvæ, when hatched, feed upon the buds, causing them to prematurely fall. At this period the insects are often in the pupal state, and if the fallen buds could be readily collected and destroyed, the numbers of the pests would be sensibly diminished. The trees should also be shaken at the time the insects are egg-laying, as many will be dislodged by this means. When the perfect insect stage is assumed in summer, the Beetles feed upon the foliage, which should be sprayed with Paris Green. The winter is passed in the Beetle



FIG. 713.—APPLE BLOSSOM WEEVIL.

stage, sometimes in the crevices of loose and old bark, at others under the trees themselves just beneath the surface-soil, or any rubbish, such as fallen leaves, which has been allowed to accumulate.

WINTER MOTH (*Cheimatobia brumata*).—To hardy fruit-trees like Apples and Pears there are no worse pests than the caterpillars of the above Moth, which attack the trees in early spring. Many forest and landscape trees are also laid under contribution. The male flies towards dusk in late summer, but the female is unable to fly. The perfect insects are found right into the

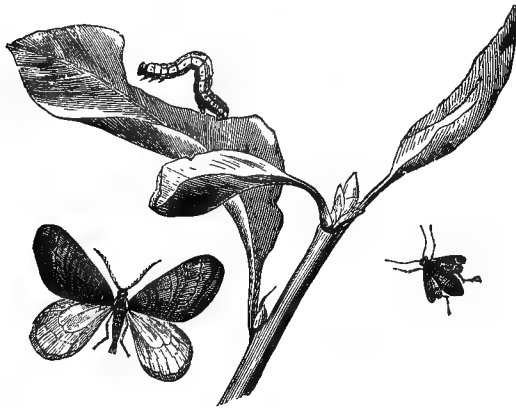


FIG. 714.—MALE, FEMALE, AND CATERPILLAR OF WINTER MOTH.

New Year. The Moths are too small to be generally noticed. If a female (with rudimentary wings) should be seen in early autumn she should be destroyed. The mature caterpillar is greyish-yellow, with white stripe. Paris Green is the remedy to employ against the abundant pest, taking care that it is not used while

the trees are in blossom, and that the foliage is well wetted. As a preventive measure all orchard trees should be grease-banded in autumn, using Willesden or similar grease-proof paper. The bands should be frequently examined, and any females caught destroyed, while the grease should be renewed as it becomes necessary. Male and female Moth and caterpillar are shown at Fig. 714.

WIREWORMS.—By this popular name are designated several most destructive insects, the larvæ, or grubs, of certain species of Click Beetles, but principally of *Agriotes lineatus*. The Beetles themselves (Fig. 715) are not sufficiently destructive to call for special measures being taken. The grubs are, when full-fed, about 1 in. long, nearly cylindrical in form (Fig. 715), and of a dirty yellow colour. Unlike the majority of insects these pests remain at least two years in the larval state. The damage they do to such vegetables as Carrots, Cabbages, Cauliflowers, Potatoes, Parsley, Lettuce, &c., to such flowers as Carnations, Iris, Gladioli, and

Pansies, as well as to cereals, is enormous. They feed upon the living roots and underground stems, and plants attacked soon present a sickly appearance.

When once fairly established, they are difficult to combat, and nothing short of radical measures will suffice. Allowing the ground to lie fallow and then dressing with gas-lime, laid on $\frac{1}{2}$ in. or so thick, has proved of assistance in very bad attacks. Deep cultivation is also of great service in small gardens; combined with dressings of soot and lime in equal proportions. Where, however, Potatoes are grown, Mr. Abbey recommends the employment of kainit and nitrate of soda, mixed, at the rate of 2 lb. per rod on ordinary garden land. This, the writer

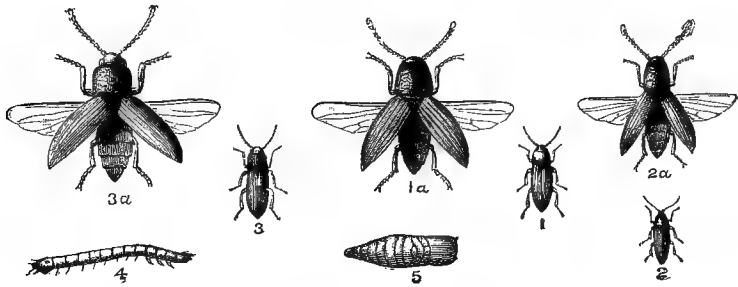


FIG. 715.—1 AND 1a, *AGRIOTES LINEATUS*; 2 AND 2a, *AGRIOTES SPULATOR*; 3 AND 3a, *AGRIOTES OBSCURUS*; ALL NATURAL SIZE AND MAGNIFIED. 4, LARVA OF *AGRIOTES LINEATUS*; 5, PUPA; NATURAL SIZE.

(By permission of the Board of Agriculture.)

further suggests in the *Journal of Horticulture*, is equally good for other root-feeding pests, like Eelworms, Leather-Jackets, and Mites. The kainit and soda should be crushed fine and be evenly distributed when the ground is moist, with a prospect of fine weather for a few days.

The old-fashioned method of trapping by means of pieces of sliced vegetable through which a stick has been thrust is slow, and would only be of use in very small gardens and slight attacks. By way of prevention, soil used for potting should be carefully examined, and all Wireworms picked out and destroyed. Beneficial results have followed the ploughing-in of a crop of mustard. Mustard dross very lightly dredged over the surface of the soil in the case of flowering plants is equally useful. Wireworms are usually most troublesome in newly-made gardens where the top spit of pasture land has been employed.

WOOD-FEEDING INSECTS embrace the Caterpillars of the Goat Moth (*Cossus ligniperda*, Fig. 716), which are met with in fruit-trees as well as in Willows, Poplars, Ash, and many other trees. They are exceedingly destructive, living as they do some three years as larvæ, and in enormous numbers. They tunnel the

trees, and in time quite destroy the heart-wood. The Caterpillars are pinkish at first, but just prior to assuming the pupal state they are yellowish.

Another wood-feeder is the scarcer and more beautiful Wood Leopard Moth Caterpillar. This affects the young branches



FIG. 716.—GOAT MOTH.
(natural size.) •

rather than the trunks, and Apples, Pears, Plums, and many allied trees harbour the pests. The Moths are white with steel-blue spots, and measure 2in. or more in wing-expanse. The female is provided with an ovipositor. The larvæ are of the shape shown at Fig. 717, and are covered with black dots.



FIG. 717.—LARVA OF WOOD
LEOPARD MOTH.

These insects do not so readily betray their presence as do the Goat Moth Caterpillars, as they cover up their exit-holes. A piece of copper-wire should be thrust into the holes made by these wood-feeding larvæ; or some powerful insecticide may

be squirted into their tunnels if possible. It is also a good plan to seal over the entrance-holes, to preserve the trees as far as possible.

WOODLICE.—These Crustaceans feed upon a variety of crops, but are especially destructive to Indoor Mushrooms, Melons, and to plants in frames generally. Pots half filled with hay and laid upon their sides are excellent traps if they are examined each day. If, however, the pests congregate in a place at all accessible, hot water should be poured over them. Sliced vegetables also make good traps. The most effective lure the writer has tried is one

tor which he was indebted to the *Journal of the Pharmaceutical Society*. Cut some long strips of brown-paper, bend them over like a conduplicate leaf, and smear on one side a mixture of treacle, foot-sugar, and beer. They will crowd to this feast, when the papers may be lifted and shaken over a vessel of boiling water. Small flower-pots similarly treated on the inside will prove equally as attractive.

Vegetable Foes.

Compared with Animal Pests those belonging to the Vegetable group are numerically insignificant, yet they are even more insidious, as well as more difficult to cope with because, as regards their life-histories, so much remains to be perfected. Vegetable pathology, though no new science, is yet in its infancy. More than half a century ago there were earnest workers in the field, as evidenced by the more stable literature of the day, as well as by the record in the more ephemeral gardening press. Until the last twenty years, however—at any rate, so far as this country is concerned—there have been few who have attempted to follow in the lead that Berkeley established in the case of parasitic fungi. These, of all Vegetable Pests, are the most complicated to the average gardener, as they are also the most numerous, and the most disastrous and far-reaching in their effects. As a proof of this latter, one has but to instance the Sleeping Disease of Tomatoes (*Fusarium lycopersici*), of which so much has lately been heard, both in Guernsey and in this country, where a whole season's crop may have to be sacrificed owing to the seed having been obtained from a diseased source.

To many gardeners the methods by which fungoid diseases are reproduced are absolutely unknown, and such visitations as Mildew of various kinds are attributed to chance, or oftener to weather influences. Then there is a still larger section who regard such diseases as "not proven," or their injurious properties as having been exaggerated. Even to-day there are thousands who believe that the disease of Apple and other trees, popularly called Canker, may be remedied by improving the soil, or by keeping the roots out of the sub-soil. That such treatment will benefit trees under certain conditions there cannot be a shadow of a doubt, but that it will cure Canker proper is incorrect. Canker is due to the attack of a specific fungus, usually *Nectria ditissima*, which gains access by means of a wound. Once there the disease rapidly spreads, and when ready to produce its fruits, or spores, it causes the bark to crack; or again, to be distorted in the way shown at Fig. 718, disclosing the affected parts. In spring, if such trees be examined even without the aid of a glass, the deep red perithecia (spore-bearing cases) will be detected.

Such perithecia disclose their contents, and the spores are released to be distributed by insects, birds, wind, or even by man himself, those finding a suitable "home" germinating, increasing the area of the disease. And similarly with other parasitic fungi which attack leaves, &c. The gardener's chief difficulty with all is that his first acquaintance with any is usually when much mischief has been done. His first indications are when the fungus has existed sufficiently long to produce outward characteristics—like the familiar Mildew on the Strawberry, the "Rust" on Chrysanthemum, or the Mushrooms in the roots of his orchard and landscape trees like *Agaricus melleus* (*Armillaria mellea*). Again, he does not seem able to

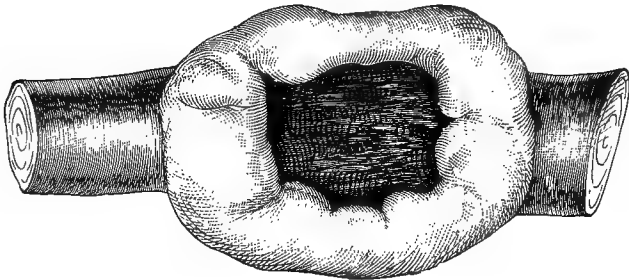


FIG. 718.—PORTION OF CANKERED TREE, DUE TO *NECTRIA DITISSIMA*.

(By permission of the Board of Agriculture.)

reconcile the fact that such fungi have forms of fruits, or spores, varying with the seasons; each has its part to play in the reproduction, or it may be in the extension of the infected area, of the species. Then just as there are in the Animal World certain parasites—like, say, the hydatid which causes gid in sheep, and which needs another host, the dog, to complete the cycle, so there are certain small fungi (called heteroecious) which require two plants—sometimes of widely different natural orders—to complete the cycle. The Gooseberry Rust (*Aecidium grossulariæ*), whose orange-red patches are familiar upon the foliage and fruit of that plant, is but the Cluster-Cup stage of *Puccinia Pringsheimiana*, whose other stages are found upon *Carex acuta* and *Carex Goodenovi*; while the Rust, found on the leaves and other parts of Barberries, is likewise a stage in the life-history of a still more destructive fungus known as Wheat Rust (*Puccinia graminis*). These are only two familiar examples of heteroecious fungi. Many others might be cited.

Parasitic fungi reproduce their kind in various ways. One of the commonest, however, is by means of fruits which are equivalent to the seeds of flowering plants, though differing from them in never enclosing an embryo, or young plant. They, moreover,

are of more than one kind, each, as previously stated, having a particular part to fulfil. The forms of fruits (or rather the appearance of the plants when such fruits are ripe) with which the gardener is familiar are the spring and summer ones. The winter fruit is absolutely unknown because, being a resting stage, it is passed in the soil, or it may be in the decaying parts of the plant, until the following season, when it resumes activity, and only needs to come in contact with a host-plant whose parts are favourable to its development, to commence again the cycle of life. The summer form of fruit is produced very rapidly, and as it is scattered so readily in various ways, unless the surrounding plants of the same kind are protected in some way they are sure to fall victims. Thus it is that spraying with a fungicide a house of plants from which say one unhealthy one has been removed, is of the utmost value, as it renders the susceptible parts non-susceptible. In other words, the fruit which is carried—it may be on the leaves—will not germinate, even though the conditions generally are favourable. Still, with every precaution taken, so minute are the bodies responsible for reproduction, and so difficult is it to be certain that all parts of the plant liable to infestation are covered, that some of the summer fruits are likely to find a place and go on extending the disease. A second spraying in ten days or so might therefore be adopted. When, however, plants in houses or outside have been known to be attacked one season, it will usually pay to spray early in spring, even as a precautionary measure. Many gardeners omit to do this, which accounts possibly for their failure to battle with many a fungoid disease.

As to the actual fungicide, this will vary with the nature of the plant—and particularly whether it is flowers or fruit; and again whether the latter is of an age suitable to be marketed, as it would obviously never do to use Bordeaux Mixture, which disfigures plants or fruit treated therewith, if such were ready, or even nearly ready for the salesman. Nor, again, should we advise ornamental subjects to be so treated. For all that there is no need to fear any ill effect, in so far as the consumer of fruit so sprayed is concerned. In America, where Bordeaux Mixture is very largely employed to keep under control those fungoid diseases affecting plants, a preparation of cider-vinegar is used in the case of Grapes to remove the discoloration already alluded to.

A very popular notion prevails that once a plant attacked with fungus dies, the trouble is at an end. This is, however, far from being the case, as the majority of the most troublesome diseases are tided over the resting period of the plant by the winter fruits already alluded to. For this reason the grower cannot be too particular in getting rid of every particle of rubbish—leaves, prunings, &c., by burning, returning the ashes

to the soil. This will minimise considerably the trouble from such a source; while, if it is possible to apply a dressing of lime in winter beneath trees so affected, this would further help the grower to battle with the disease.

Other means of reproducing such diseases of parasitic fungi are by the mycelium, or vegetative part of the plant. For this reason where trees are attacked by fungi like *Armillaria mellea*, *Trametes pini*, &c., the practice of isolating such by means of trenches is adopted. Hartig, in his excellent work upon "The Diseases of Trees," says that if this is carefully carried out it is a certain preventive against the spread of the disease.

Another most prolific source of reproduction is found in Sclerotia which are produced by certain fungi affecting Potatoes, Marrows, Beans, and many bulbous plants.

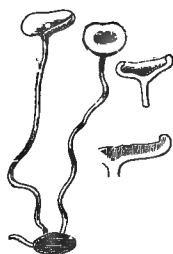


FIG. 719. — SCLEROTIUM OF PEZIZA POSTUMA

(natural size), with two Cups on slender stalks.

As the name suggests, they consist of *hard* structures which are of variable size, colour, and form. Frequently, however, they are roundish or oval (Fig. 719), and black; they are also numerous. It is within the last few years that Sclerotia in connection with several well-known fungoid diseases have been discovered—the Lily Disease for instance. In this Prof. Marshall Ward compares them to mice-droppings, and suggests how readily they might be mistaken for "foreign bodies." Then there is an extremely troublesome fungus popularly called the Sclerotium disease (*Sclerotinus Sclerotionum*), which affects a

host of plants, the Sclerotia being of large size. Burning those affected is all that can be done.

Sclerotia are sometimes found only in dead plants; at others only in living ones. In no case, however, do they resume activity until the host-plant itself is well advanced. Usually they rest in the soil through the winter, the hard, outer coat serving to protect the soft inner contents of felted mycelium from frost and cold.

Mention has already been made of the desirability of collecting and burning all rubbish, such as leaves and prunings; fallen fruits should be included in the same category. Cuttings from plants infested with fungi should never be taken, and seeds from a similar source are also to be avoided. Some varieties of vegetables and fruits have proved themselves if not exactly disease-proof, at least partially resistant, and all the principal nurserymen may be relied upon to supply them. Potatoes have been vastly improved in constitutional vigour. Unfortunately, some of our finest hardy fruits have proved least capable of resisting disease than others. Cox's Orange Pippin cankers badly

despite every care in its cultivation. Another factor for the practical gardener to consider is the question of cropping. The practice of growing the same crop, or even one liable to similar diseases, year after year, on the same spot, is to be condemned, as the cultivator's trouble is only increased. Too little attention is also paid to fruit and other receptacles, and by this means it is quite possible to introduce a most troublesome disease into an area that previously boasted an immunity therefrom.

Of the standard fungicides there can be no question as to the practical value of the Bordeaux Mixture, for whose introduction we are indebted to Millardet, who first experimented with it in 1882. It was, however, several years after that date that the preparation was given a really practical trial. The *Gardener's Chronicle* was the first to advocate the use of the Bordeaux Mixture, and an article on the subject appeared in that journal in 1885. The reports from the first few trials here were hardly favourably regarded, as it was found that the mixture, as originally propounded, scorched the foliage, especially in the young and tender stage. It was then considerably modified, and a safe formula is as follows :

Bordeaux Mixture.—Copper sulphate, 6lb. ; unslacked lime, 4lb. ; water, 50gals. Dissolve the copper sulphate (in an earthen or wooden vessel) by tying it in a piece of coarse sacking and suspending it by means of a stick across the vessel, which should contain half the amount of water given in above recipe. Next slack the lime in another vessel, adding the water by degrees until a smooth paste has been formed, quite free from lumps. Add sufficient water to bring the water up to the maximum required, and allow to cool. The two mixtures should now be poured slowly into a large tub capable of holding 60gals. or more, and well stirred for a time with a piece of wood.

Some writers, Perret for instance, recommends the addition of 4lb. of molasses to the mixture, with a view to increasing its adhesiveness, while others advocate a similar quantity of soft soap. The preparation should be got ready and used the same day, as after a time the copper sulphate is precipitated, and requires constant stirring, otherwise the mixture would be inert as a fungicide.

Even the 50gal. formula may be found too strong for young foliage and the tenderer fruits, like Peaches and Nectarines. In that case it would be advisable to increase the quantity of quicklime, and add water to 60gals. For Potatoes, Apples, Pears, Plums, and Gooseberries the 50gal. formula will usually suffice ; but for Vines, Peaches, and Nectarines the weaker mixture will be safer. The spraying should not be continued later than six weeks prior to the fruit being required for market or table—on account of appearances alone.

Potassium Sulphide (Liver of Sulphur).—Potassium sulphide, $\frac{1}{2}$ oz.; hot water, 1gal. Apply when cool. This fungicide has the advantage over Bordeaux Mixture that it leaves no spotting on the fruit or plants. Excellent for Mildew.

Flowers of Sulphur.—Though this has been largely superseded for various forms of Mildew by the Liver of Sulphur liquid above named, it is nevertheless useful, as the substance is to be found in most houses, and promptitude in dealing with pests of any kind is important. This is best applied in the early morning.

Copper Sulphate Solution.—A useful preparation to apply as a *winter dressing* only to plants which have been known to be infested the previous season. Vines and other fruit-trees may be treated with advantage, as also the walls of greenhouses, as the preparation destroys the resting-spores of destructive parasitic fungi. To 1lb. of sulphate of copper 25gals. of water should be employed. *To use this solution on foliage would be fatal.*

Ammoniacal Solution of Copper Carbonate.—This makes a clear fungicide, and may be employed where Bordeaux Mixture would be prohibited. According to Mr. Clarence M. Weed it has been successfully used in Apple Scab, Mildews, &c. His formula is as follows: Carbonate of copper, 4oz.; strong ammonia, $\frac{1}{2}$ gal.; water, 45gal. Mix the carbonate of copper with sufficient water to form a paste, then add to the ammonia. Another advantage of the fungicide is that the constant clogging of spraying nozzles is obviated.

Spraying Machines.—With these there is plenty of choice, and the selection will depend largely upon the class of plants to be sprayed—whether tall or dwarf, or whether outside or indoors. The efficacy of a fungicide depends rather upon its method of application than on any particular kind of machine. Boulton and Paul are makers of first class spraying machines to suit all gardens. In small gardens and with dwarf trees, Clarke's Vermorel Knapsack Machine is a useful appliance. There are also kept by all first class firms of horticultural sundries-men nozzles to suit every class of work, fine or coarse.

In the enumeration of plant diseases which follow, only those affecting several kinds are noticed. Where, however, the disease infesting any particular plant is sufficiently well known to come under the designation of a pest, it has been dealt with under its host-plant.

APPLE AND PEAR SCAB (*Fusicladium dendriticum*) is a disease very familiar to the ordinary observer, as the spotted appearance of the fruit renders it most unsightly and unsaleable, as in bad cases the fruits crack. Spraying with weak Bordeaux Mixture *early* in the season is the treatment advocated by American specialists in plant diseases where Apple Scab is

extremely common. According to the Cornell Agricultural Bulletins, the time to spray is before the blossoms open, and again when they have fallen. This should suffice in dry seasons; but in wet ones it may be necessary to spray three or four times more at intervals of about ten days.

ARMILLARIA MELLEA (*AGARICUS MELLEUS*).—This is a most destructive fungus found upon living ornamental trees, such as Conifers, as well as upon orchard trees. It is responsible for the disease known as Tree Root Rot. The fungus (Fig. 720) is most abundant, and is

found both as a saprophyte and as a parasite. The clusters of Mush-

rooms at the base of trees are very familiar; they are, moreover, conspicuous alike as to size and colouring. The cap is of a pale yellow, with darkish scales upon it; the stem is also yellow.

The fungus finds access to healthy trees either by means of its spores, which germinate on an injured part of the bark; or by means of the very peculiar mycelium, which is black and stringlike,

and always endeavouring to penetrate the roots of healthy trees. The only thing that can be said in favour of this fungus is that its sporophores, or Mushrooms, are edible, though not particularly rich in flavour, being somewhat strong. Care should be taken to carefully remove and either eat or burn all specimens of the fungus, so that the danger of trees being infested by the spores which are shed is minimised. The mycelium found under the bark is white and felted.

Once a tree has been badly attacked nothing can save it from destruction, as the mycelium spreads under the bark with considerable rapidity. Preventive rather than remedial measures should be adopted. These may well consist in the removal of all dead stumps (Fig. 720) on which the fungus is growing as a saprophyte; and in isolating the infected live trees by means



FIG. 720.—MASS OF *ARMILLARIA MELLEA* ON ROOT OF YOUNG PINE.

a, a, a, Mycelium in form known as *Rhizomorphs*;
b, Very young Spore-bearers produced on *Rhizomorphs*;
d, Older Spore-bearers (*Agaricus melleus*) produced by Mycelium under the bark.

of narrow trenches some distance from the trunk. This is Hartig's method of coping with the disease, though care must be taken to see that all roots encountered are severed.

BROWN FRUIT ROT (*Monilia fructigena*).—In America this fungoid disease is very prevalent, and in some seasons the Peach crop is practically destroyed. Here the disease is practically restricted to the Apple; but inasmuch as it will attack Plums, Cherries, and many other fruits, it is not a desirable visitor. The fruit on which the disease is generally noticed has dark discoloured spots upon the surface, and after a time it commences to shrivel. Leaves and shoots are also involved. According to Lodeman the disease may be controlled by the use of the simple sulphate of copper solution just before the buds begin to swell; and later by the Bordeaux Mixture. All shrivelled fruits should be removed and burned, otherwise the tree next spring will be infected again.

DAMPING OFF.—Practically every gardener has had the unpleasant experience with his seedlings suggested by the above heading. The cause of the young plants collapsing in this characteristic fashion is due to a fungus (usually *Pythium de baryanum*). At first but few of the plants appear to be attacked and fall over, but in a very short time the whole of them in seed-bed or seed-pan are involved, turn pale, rot away, and are covered by a white thread-like mycelium. Cruciferous plants, and especially Mustard and Cress, are very prone to the disease, though it is not restricted to any one, or, indeed, to any section of plants. The point of attack is in the stem, just above the soil-line. The fungus is most fatal to seedlings kept too damp, or those from which light and air are excluded. Those who grow numbers of plants from seeds watch them very closely, and as soon as they notice a few of them toppling over they at once remove them, and alter the conditions under which the seedlings are being raised. Care should also be taken not to utilise the same patch the next season for seedling-raising, as oospores are developed, which live through the winter. The fungus also lives as a saprophyte.

FINGERS AND TOES, CLUB ROOT, and ANBURY.—This disease, due to one of the Slime Fungi (*Myxomycetes*) has already been touched upon in the Chapter "On Vegetable Culture." The species responsible for the mischief is *Plasmodiophora brassicæ*, and the excrescences upon the roots of cruciferous plants, generally Candytuft, Wallflowers, Stocks, as well as upon the members of the Cabbage tribe, are too well known. Remedial and preventive measures will be found under "Cabbage" in the Chapter "On Vegetable Culture."

LICHEN is met with on orchard and other trees, particularly those upon poor soils and upon which not much attention has been bestowed. It is objectionable chiefly because of the harbourage it affords to many very destructive species of insects. Winter dressings of ordinary commercial potash and caustic soda (in the proportion of $\frac{1}{2}$ lb. of each to 6 gals. of water) is the best remedy to apply, first having scraped the trunks, but taking care not to penetrate the bark. The dressing recommended will not only destroy the Lichen, but will kill many kinds of insects found thereon. This must be used as a *winter dressing* only, and the operator should wear thick gloves. In the case of Peach- and Apricot-trees, which push their buds early, the greatest care must be taken, as the mixture is likely to prove injurious to forward buds. It should be applied hot. Bordeaux Mixture, sprayed on in winter, may also be employed in the case of Lichen-grown trees. Errors in cultivation or poor soils must, of course, be attended to, or the trees will be again speedily attacked.

MILDEWS.—By this name are popularly designated a number of fungi affecting various plants and substances. Scientifically the true Mildews are known as *Erysipheæ*, to distinguish them from the *Peronosporæ*. The chief characteristic is that the mycelium is white, and is found on the outer surface of leaves, fruits, and stems. Mildews appear year after year if measures are not taken in summer to prevent the conidia from germinating. They are tided over the winter by means of ascospores. Sulphur in some form is the best fungicide with which to combat Mildews, sulphide of potassium and flowers of sulphur both being employed. The work must be thoroughly done, and often repeated. Hot water should also be tried.

POLYPORUS.—To this genus belong several species with which the gardener, and especially the landscape gardener, and fruit cultivator, should be acquainted. Many are very destructive, and occur on a very large number of trees—*P. sulphureus*, for instance, whose yellow sporophores are common upon Oak, Apple, Pear, and many other trees. The spores gain access through a wound, the internal parts of the tree are involved, the wood assuming a reddish tint, and finally rotting ensues. The sporophores should be removed and burned as soon as possible, otherwise multitudes of spores will be released and disseminated. Trees which are accidentally injured should at least have a dressing of tar applied to the wounds. It is useless attempting to deal with the mycelium.

Another destructive species is *P. hispidus*, found upon fruit-trees generally, as well as upon Ash, &c. The sporophores are dark brown, and rough on the upper surface, and with smooth yellowish pores. They are of large size, and are common objects on the trunks of their host-plants. Like the preceding

species it is a wound-parasite. *P. squamosus* also occurs on a number of trees, Maple, Oak, Mountain Ash, Horse-Chestnut, and many others. The semi-circular sporophores are yellowish-white on top, with darker scales (hence the specific name). Then there are also the destructive and distinctive *P. betulinus*, on Beech, and *P. dryadeus*, on Oak, both having hoof-like sporophores, and many others.

POLYSTIGMA RUBRUM.—This is a well-marked fungus attacking Plums (both wild and cultivated), Bird Cherries, &c. The leaves are frequently disfigured by somewhat roundish patches of a reddish colour, which, after a time, thicken. The disease is not a virulent one, and, moreover, is easily controlled by burning the infested leaves as they are shed.

RUSTS (*Uredineæ*).—These fungi are almost as familiar as the Mildews. They differ, however, from the latter in many important details. One is that the mycelium instead of being on the outer surface is intercellular—in the leaf or bark-tissues, as a rule. The life-histories of many are quite unknown, more particularly those species which are heterœcious. One of the best known of these Rust fungi is the Rose Rust (*Phragmidium subcorticalum*), whose deep yellow patches may be found alike upon foliage and shoots of garden and wild Roses. Another familiar species is that causing Rust of Wheat (*Puccinia graminis*), a heterœcious species whose aecidium-form is familiar to gardeners by reason of the orange-yellow spots on *Berberis* in spring. This species develops both uredospores and teleutospores upon wheat and other cereals. The former are bright orange-yellow, and appear in summer, and the latter are dark brown, with a harder coat, and are associated with autumn. The uredospores germinate readily in summer as soon as ripe; but the teleutospores are for the purpose of carrying the disease over the time when the host-plant is resting.

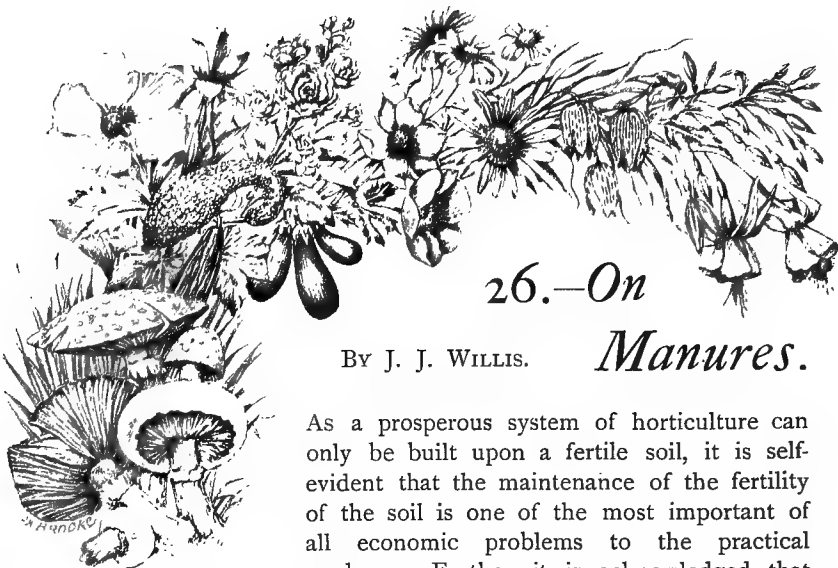
Two other examples of the Rusts may be instanced in the injurious Hollyhock Fungus (*Puccinia malvacearum*) and the Raspberry Rust (*Phragmidium rubi-idaei*). Weak Bordeaux Mixture is useful in both the aecidium and uredospore conditions; but the teleutospores, which are in the soil, are difficult to reach. Quicklime, where it can be applied with safety to the roots, might be useful; while the burning of all leaves, fruits, &c., from infested plants will also help to lessen the attack the following season. In the case of heterœcious species like *Puccinia graminis*, whose aecidium-stage, as previously stated, is passed on *Berberis*; or *Gymnosporangium sabinæ* (destructive to Pear foliage), and whose teleutospore stage is passed upon the Common Juniper (*Juniperus communis*) and other species, care should be taken to uproot and destroy both the Barberry and the Juniper if they can be traced, often a matter of great

difficulty, seeing how readily and over what a distance spores may be carried.

The subject of Plant Diseases is one of such absorbing interest and practical value to the gardener that in these exacting days he cannot afford to remain ignorant of at least the chief diseases affecting his crops. So vast a subject, of course, could only be adequately treated in a decent-sized volume, and those who would pursue the subject further than is possible here, should obtain Prof. Marshall Ward's "Diseases of Plants," Massie's "A Textbook of Plant Diseases," Lodeman's "The Spraying of Plants," with, if possible, Tubœuf's "Diseases of Plants Induced by Cryptogamous Parasites," translated by Dr. W. G. Smith; and Hartig's "Diseases of Trees," translated by Prof. W. Somerville.



EYED HAWK-MOTH.



26.—On

BY J. J. WILLIS. *Manures.*

As a prosperous system of horticulture can only be built upon a fertile soil, it is self-evident that the maintenance of the fertility of the soil is one of the most important of all economic problems to the practical gardener. Further, it is acknowledged that an indifferent system of manuring is at the root of a great many well-founded complaints of failure in various branches of horticulture, and in fruit culture in particular.

That a soil may be speedily reduced in fertility under an improvident method of gardening, and that the original fertility of a once productive soil may be restored, although sometimes slowly and laboriously, are matters of common observation.

The reason why soils require the addition of manures is apparent when we remember the continual process of exhaustion that goes on, due to the growth of plants year after year; and profitable gardening necessitates the maintenance of the soil in an increasing, rather than a diminishing, state of fertility. At the same time, it must be borne in mind that to use manures on a soil which does not require them, or to add manures in great excess, or to apply those not required by the particular crop under cultivation, is so much waste of money.

In order to grow a full crop, or a maximum healthy plant, whether for foliage, flowers, or fruit, it is necessary, even supposing that conditions of moisture, heat, and light, with texture

and porosity of soil are all favourable, that the soil contain, within reach of the roots of the crop, a sufficient supply of all the food-constituents, both of minerals and of nitrogen, which the plant cannot obtain from the atmosphere; also that these be in an available and assimilable form. In other words, this food must be capable of being dissolved by soil-water during the growth of the plant.

It is not merely essential that the soil contain so much nitrogen, potash, phosphoric acid, and lime, but rather that it should contain enough plant-food to yield up to the water percolating through the soil during the period when the crop is in active growth, and that the growing plant can take these elements through its rootlets.

The real point at issue, then, is to learn to what extent the gardener may call in the aid of discoveries of modern chemical science in making more effective the empirical methods of his forefathers, or whether he may substitute for those old systems of feeding plants others yet more effective and certain.

Constituents and Sources of Plant-food.

The carbon of all green-leaved plants is absorbed directly, and practically exclusively, from the atmosphere through the medium of the foliage. At least the soil supply of carbon is a matter of minor importance. In fact, Sir John Lawes and Sir Henry Gilbert have found in their invaluable experiments at Rothamsted, Hertfordshire, that an average of about 2500lb. of carbon can be annually assimilated by growing plants over an acre of land without an ounce of carbonaceous manure being applied to it.

The oxygen of green-leaved plants is chiefly absorbed in like manner by the foliage, or is taken up by the roots in combination with hydrogen, in the form of water, although a small and comparatively unimportant source of oxygen and of hydrogen may be found in the breaking up of nitrates and ammonia within the soil.

The nitrogen of most garden plants is obtained invariably from the soil, either directly from compounds of nitrogen with oxygen, or from mineral and organic compounds—such as nitric acid, ammonia, nitrates, and humus. Or it may be obtained indirectly through symbiotic growth of micro-organisms living in the soil, which have the power of assimilating the free and uncombined nitrogen of the atmosphere. This symbiotic growth is apparently almost altogether confined, so far as is yet known, to species of plants belonging to the leguminous family, of which Beans, Peas, Clovers, and Lupins are examples; and, possibly Orchids may be included in the list.

The mineral constituents of plants—that is, those ingredients which are found in the ashes of plants when these are submitted to the process of burning—are taken directly from the soil, being absorbed by the roots in the form of solution in water. About thirteen different chemical elements will be found on analysis in the ashes of most garden plants; but, with the exception of potash and phosphoric acid, and sometimes also of lime, all the other ingredients will be furnished in abundance by practically all fertile soils.

The various constituents found in plants are combined with each other in certain definite proportions, varying for different genera and species; and the growth of the plant is measured and limited by the least abundant of these substances required for its sustenance.

Reducing these principles to practical use, we may say that a plant will secure a full supply of carbon provided other necessary nutrients are available. The supplies of oxygen and hydrogen are chiefly dependent upon the water-supply. The available nitrogen may be regulated by the use of nitrate compounds or ammonium salts; or the setting up in the soil of those conditions which favour the development of nitrogen-working micro-organisms.

Having provided a full nitrogenous supply, the gardener may control the growth of his plants by giving or withholding phosphoric acid, potash, and lime.

The water-supply to plants is a matter of supreme importance to the horticulturist, for not only does water comprise three-fourths, or more, of the actual weight of all garden plants when growing, but it is the vehicle in which all the mineral and nitrogenous constituents of plant-food are carried to their destination in the fabric of the plant. In the performance of this function, water is constantly passing through the plant, being absorbed by the roots, and transpired by the foliage. It is estimated that more than 300lb. of water must pass through the plant for the deposition of a single pound of dry substance in the plant. Thus the question of the maintenance of the water-supply in greenhouses and conservatories becomes one which cannot be overlooked or neglected.

The nitrogen supply to plants takes rank next to water in importance, for it is this element which may be most quickly exhausted in the garden soil, and which is the most expensive to replace by artificial means.

Food-requirements of Plants.

Science has taught the horticulturist what nutrients the soil must contain in order to secure thriving plants and the best crops; the gardener, therefore, should put into the soil he cultivates those fertilising substances only which it requires to render it capable of fulfilling the functions required of it.

The gardener has to bear in mind that different plants require for their growth and development sufficient quantities of different, but quite definite, plant-foods, and that they take these chiefly from the soil. Moreover, if the plants are to thrive luxuriantly, these foods must not only be present in the soil in abundance, but also be in an assimilable form.

Manuring is always heavier in gardening than in ordinary agriculture. On the farm, the cultivator has to do with a comparatively small number of different kinds of plants which can readily be controlled. In horticulture, on the other hand, there are far greater difficulties. The gardener has to do with a large number of plants belonging to very different genera and species, each having its own particular requirements as regards both food and treatment. Besides which, the finer kinds of flowers, fruits, vegetables, and foliage plants are, as a rule, more delicate and sensitive than the ordinary crops of the farm.

To illustrate how plants of the garden vary in their chemical composition, and hence require different materials, and in different quantities for their growth and sustenance, a few examples are given in the following tables. The first table refers to four different kinds of vegetables, showing the marketable and the unmarketable portions of each. The second table gives the composition of six different kinds of fruit, while the third shows a few selected constituents in the ashes of six different kinds of flowers.

COMPOSITION OF VEGETABLES, IN 100lb. OF EACH.

| | CUCUMBERS. | | CARROTS. | | POTATOES. | | CABBAGE. | |
|----------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Vines. | Fruit. | Roots. | Leaves. | Tubers. | Haulms. | Heads. | Roots. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Dry Sub- stance } | 4.40 | 3.70 | 15.00 | 17.80 | 25.00 | 23.00 | 10.00 | 11.00 |
| Nitrogen .. | 0.16 | 0.20 | 0.22 | 0.51 | 0.34 | 0.49 | 0.30 | 0.24 |
| Ash | 0.61 | 0.76 | 0.82 | 2.39 | 0.95 | 1.97 | 0.96 | 1.56 |

SELECTED CONSTITUENTS IN THE ASH, PER CENT.

| | | | | | | | | |
|----------------------|------|------|------|------|------|------|------|------|
| Potash | 39.3 | 51.7 | 36.6 | 12.1 | 61.1 | 21.8 | 44.8 | 37.2 |
| Phosphoric Acid } | 19.7 | 13.1 | 13.4 | 4.2 | 16.8 | 8.1 | 11.5 | 9.0 |
| Lime | 6.6 | 7.0 | 11.0 | 33.1 | 3.2 | 32.5 | 12.5 | 17.8 |
| Soda | 9.8 | 4.2 | 20.7 | 19.7 | 3.2 | 2.2 | 8.3 | 9.6 |

Thus we see that the dry substance of vegetables, that is to say, the organic portion, varies from 3.7 per cent. in the fruit of the Cucumber, to 25 per cent. in the tuber of the Potato. The nitrogen varies from 0.16 per cent. in the vine of the Cucumber, to 0.51 per cent. in the leaves of the Carrot. The ash or mineral portion varies from 0.61 per cent. in the vine of the Cucumber, to 2.39 per cent. in the leaves of the Carrot.

Looking at the ash constituents in the different vegetables, it is seen that these ingredients vary in quantity even more than do the organic constituents. Thus, potash varies from 12 per cent. in the leaves of the Carrot, to 61 per cent. in the tubers of the Potato. Phosphoric acid varies from 4 per cent. in the leaves of the Carrot, to 19 per cent. in the vines of the Cucumber. Lime varies from 3 per cent. in the tubers of the Potato, to 33 per cent. in the leaves of the Carrot. Soda ranges from 2 per cent. in the haulm of the Potato, to 20 per cent. in the roots of the Carrot. The data further shows that in most cases the refuse portion of vegetables—the stems and haulms—abstract from the soil a very much larger amount of plant food constituents, weight for weight, than do the marketable portions, teaching the gardener the advisability of returning to the soil all the unsaleable products.

Well-made farmyard manure is very rich in available potash and phosphoric acid, which is doubtless one reason of its immense value and general application to all garden vegetables, containing, as the foregoing data shows that they do, so large a proportion of these ingredients.

COMPOSITION OF FRUITS, IN 100lb. OF EACH.

| | APPLES. | CHERRIES. | PEARS. | GRAPES. | APRICOTS. | TOMATOES. |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Dry Substance | 16.90 | 17.50 | 16.80 | 17.00 | 13.90 | 6.20 |
| Nitrogen..... | 0.06 | 0.23 | 0.06 | 0.17 | 0.23 | 0.16 |
| Ash | 0.22 | 0.39 | 0.33 | 0.88 | 0.55 | 0.80 |

SELECTED CONSTITUENTS IN THE ASH, PER CENT.

| | | | | | | |
|-----------------------|------|------|------|------|------|------|
| Potash | 46.2 | 51.9 | 54.7 | 56.8 | 54.9 | 27.0 |
| Phosphoric Acid | 10.9 | 16.0 | 15.2 | 15.9 | 13.9 | 18.6 |
| Lime | 4.9 | 7.5 | 8.0 | 12.7 | 3.5 | 12.1 |
| Soda | 14.0 | 2.2 | 8.5 | 1.1 | 10.6 | 10.4 |

Comparing the food-requirements of the various kinds of fruits with those of the vegetables, we find that the range of constituents is not so great with the matured fruit as it is with the succulent and immature vegetable. Potash is especially abundant in all kinds of fruit, and there is a fairly-uniform range in the quantity of phosphoric acid. Lime is extracted from the soil by Grapes and Tomatoes to a much greater extent than by the other fruits enumerated. Apples are large consumers of the ingredient soda, while Grapes require scarcely any soda at all.

Investigations have shown that an average crop of Apples from a tree ten to fifteen years old remove from the soil, in round numbers, 12lb. of nitrogen, 6lb. of phosphoric acid, and 32lb. of potash; and that the leaves of a tree large enough to produce the Apples would contain 10lb. of nitrogen, 3lb. of phosphoric acid, and 10lb. of potash; or a total of 22lb. nitrogen, 9lb. phosphoric acid, and 42lb. potash.

These analyses throw some light on the great sustaining power of Grapes as food for sick persons. In one ton weight of Grapes will be found 363lb. of dry substance, 20lb. of mineral matter (ash), $3\frac{1}{2}$ lb. of nitrogen, 10lb. of potash, 3lb. of phosphoric acid, and 205lb. of sugar.

SELECTED CONSTITUENTS IN THE ASH OF DIFFERENT KINDS OF FLOWERS, IN 100lb. OF EACH.

| | VERBENAS. | CLEMATIS. | CHRYSANTHE- MUMS. | GODETIAS. | CACTI. | CARNATIONS. |
|-----------------------|-----------|-----------|----------------------|-----------|-----------|-------------|
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Potash | 28.2 | 30.6 | 16.2 | 30.1 | 7.8 | 29.2 |
| Phosphoric Acid | 42.7 | 26.8 | 19.5 | 33.1 | 7.3 | 12.6 |
| Lime | 10.3 | 16.2 | 26.3 | 12.3 | 10.7 | 22.6 |
| Soda | 5.1 | 6.9 | 10.4 | 3.7 | 36.1 | 2.9 |

Here again is shown an enormous range in the chemical constituents of the different flowers of the garden, the ingredient potash varying from 7 per cent. to 30 per cent.; phosphoric acid from 7 per cent. to 42 per cent.; lime from 10 per cent. to 26 per cent.; and soda from 2 per cent. to 36 per cent. The large quantity of soda in Cacti is most remarkable, and clearly points to the special requirements of this class of plants.

These analytical results, which are well worthy of careful study by every practical gardener, give an insight into the composition and the food-requirements of some of the many different plants with which he has to do. And a system of manuring may be called well-devised or rational when it is based upon the results of a careful examination into the composition of the plants under cultivation, and on a due consideration of the natural capabilities of the plant for availing itself of the needed plant-food, both from the atmosphere and from the soil.

The gardener, however, has to remember that the essential elements of plant-food are not required by different plants in the same invariable proportions at the various stages of growth, but are wanted at different periods of their life, in different absolute amounts, and in different proportions, according as to whether stems, leaves, flowers, fruit, or seed are required to be brought into prominence.

The gardener is therefore taught that all his cultivated plants, whether in the open garden, the orchard, or the conservatory, contain the same elementary constituents, yet no two of them are in exactly the same proportions. Each plant has its especial wants at different stages of its development. Succulent and rapidly-growing vegetables require an abundant supply of nitrogenous food in an easily available form during their early periods of growth; flowering plants and fruit-trees require phosphoric acid when blossoming and developing fruits and seeds; Grape-vines need a large amount of available potash during the formation and maturing of the Grapes, for the production of a rich and sugary juice; whilst Potatoes require nitrogen and potash in combination for the production of starch in the tubers.

It is found that the proportions of sugar and starch, and other constituents, can be considerably changed by the judicious use of special fertilisers. For example, in one of the experiments at Rothamsted, Hertfordshire, on root crops, the amount of sugar in the roots of Beet has been increased in one experiment from 780lb. to 1632lb. per acre; and in another experiment, from 986lb. of sugar, the amount has been raised to 2512lb. per acre—an increase of more than half-a-ton of sugar on each acre of land.

In practical gardening, four only of the chemical constituents of plants are in the majority of cases supplied to the crop under the form of fertilisers, and these are nitrogen, phosphoric acid, potash, and sometimes lime. The first three especially are the most sparsely distributed in soils, are the most easily exhausted, and the most costly to replace.

With every crop of vegetables, fruit, or flowers removed from the soil, the available stores of potash, phosphoric acid, and nitrogen are diminished; therefore, if a gardener proportions his

supply of manure to the waste caused by the growth and removal of his crops, and to the unavoidable loss by drainage, he will keep up the fertility of his soil to the degree in which he found it. And if he gives more judiciously he will gradually increase the fertility of the soil, and enable it to withstand drought and other adverse influences more effectively.

Respecting the need of fertilisers for orchards, Professor Voorhees writes as follows: "It is argued by many, and sometimes by those who should know better, that fruit-growing is quite similar to growing timber-trees; that the question of soil exhaustion is not a matter of very great importance, provided the soil is well cultivated; and that all soils contain sufficient quantities of the food-elements to insure the relatively small available supply required from year to year. It is admitted that on soils of good mechanical condition, well drained and cultivated, which are naturally adapted for fruit as well as other crops, because well supplied with the essential constituents—nitrogen, phosphoric acid, potash, and lime—the exhaustion arising from the continuous removal of crops will not become apparent for a long time, but it should be emphasised that it is only upon soils which possess these characteristics that the growth of fruit, even poor fruit, can be continued for any considerable period without the application of manures."

Manures and their Application.

Formerly, all substances which were incorporated into the soil for the purpose of enriching it, were designated manures. Since the introduction of commercial fertilisers in recent years, the meaning of the word has changed somewhat, for according to their origin, or the kind of plant-food material they supply, manures are spoken of as:—

(1) ANIMAL MANURES.—These are the excrements of domestic animals. The term "excrements" has been substituted for the ancient word *dung*, the meaning of which was somewhat ambiguous. Excrements are the solid and liquid voidings of animals, unmixed with litter. These are characterised by the large quantity of nitrogen they contain, and the ease with which they decompose and yield their fertilising matter in available forms. To this class of manures would belong guano, desiccated blood, bones, bone-meal, fish, and bone superphosphate.

(2) VEGETABLE MANURES comprise ordinary farmyard and stable manure, having a variable proportion of plant-food constituents, seaweeds, vegetable refuse, oil-cakes, &c., which undergo decomposition more or less slowly.

(3) MINERAL MANURES, which are extracted from the mineral rocks of the soil, and yield the ash constituents to plants, which may include sulphate ammonia, obtained from coal-tar, potash,

soda, magnesia, lime, iron, silica, &c., combined with sulphates, phosphates, and nitrates.

Then, again, manures are spoken of as "general manures" when they contain all the necessary elements for plant-growth; or "special manures," when they only supply one or several of these elements.

These elements, again, are said to be "dormant," "latent," or "active," according as they are insoluble or soluble in plant-juices, which exude from the rootlets, or in soil-water, and are thus made available for plant-food, or are locked up in an inert form in the soil. In fact, a very large part of the elements of plant-food contained in soils is present in such a condition that plants are unable to make use of it. For example, it is very usual to find about 0.15 per cent. of phosphoric acid in an ordinary garden soil. Such a soil 9in. deep, in its dry state, may be said to weigh from 1200 to 1500 tons per acre. A soil containing 0.15 per cent. of phosphoric acid would accordingly contain somewhere about two tons of phosphoric acid to the acre, disregarding the subsoil altogether. Such a soil contains as much phosphoric acid per acre as would be contained in about seventeen tons of superphosphate, or in nearly ten tons of bone-meal; and yet the addition of a few hundred pounds of phosphatic manure may make the difference between a full crop and a bad one. Similar statements would apply to other constituents of the soil. This leads the gardener to recognise the important fact that it is not the total proportion of phosphoric acid, or potash, or of nitrogen, that rules a soil's fertility for horticultural purposes, but the amount of each of them that is present in an immediately available condition.

Manures for the garden, for practical purposes, may be considered as nitrogenous, phosphatic, potassic, or calcareous fertilisers, according as nitrogen, potash, phosphoric acid, or lime is the predominating ingredient.

Farmyard and Stable Manure.

This substance differs from all artificial manures, and in several important particulars. Its value depends, first, on the materials of which it is formed; secondly, on the condition of its formation; and, thirdly, on the way it has been kept and treated until it is applied to the soil.

The materials of farmyard or stable manure are litter and the excreta of animals. That produced from young growing stock, or from milch cows, is not so good as that produced from old, or fattening animals. Then, again, that which is produced from underfed animals is of a very inferior description. Further, the composition of the excreta of domestic animals of various kinds is different. The excrements of horses which are fed with a more nitrogenised food than most other animals of the farm, are of a

very fertilising and valuable character. The excrements of farm animals may be placed in the following order of manurial value: Horse-dung and sheep-dung are about equal; then dung from oxen and cow-dung; and, last, pig-dung. The dung of horses and sheep yield hotter and more rapidly fermenting material than does the dung of oxen, cows, or pigs.

Farmyard or stable manure is said to be a perfect fertiliser, because it contains all the elements necessary for supporting a healthy and vigorous growth of plants. It is a universal manure, because it universally produces these effects upon a great variety of soils, and upon most descriptions of garden products.

Another reason why it is so valuable is that it produces mechanical effects in the soil to which it is applied, from its mass of organic matter, which no artificial manure can accomplish. The important mechanical effects, especially of long dung on clay soils, are not to be underrated. Then, again, the vast amount of heat developed during the decomposition of dung is of immense value to the gardener for forcing purposes, and this cannot be attained by other chemical agents.

Further, farmyard and stable manures furnish available humus and a mulch if they are spread upon the surface of the soil; they also tend to increase the water-holding power of the soil, and improves its texture and physical condition. It may here be stated that, so far as the humus matter of dung is beneficial to vegetation, it is only by its oxidation and nitrification, and a consequent supply of carbonic acid within the soil—a source of immense importance in the early stages of the life of a plant, and before it has developed and exposed a sufficient amount of green-leaf surface to the atmosphere to render it independent of soil supplies of carbonic acid.

In many cases it is believed that these benefits are a full equivalent for the less soluble characters of the fertilising constituents of farmyard or stable manure, as compared with commercial fertilisers. When the soil has a reasonable amount of available plant-food within it, the foregoing statement may be correct; but as the ultimate welfare of garden plants depends so much on a healthy and vigorous start, with an abundant root development, it becomes a question whether the more quickly-acting commercial manures may not be more valuable than the slowly-acting animal manures, whenever the soil is deficient in readily available plant-food. Then, again, farmyard manure, with its slow, nitrifying properties, may furnish sufficient nitrogenous food for all late crops in the garden, or those having a long period of growth; but for early crops or very rapidly-growing plants, some easily soluble nitrogenous manure, such as guano, nitrate of soda, sulphate of ammonia, &c., will be found of great advantage. A ton of farmyard or stable manure, when

applied to the soil, will add about 605lb. of organic matter, which will yield from 9lb. to 15lb. of nitrogen. But the large amount of carbon in combination with the nitrogen causes it to nitrify with comparative slowness, and the nitrifying process is essential before dung becomes available for plants. The ton of dung will also add 67lb. of ash or mineral constituents, supplying from 4lb. to 10lb. of phosphoric acid, and from 5lb. to 13lb. of potash.

Stable v. Moss-litter Manure.

Regarding the relative values of ordinary stable or straw manure and moss-litter manure, it may be stated that farmyard manure differs from moss-litter manure in several important particulars. The quantity of straw employed as litter must necessarily affect the general composition of fresh dung, and more especially the amount of moisture which it contains. The greater the amount of liquid manure the litter can be made to absorb, the larger will be the heat developed. In fresh dung the proportion of organic and mineral substances is small; this circumstance fully explains the slow action of stable manure when compared with the effect which well-made moss-litter manure—containing as it does more of both the solid and the liquid excrements of the animals—is capable of producing.

The proportion of insoluble matters, more especially of insoluble organic matters, in fresh dung, on the other hand, is very large, and considerably exceeds those of moss-litter manure. The total amount of nitrogen contained in the soluble portion of fresh dung likewise is inconsiderable. Most of the nitrogen, which is gradually liberated as the fermentation of the dung progresses, is contained in the portion of the manure which is insoluble in water. In other words, comparatively speaking little nitrogen exists in fresh dung in a state in which it can be assimilated by growing plants; while in moss-litter manure, owing to the large amount of carbonate of lime present (an ingredient of the peat moss), the nitrogen of the animal excrements becomes rapidly converted into nitrate of lime, and is assimilated by plants at once. For this reason the staying powers of moss-litter manure is less than straw-litter manure, weight for weight; also the nitrogen which is not at once taken up by the growing plants is wasted by drainage. Therefore it is, that although moss-litter manure may originally contain more nitrogen than the straw-litter manure, it does not last so long, nor produce the crop effects which one would be led to expect.

Again, moss-litter manure is very poor in alkaline salts, especially of potash, since these substances have been in great part washed out by the water covering the peat deposits. The principal constituent of the soluble ash of fresh dung, on the other hand, so far as quantity is concerned, is potash. One hundred parts

of soluble ash contain no less than thirty-seven parts of real potash, or a quantity which is equal to fifty-four parts of pure carbonate of potash. Straw-litter manure also contains a large amount of soluble silica, both in the soluble and in the insoluble ash. This is practically lacking in moss-litter manure. In the soluble ash this silica is united principally with potash. Fresh farmyard or stable manure, made with straw as litter, contains much soluble silicate of potash, which is especially valuable in the growth of plants.

Chemical Composition of Animal Manures.

The following Table shows the comparative value of ordinary farmyard manure composed of animal excrements and litter; and the excreta of various domestic animals, of both the solid and the liquid dejections. The constituents are each given in one ton of each description of manure.

SELECTED CONSTITUENTS IN ONE TON OF ANIMAL DUNG, AND OF FARMYARD MANURE IN A FRESH CONDITION.

| | NITROGEN. | POTASH. | LIME. | PHOSPHORIC ACID. |
|----------------------|-----------|---------|-------|------------------|
| | lb. | lb. | lb. | lb. |
| Farmyard Dung | 10 | 12 | 39 | 6 |
| Horse Droppings | 17 | 13 | 10 | 9 |
| Cow Droppings | 9 | 8 | 10 | 3 |
| Pig Droppings | 16 | 4 | 35 | 4 |
| Sheep Droppings | 20 | 14 | 33 | 13 |
| Hen Droppings | 43 | 19 | 58 | 39 |

SELECTED CONSTITUENTS IN ONE TON OF ANIMAL URINE IN A FRESH CONDITION.

| | NITROGEN. | POTASH. | LIME. | PHOSPHORIC ACID. |
|-------------------|-----------|---------|-------|------------------|
| | lb. | lb. | lb. | lb. |
| Horse Urine | 42 | 33 | 17 | — |
| Cow Urine | 11 | 31 | 3 | — |
| Pig Urine | 8 | 4 | 1 | 29 |
| Sheep Urine | 38 | 44 | 13 | 1 |

THE EXCREMENTS OF HORSES are richer in nitrogen than those of the cow or pig, but less rich than the dung of sheep; they have a somewhat denser texture, and cohere but loosely. For this reason, the droppings are readily distributed through the soil, and pass quickly into decay. In consequence of this faculty of decomposition, the nutrient elements they contain become rapidly fit for absorption and assimilation by plants; this effect is shown by early plant development. The solid excrements of horses are less lasting in the soil than those whose action is more tardy.

THE EXCREMENTS OF COWS contain the smallest quantity of nitrogen of the animals enumerated, but a fair proportion of potash. They pass but slowly into putrefaction, and become less heated when lying in heaps; heating in manure is exclusively a result of decomposition. In addition to this the substance of these excrements does not acquire a crumbly texture, but becomes sticky and compact, by which its distribution in the soil, as well as its decay, is rendered more difficult. The slow but persistent action of this manure renders it extremely useful for making up garden beds, when a lasting effect is desired; particularly is this the case in Vine-borders and Carnation-beds. Sometimes for Vine-borders one-half each of horse-manure and cow-manure is to be recommended, because a too-forcing manure in certain soils induces the production of stems and leaves, thus using up the small supply of phosphoric acid and of potash, to the great detriment of fruit-buds, blossoms, and fruit. As a consequence, most of the blossoms are barren and fall off, whilst only a few berries develop, and they but meagrely.

THE EXCREMENTS OF SHEEP contain more nitrogen and more of the mineral ingredients—potash and phosphoric acid—than those of cows or horses; but rather less lime than the excrements of pigs. As sheep droppings contain a comparatively small proportion of water, they are tolerably easy of decomposition, although possessing a closer and more compact texture than horse droppings. When mixed with their proportion of urine, sheep droppings form a very powerful manure.

For pot-plants, horse and sheep droppings combined, soaked in water, hanging a bagful of fresh soot in the tank or tub, makes a capital liquid manure.

THE EXCREMENTS OF PIGS vary exceedingly in their composition, because the feeding of these animals is far more varied than that of horses, cows, or sheep. As it gives out but little heat in its decomposition it is called a "cold" manure. Large quantities of undecomposed food are frequently found in the excrements of pigs; it therefore particularly favours the development of injurious animals in the soil, especially the black millepedes. It

is accordingly better employed in the cultivation of the coarser descriptions of garden products—such as the Cabbage tribe and Turnips—than of the more delicate vegetables or flowers, especially as it favours luxuriance rather than maturation of plants.

Urine a Forcing Manure.

The immense difference between the manurial value of the solid and liquid excrements of animals has been shown in some recent experiments. The analysis of farmyard and stable manure, together with the plant investigations, showed that the effect of these manurial substances was plainly connected with the proportion of soluble and active nitrogenous matters which they contained.

It will be observed in the foregoing Table of the analysis of animal manures that the comparatively large proportions of nitrogen in the urine of animals, ranging from 8lb. per ton in that of the pig, to 38lb. per ton in that of the sheep, and to 42lb. per ton in that of the horse, corroborates the common view of gardeners that urine is a forcing manure. Fresh urine is, in fact, a very valuable nitrogenous fertiliser, but it must be used with discretion for garden purposes, otherwise rank and unsightly plants, with coarse foliage, will be produced instead of flowers and fruit. Each pound of nitrogen in undiluted urine may be rated at as high a price as has to be paid for the pound of nitrogen in guano, nitrate of soda, or sulphate of ammonia. The urine of horses, cows, and sheep contains also an exceedingly large proportion of potash, while that of the pig is extremely rich in phosphoric acid.

The nitrogen in mere animal dung is of a very inferior quality to that in urine, since most of it is insoluble and in a condition unassimilable by plants until it has been subjected to the process of nitrification. The nitrogen of the solid excreta is contained chiefly in the undigested, not to say indigestible, portion of food which has been expelled by the animal as useless for his purposes, while the nitrogen in urine is all in solution and in a condition fit to be immediately taken up by plants. And as there is no excess of organic matter in urine, there is less loss of nitrogen from denitrification.

Experiments with Farmyard Manure.

In some experiments of Sir John Lawes, at Rothamsted, Hertfordshire, with Potatoes grown year after year on the same land, it was shown that in the first year of the application of 14 tons of farmyard manure per acre, an increase of 8 cwt. of Potatoes only was obtained over the plot which received no manure at all; while in the next four years of the application of the same quantity of farmyard manure, the increase of Potatoes averaged 2 tons 17 cwt. per acre over the unmanured plot, pointing

clearly to the slow action of the dung, and showing that it rarely produces much effect in the first year of its application.

Further, it was found that when 200lb. of nitrogen was applied to the Potato crop in the form of farmyard manure, which also contributed a very large amount of mineral constituents, in no case was the increased yield of the crop so great as was obtained by an artificial mixture of minerals and nitrogenous manure supplying only 86lb. of nitrogen, but in a more readily available condition. Nor was the increased assimilation of any one of the individual constituents so great under the influence of farmyard manure as when these were applied in the rapidly available condition, as in the artificial mixtures.

In the case of several other crops it has also been found that only a small proportion of the nitrogen of farmyard manure was taken up in the first year of the application.

In ordinary garden practice farmyard and stable manure are not only largely relied upon for the growth of most crops, but are applied in considerable quantities. It is probable, therefore, that independently of the liberal supply of all necessary constituents of plant-food, the beneficial effects of this manure are in a considerable degree due to its influence on the mechanical condition of the soil, rendering it more porous and easily permeable to the surface-roots, upon the development of which the success of so many garden plants greatly depends. Then, again, something may be due to an increased temperature of the surface-soil, engendered by the decomposition of so large an amount of organic matter within it; whilst the carbonic acid evolved in the decomposition will, with the aid of moisture, serve to render the mineral resources of the soil more soluble.

There are several practical considerations which count in favour of using well-rotted manures, especially when not used in conjunction with an artificial fertiliser. It is especially worthy of observation that, whilst the insoluble organic matter of dung is much reduced in quantity during the fermentation, the insoluble organic matter which remains is richer in nitrogen than an equal quantity of the same substance from fresh dung. Therefore, weight for weight, well-rotted farmyard manure is richer in soluble fertilising constituents than fresh dung, and contains especially more readily available nitrogen, and hence produces a more immediate and powerful effect on vegetation. Many practical gardeners have urged that fresh manure, even if it does not actually injure the crop to which it is applied, may still tend to the production of stems and leaves rather than of seeds and fruits. The rankness, however, of fresh dung and urine could be controlled and utilised by applying the manure in small quantities, and supplementing it with artificial fertilisers of kinds appropriate to the crops or individual plants that are to be grown.

Poultry Manure for the Garden.

Fresh poultry manure from hens and pigeons is decidedly richer in plant-food than the dung of other animals, because it contains both the solid and liquid excrements combined, and is somewhat analogous to guano in character, though far less valuable than guano weight for weight. To begin with, the food of hens, of pigeons, and even of turkeys, except in grasshopper season, is of vegetable rather than of animal origin, while the sea-fowl that produced the guano lived upon fish, and consequently voided a more highly-nitrogenised excrement; and, moreover, the guano has become exceedingly concentrated by the peculiar processes of slow decay to which it has long been subjected.

The Table giving the analysis of animal manures shows that poultry manure is exceedingly rich in all the constituents of plant-food, especially in nitrogen, lime, and phosphoric acid. Like the excrements of other animals, its value as a fertiliser depends largely upon the food consumed. If the fowls eat a good many worms, insects, and other animal food, their droppings will be much more valuable than if they were fed on grain and other vegetable products exclusively.

Dr. G. G. Groff has recently made some investigations upon the fertilising value of fowl manure, and he finds a considerable increase in value when the fowls are well fed and their droppings properly cared for. Dr. Groff advises feeding the fowls with all the fresh bone they will eat, giving it in a pulverised condition. By this practice their droppings are made much richer, while the number of eggs is greatly increased. The bone has been found to be of nearly as much value for manurial purposes as before being used as food by the fowls.

The following data gives the analysis of fowl manure, the animals being differently fed, in quantities of 100lb. of each:

HEN MANURE. SELECTED CONSTITUENTS IN AIR-DRIED DUNG. PERCENTAGE QUANTITIES.

| CHIEF DIET. | WATER. | NITROGEN. | PHOSPHORIC ACID. | POTASH. |
|-----------------|-----------|-----------|------------------|-----------|
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Bone Fed | 7.5 | 3.55 | 1.11 | 1.30 |
| Grain Fed | 6.5 | 1.03 | 1.60 | 1.85 |
| Maize Fed | 7.1 | 1.53 | 1.92 | 1.01 |

These results are a strong argument for feeding fowls with ground fresh bones ; and the data are further instructive as showing that well-cared for manure from well-fed fowls may be of great practical value to the gardener, being especially adapted for crops that have to be forced into rapid growth early in the season. When making up a hot-bed, it is a good plan to mix three or four bushels of poultry manure with each load of stable manure. If the heap is moist enough the former will greatly favour the generation of heat and facilitate fermentation and nitrification of the organic nitrogen.

For many horticultural purposes also it may be well to turn over the heap of poultry manure, or of compost made from the same, many times and often, in order to provide delicate food for some cherished plant.

Manurial Drainings.

The application of stable and house drainings to compost heaps is highly to be recommended for garden purposes, since by this means the drainings can be brought into a manageable form without sustaining a loss of their fertilising properties. If in collecting these heaps of compost all the refuse matters found in a garden are made use of, whatever their appellation—sweepings, lawn-grass, hedge and tree clippings, refuse vegetables, path trimmings, leaves, coal-dust, ashes of all sorts, sawdust, &c.—and the mass is kept moist by frequently pouring on urinous liquids and house drainings, very considerable quantities of the latter may be brought into a dry form, inasmuch as the watery portions of the drainings by degrees evaporate, and the ammoniacal combinations generated by its nitrification are firmly held and absorbed, partly by the acids which are simultaneously formed in the humus matter and partly by the soil. Moisture, we know, plays an important part, not only in the growth and development of plants, but also in changing the otherwise insoluble nitrogenous compounds into nitrates. By occasionally turning over the compost heap the process of decay is very essentially accelerated. Should a pungent odour of ammonia be remarked, some soil or lime, or a coating of ashes, should be added to the heap.

Explanation of Nitrification.

As the term nitrification frequently and necessarily occurs in this chapter, it may be well, on account of the importance of the subject, to give a brief explanation of its meaning and significance in the garden.

Nitrogen in the form of nitrates is generally regarded as the best kind of nitrogenous food for plants of all descriptions. Nitrates are compounds of nitric acid with mineral bases, as potassium nitrate, sodium nitrate, calcium nitrate, and ammonium nitrate. Plants obtain their nitric acid by absorbing the nitrates

that are already present in the soil—those that are carried down to the soil from the atmosphere in rain, dew, hoar-frost, and snow; those that are applied artificially in fertilisers; and those that are formed in the soil from the nitrogen of other substances.

As is well known, all the nitrogen that is applied to the soil for fertilising purposes, especially in farmyard and stable manures, compost heaps, in green-manuring, and by animal manures, is not in the form of nitrates. It may be either in the form of ammonia or of more complex organic compounds. It is very probable, however, that before it is taken up by the growing plant the organic nitrogen is changed, first into the form of ammonia, and then into nitric acid.

These changes all take place through the agency of micro-organisms, or ferments, in the soil, and that particular process in which the nitrogen of the ammonia is changed into nitric acid is called nitrification. This change is accomplished by the joint action of two separate organisms, one of which changes the nitrogen of ammonia into nitrous acid, while the other changes the nitrous acid into nitric acid, the latter being the form in which it is assimilated by plants.

The conditions that are required for the development of nitrifying organisms are the presence in the soil of certain food-constituents—heat, moisture, oxygen, and some mineral base—to neutralise the nitric acid as it is formed. It is also necessary that the soil be slightly alkaline. The nitrifying organisms require certain substances as food, among which phosphoric acid and lime are most important. It has been found that without phosphoric acid there can be no nitrification. This probably is one of the reasons why phosphatic manures show such beneficial results when applied to certain soils, as well as furnishing direct plant-food.

The three conditions which exert a marked influence on nitrification, and which in horticultural practice are more or less intimately associated, are heat, air, and moisture. The process is most rapid during warm weather, in presence of sufficient air and moisture. Hence it is more active in summer than in winter, and more rapid in a conservatory or covered frame than in the open garden.

Nitrification teaches the gardener, also, the reason why thorough tillage of the soil is so essential, and why charcoal, added to potting material and a sufficiency of drainage crocks, in pot-culture, is so important and beneficial. The loosening and pulverising of the soil allows the admission of necessary oxygen and regulates the supply of moisture. If the soil is allowed to become very dry, or, on the other hand, is saturated with water to the exclusion of air, nitrification is retarded, and may be permanently stopped. In this connection it is interesting to note that in certain plant-cultures, especially that of the

Chrysanthemum, if the soil is allowed to get thoroughly dry, the plants never afterwards seem to regain their former healthy vigour, nor will they produce such fine blossoms as if a steady and continuous growth is maintained.

The final product of nitrification is nitric acid; but the nitrifying organisms cannot develop in the presence of a free acid, hence the benefit of liming sour soils, such as water-meadows, peaty soils, or very rich old garden soils. The lime corrects the sourness of the soil by neutralising the free acid, and then, if the other conditions of heat, oxygen, moisture, and food are favourable, nitrification may proceed. There must be an excess of lime applied over and above the amount necessary to correct the acidity of the soil in order to neutralise the nitric acid as it is formed.

Whenever the soil is in a condition unfavourable to nitrification, there is danger that not only may nitrates not be formed, but that there will be a loss of nitrogen from those nitrates which are present. This loss is due to a process known as denitrification—a process which is also dependent on micro-organisms. The denitrification organisms flourish under one condition, which is directly opposed to the corresponding condition favouring nitrification—namely, the absence of oxygen. Under that condition the nitrates may be reduced or changed back to nitrites, and the nitrites are often further reduced till they lose their nitrogen altogether by having it pass off into the air as gaseous nitrogen.

Denitrification may take place, therefore, in water-logged soils, in badly-drained pot-cultures, and in the inner parts of manure or compost heaps, when air is measurably excluded. An organic manure, therefore, which is effective for plant growth when applied in small quantity may thus become injurious when made use of in excess. The supply of atmospheric oxygen to a soil is effectually prevented if the soil is kept in a saturated condition with stagnant water. This condition alone is sufficient to set up an energetic denitrification, by which process the growing plants must considerably suffer:

A recently-published experiment by Professor Bréal furnishes a further excellent example of the active denitrification which takes place in a soil kept saturated with water. He placed some garden soil in a percolator, and consolidated it by pressure; the column was about 15 in. high. Water more than sufficient for saturation was then poured upon the soil; when the water had run through it was poured back again over the soil, and this treatment was continued for some time. The soil at the commencement of the experiment was in an active state of nitrification, and the drainage-water was at first rich in nitrates; but at the end of three weeks the nitrates had entirely disappeared from the drainage-water, though no water had been removed from the soil.

The advantages to the horticulturist of the uses of nitrates may thus be briefly summarised:—(1) Nitrate of soda and nitrate of lime serves directly as food for plants; not having to undergo any change in the soil, they act more rapidly than any nitrogenous manure of organic origin, such as farmyard or stable dung, guano, blood, fish, rape cake, &c., or even sulphate of ammonia and soot, as the action of all these materials is dependent on their undergoing nitrification. (2) The rapidity with which the nitrate is absorbed by plants quickly puts them into a state which, by the vigour of their development, they can the better resist disease, insect attack, parasitic growths, and drought. (3) In seasons following a severe winter, or for early productions of vegetables, nitrate supplied in the spring repairs the lateness caused by climatic disadvantages. (4) Young plants take up nitrates so rapidly, and send their roots into the soil so quickly, that the nitrates cannot escape them, even if washed down by heavy rains, always provided other conditions are favourable.

Artificial Manures : their Chemical Composition and Use in the Garden.

Having dealt with the nature, the composition, and the uses in the garden of farmyard and stable manures, and also of the manure from various descriptions of domestic animals, we have next to consider the place occupied in a proper system of horticulture by artificial fertilisers.

It has been found from numerous investigations that horticulturists use nearly 7lb. of nitrogen in the form of manure to get back 1lb. of nitrogen in the crop produced. This is owing to the low percentage of plant-food in the bulky farmyard or stable manure, which is generally used for manurial purposes, and to the slowness of its action.

It will be well, therefore, to impress upon every gardener the fact that to manure horticultural soils and crops efficiently means, to-day, something more than to incorporate into the earth an exceptionally liberal amount of such a varying substance as farmyard or stable manure, vegetable composts, and the like, which may take many years to yield all the effects of which they may be capable. A moderate use of what are termed "natural" manures, supplemented by a suitable addition of concentrated artificial fertilisers, for the purpose of rendering the former more rapidly available, in order to force particular garden products "out of season" and to raise special plants vigorously and well, should commend itself to the horticulturist on account of the directness with which he can thus reach the object in view. Both good economy and the preference for a healthy and vigorous condition of cultivated plants advise a change from an indifferent system of manuring to one of a more rational character.

An important lesson, therefore, to be learned by the gardener at the present time is how to use artificial fertilisers to the best possible advantage in conjunction with dung; or, rather, how to supplement and eke out the dung of animals, by means of artificial fertilisers, in such wise that the utmost success shall be got both from the dung and from the chemical ingredients.

There are special cases, necessarily, where it may be best on the whole to use farmyard manure alone, or, on the other hand, to use artificial fertilisers by themselves. Furthermore, artificials may be chosen as to yield their full effect immediately, which to the market-gardener is a matter of special importance, whereas dung takes many years to give up all its fertilising properties. Hence it stands to reason that, if a manure is sluggish in its action, it means that the profit by its use is delayed, the capital it represents yielding no interest until it is realised. For example, coarse bones have been sometimes preferred to fine bone-meal merely for the reason that they distribute their effects over a greater number of years.

A well-chosen artificial fertiliser should act promptly and decisively on the crop or on the particular plant to which it is applied, but it does not follow that its effect is limited to that crop or plant; some constituents, such as potash, may remain in the soil for a long time if not taken up by the growing plant.

Artificial manures, properly and abundantly used, do not stimulate plant-life in the sense in which the word is commonly used. Nitrogen, potash, and phosphoric acid, in whatever form they may be employed, are true plant-foods, and furnish actual nourishment to growing crops.

It is well known that plants frequently suffer from lack of a full supply of food at a critical period of their growth. When they have used the easily available food stored in the seed, but have not yet had time to produce roots sufficiently numerous to secure a full supply of nourishment from that which is less available in the soil, the addition of an assimilable concentrated fertiliser is of the greatest value. Most soils, even the richest, are so imperfectly adapted for the maximum welfare of plants that, unless a small amount of delicate plant-food be supplied, growth languishes until the plant has extended and multiplied its roots sufficiently to secure a supply of nourishment from the inherent and less available constituents stored up in the soil.

If, then, some easily assimilable food is at hand to make good the soil's deficiencies, and to sustain the plant and keep it in complete vigour during the whole period of its life, it is reasonable to suppose that a larger crop will be secured than would have been obtained if no additional nutriment had been provided.

It is believed that the beneficial effects of artificial fertilisers are due as much to the timely supply of plant-food as to the actual amount of assimilable ingredients they may contain. Food given at the right time, and in judicious quantities, enables the plant to extend its roots, whereby it is able to secure more nourishment from the soil, over and above that furnished by the manure, than it could have secured without such help. If this is so, it shows that the use of commercial fertilisers in small but frequent quantities may not only largely increase the total yield of crops, but may also produce a greater abundance of flowers and of fruit. It must be remembered, however, that one and the same description of manure will not be equally efficient on all classes of soils.

Reference has been made to complete fertilisers, that is, those manures which contain, as it has been aptly described, the "golden tripod of plant-life"—namely, nitrogen, phosphoric acid, and potash, in the proportions found in the plants to be grown. But plants vary widely in their amounts and proportion of nitrogen, phosphoric acid, and potash. The variations are due to many causes, such as an abundance or lack of moisture, sunshine, and inherited power of the plants. Then, too, the soil varies more widely in the percentage of plant-food and its availability than the plants do.

In general terms it may be stated that, in the garden, when it is desired to increase the leaves and stalks—the vegetative system—of plants where luxuriance and succulency are required, as in the cultivation of the various Cabbage and Broccoli tribe, Celery, Asparagus, Lettuce, Spinach, Rhubarb, and foliage plants, this can be accomplished by supplying them with plenty of nitrogen; while, on the other hand, the production of flowers, seeds, fruits, tubers, and roots, where maturation rather than luxuriance is the end in view, is best secured by using moderate quantities of nitrogen and liberal amounts of available phosphoric acid and potash, and sometimes of lime also.

Artificial manures may be divided into (a) phosphatic manures, including the nitrogenous guanos; (b) nitrogenous manures proper; (c) potassic manures, some of which also contain nitrogen; (d) other mineral manures, like gypsum, lime, &c.; (e) special mixed manures.

Phosphatic Manures.—Phosphate of lime is a chemical substance, which has acquired great commercial importance in recent years, and has been found to be a manure of considerable value in the garden, in the orchard, and in the conservatory. There are several varieties of this manure, which includes such fertilisers as raw bones, bone-meal, bone-ash, superphosphate of lime, phosphatic rocks, and basic slag, as well as the phosphatic guanos.

Raw bones are true phosphatic manures, although they contain a small percentage of nitrogen. They decompose slowly in the

soil, and particularly so in heavy and wet clays. Pulverised bones form an excellent permanent manure for Vine-borders; they are especially adapted for light sandy or loamy soils, also in other cultures where a slow action is required.

Bones, bone-meal, and lightly-boiled bone-dust should contain from 40 per cent. to 50 per cent. of phosphates, about 30 per cent. of organic matter, and from 3 per cent. to 4 per cent. of nitrogen, equal to about 4 per cent. or 5 per cent. of ammonia. As a general rule, the more finely bones are crushed, or ground, the better they are adapted for manurial purposes, and the quicker they act. They are, however, used in various degrees of fineness—as 1 in. bones, $\frac{1}{2}$ in. bones, bone-meal, and steamed bone-flour. The following table shows the composition of raw bones, bone-meal, and boiled bones, each being of good quality :

PERCENTAGE COMPOSITION OF BONE MANURES.

| | BONES. | BONE MEAL. | BOILED BONES. |
|-----------------------------------|--------|------------|---------------|
| Moisture | 9.90 | 8.38 | 10.61 |
| Organic Matter (1)..... | 33.70 | 31.12 | 21.55 |
| Phosphate of Lime | 49.12 | 49.43 | 60.19 |
| Alkaline Salts and Magnesia | 6.18 | 9.56 | 5.81 |
| Silica..... | 1.10 | 1.51 | 1.84 |
| Total..... | 100.00 | 100.00 | 100.00 |
| (1) Containing Nitrogen | 3.76 | 4.06 | 1.76 |

The figures show that there is but little difference in the manurial value of bones and bone-meal, only the meal gives up its fertilising properties more quickly. Bones that have been highly steamed or boiled to obtain gelatine for glue-making have lost much of their organic matter and nitrogen. This is clearly shown in the third column of the table, there being a loss of 10 per cent. of the former and about 2 per cent. loss of the latter substance. Steamed bone-meal, however, forms a good phosphatic manure, containing, as it does, 60 per cent. of phosphates.

These manures are very helpful to lawns and paddocks, greatly improving the character of the grasses; also for Turnips, Beet, Radishes, Celery, Onions, Potatoes, Peas, fruit-trees, and flowers generally. Bone-manures are best used in conjunction with

potash salts or kainit, and will be found beneficial in old kitchen-gardens rich in organic matter. Experiments have proved that mixtures of bone-meal and wood-ashes serve an excellent purpose when used as a substitute for farmyard manure.

Basic Slag.—Basic slag, or “Thomas’s phosphate,” of which the following data show the chief constituents, is a manure which has come largely into use in the last few years. The figures show that it contains a large proportion of lime (which is in a caustic condition), phosphoric acid, and iron oxides. It is of various manurial qualities, ranging from about 12 per cent. of phosphoric acid (equal to 26 per cent. of tribasic phosphate of lime) to over 20 per cent. of phosphoric acid (equal to nearly 44 per cent. of phosphate), so that guarantees of quality should be carefully considered by the purchaser.

SELECTED CONSTITUENTS IN BASIC SLAG.

| | |
|---------------------------|-----------------|
| Lime | 45.04 per cent. |
| Magnesia | 6.20 ” |
| Phosphoric acid | 18.11 ” |
| Iron oxides | 17.56 ” |
| Silica | 6.90 ” |
| Manganese | 3.51 ” |

Experiments with basic slag have indicated that to produce the same effects as superphosphate, at least twice the quantity should be applied in the form of slag as would suffice in that of superphosphate. Soils poor in lime, or those inclined to be wet and sticky, are most benefited by basic slag, provided that they contain plenty of organic matter. Basic slag is a manure well adapted for fruit-trees, flowering shrubs, Roses, lawns, paddocks, and pastures. It must not be used in combination with ammonia salt, because it sets the ammonia free, and causes a loss of plant-food. It may, however, be mixed with nitrate of soda.

Superphosphates.—Mineral superphosphate is the cheapest source of soluble phosphate manure, and is made by treating with sulphuric acid very finely-ground mineral rock phosphates. The value of the superphosphate for manurial purposes is indicated by the percentage of phosphate made soluble, which may range from 25 per cent. to 28 per cent. Superphosphates are frequently made containing as much as from 35 per cent. to 40 per cent. of soluble phosphate, or even more. They are then called “double superphosphates,” and are practically free from sulphuric acid, which is a decided advantage on soils that are subject to the disease known as “Club-Root” in the *Brassica* family.

When superphosphate is applied, the first rainfall or artificial watering, or even the moisture of the soil, dissolves the

soluble phosphate, and causes it to sink and distribute throughout the soil. The roots of the growing crops are thus provided with a continuous supply of phosphoric food, and there is a dissemination of the manure obtained through a large soil area, which is especially helpful to young seedling plants. Superphosphates are most beneficial on soils rich in lime. Very concentrated superphosphates should never be used in large quantities if there is but little lime in the soil, as there is a danger of injury to plant roots. Though especially esteemed for Turnips, Potatoes, and all root crops, concentrated phosphatic manures are valuable for insuring a very rapid and vigorous early growth of most seedlings, and assisting maturation and fruit development.

We learn from some investigations of Professor Wagner with vines, fruit-trees, and berry-bearing shrubs, that a great deal depends upon these plants producing leaves rapidly and abundantly in early spring; also upon the blossoms appearing at the right time, and upon the fructification ensuing vigorously; inasmuch as the more completely all these phenomena take place, the more certain are the prospects of a fruit production satisfactory alike as to quantity and quality. In the case of kitchen vegetables, and all seedlings, it is also of great advantage to make these develop rapidly and vigorously, in order that they may recover as soon as possible from the ravages made upon them by insects, frosts, and bad weather; further, that they may elaborate as quickly as possible a widely-distributed and deeply-penetrating network of healthy roots, and in this way acquire so much vital-energy and so much power of resistance that they can successfully encounter all injurious influences from whatever source.

In order to attain all this, the following conditions must be fulfilled—that the plant during its early stages of development has placed at its disposal as much easily available and readily soluble phosphate as it can possibly assimilate. On the lighter descriptions of soil, it has been found that phosphoric acid is less important in fruit culture as a manure than potash. However, the best results are to be expected when the fruit-grower closely observes the behaviour of his trees, and then applies such manurial ingredients as they appear to need.

Professor Voorhees gives the following practical suggestions for the fertilising of orchards. He states that a system of manuring for cultivated orchards based upon the limited data at our disposal may be outlined as follows: "To provide vegetable matter and to improve the physical quality of poor soils, apply farmyard manure once in four years at the rate of from five tons to ten tons per acre. To aid in the decomposition of the vegetable matter, and to ensure a sufficiency of lime as plant-food, apply lime at the rate of twenty-five bushels per acre once in five years. To

provide in addition an abundance of all forms of available plant-food at the times needed for the development of the trees and fruit, apply annually chemical fertilisers in the following proportions per acre :

| | |
|------------------------|--------|
| Nitrate soda | 100lb. |
| Superphosphate | 100lb. |
| Bone-meal | 200lb. |
| Potash | 200lb. |

The amounts to be applied must depend upon the character of the soil, the kind of fruit to be grown, and the age and vigour of the trees."

Guano.—Most horticulturists favour guano as a manure, and until within recent years this was certainly one of the most important nitrogenous fertilisers in the market. True guano is a substance found upon certain almost rainless islands along the coast of Peru, which has resulted from the slow decomposition of the dung and other refuse of sea-birds.

The wonderful plant results obtained with small quantities of this very concentrated manure produced the utmost astonishment among both farmers and gardeners, and greatly stimulated the constant inquiry into the action of manures generally, which has resulted in the addition of a great number of artificial fertilisers, and in the greater knowledge of the action of manures which we now possess.

The guano which is procurable at the present date is distinctly inferior to that which was formerly imported, and buyers should protect themselves by asking for some guarantee as to the quality of their purchases. It is in the nitrogenised compounds of guano that its value is to be chiefly attributed. In the best descriptions of guano, the nitrogen may range from 10 per cent. to 17 per cent., the phosphoric acid from 12 per cent. to 15 per cent., and the potash from 2 per cent. to 8 per cent. The classes of guano now to be obtained will probably not contain more than from 4 per cent. to 8 per cent. of nitrogen, 9 per cent. to 12 per cent. of phosphoric acid, and from 1 per cent. to 3 per cent. of potash; but even with this composition it is a powerful manure.

Considered as a general manure, the phosphates predominate over the other constituents, and guano is therefore very useful as an adjunct to farmyard or stable manure, which are poor in phosphates. It is poor in potash, consequently on soil and crops requiring a large supply of this ingredient, it should be used in conjunction with potash-salts, kainit, or wood-ashes.

About one-third of the nitrogen present in guano is in the condition of ready-formed ammonia, which acts very quickly on plant-life; the remaining two-thirds are present in a variety

of organic compounds, which yield up ammonia as they decay. As many of them are easily soluble in water, the decomposition is rapid. About one-fourth of the phosphates also are easily soluble in water; hence, guano may rank as a quick-acting manure, and, to prevent waste of plant-food, it is best applied in spring, or when plant growth is most active. The insoluble phosphate of lime, forming the bulk of the guano phosphate, is, however, only slowly available for plants, being in that respect similar to the phosphate in bone-meal, the benefit of which is only obtained some considerable time after application to the soil.

Like nitrate of soda and sulphate of ammonia, guano is a manure of quick action, tending to develop rapid growth of the leafy parts of plants. One merit of this manure is that it assures a good start to a young seedling crop. Starting with a fertile soil, such as that of a well-cultivated garden, the efficiency of guano as compared with that of farmyard manure of good quality may be estimated to be in the proportion of 1cwt. of guano to 65cwt. to 70cwt. of farmyard manure. The difference in the time and labour required for the handling of these two quantities of manure is a point worth considering by those who garden for profit.

Unadulterated guano has some advantage over most other un-mixed manures containing the same percentages of nitrogen and phosphates, on account of its more complex chemical condition. The manurial constituents are in several different forms, and of different degrees of solubility, so that they supply the plant requirements more slowly and evenly through the period of growth than can be done by manures in which the ingredients are each in some one form of chemical combination.

It is a case of necessity that the soil to which guano is applied shall be adequately supplied with water. If there is a lack of moisture the components of guano will not dissolve, ferment action cannot take place, and comparatively little effect will be produced by the manure. In dry seasons guano is apt to disappoint expectations when sown to outdoor crops. Its best results are obtained when applied to good moist loams.

Guano is a capital fertiliser admixed with water (one ounce to 1gal. of water), and applied in small quantities pretty frequently in the presence of an abundance of moisture to most garden plants in pot-culture.

Artificial Guanos.—Artificial imitations of dissolved Peruvian guano are made by mixing sulphate of ammonia with superphosphate made from phosphatic mineralised guanos and from mineral phosphates. These are guaranteed to contain varying proportions of ammonia and phosphates according to the prices, and if properly made are rapidly-acting fertilisers. These

descriptions of manure will be found useful on all classes of soils except those derived from limestone and chalk rocks.

Nitrate of Soda.—It has been abundantly proved that for the greater number of garden plants the nitrogen they use must be converted in the soil into nitric acid, and the nitric acid into nitrates, before it furnishes appropriate nitrogenous food. The importance of nitrate of soda as a fertiliser thus becomes obvious. It will increase the productiveness of nearly every crop that is grown. It does not follow, however, that its application is alike profitable on all crops: the profit depends very much on the price of the produce in the market.

Nitrate of soda contains from 15 per cent. to 16 per cent. of nitrogen, and it is the most active and efficient of all the nitrogenous manures, supplying plant-food of the most concentrated and direct kind, and its action is both feeding and stimulating. Its chief peculiarity is that it acts almost immediately on the plant to which it is applied. It is especially valuable in seasons of drought, as it enables the young plant to root rapidly, and become less dependent on surface moisture.

To those who are accustomed to use farmyard or stable manures our advice is to continue its use; but if the object is to grow maximum crops easily assimilable nitrates must be furnished in some way to the plants, in addition to the slow-acting natural manures.

With few exceptions, all the fertilisers now generally used, in proportion to the wants of the plant, contain a larger quantity of phosphoric acid, potash, &c., than they do of available nitrogen. Hence, if the market grower desires to raise maximum early crops, he must furnish available nitrogen, and the cheapest and best form to get this food is by nitrate of soda.

A grower of Tomatoes on a large scale says: "I cannot recommend too highly the use of nitrate of soda in growing Tomatoes, especially when early ripening is desired. When used at the rate of 150lb. to 175lb. per acre, or one table-spoonful to a single plant, and in connection with wood-ashes, the total yield of early fruit will be largely increased. A larger quantity of nitrate will increase the yield of fruit, but at the expense of the net profit on the crop. However, great care must be exercised in the application of nitrate of soda to any plant, and especially to Tomatoes; it should not come in direct contact with either the stalk or the roots."

The solubility of nitrate of soda and the readiness with which it finds its way into the soil—the very qualities which render it so valuable as an immediately available plant-food—have been alleged as objections to its use. Old prejudices, however, as to the exhaustive character are fast dying out in the light of a fuller scientific knowledge.

Drainage water, it has been found, will carry with it more or less of the nitrate which has been applied to growing crops, but it is a comparatively rare occurrence for water to pass through the soil out of reach of plant roots, after the land is in condition to work in the spring, in sufficient quantity to cause serious loss; besides, young plants take up nitrogen so rapidly, and send their roots down so quickly into the soil, that the nitrate cannot escape them, even if washed down by heavy showers or by artificial waterings.

Sulphate of Ammonia.—Next to nitrates the most available form in which nitrogen can be furnished to plants is ammonia. Sulphate of ammonia contains weight for weight more nitrogen than nitrate of soda. When ammonia salts are applied to the soil, the ammonia must be converted into nitric acid before the plants can use it. If lime is deficient in the soil, the conversion of ammonia into nitric acid will be retarded, and in this case the ammonia, if applied to such crops as Onions, Beet, Potatoes, &c., would at first be injurious rather than beneficial. On the other hand, from an economical point of view, this manure cannot be recommended for chalky and limestone soils, because lime assists to expel the ammonia in a state of gas. Sulphate of ammonia, however, has some peculiar advantages as a manure, being slower in its action than nitrate of soda, and its efficiency in the garden depends greatly on the completeness of the accompanying mineral supply. It mixes well with bone-meal or superphosphate. It is a capital fertiliser for Chrysanthemums, foliage plants, Poinsettias, Potatoes, &c. For the colouring of Grapes, sulphate of ammonia has been recommended, but it must be applied in small quantities only.

When nitrate of soda is used as manure, its nitrogen does not enter into fixed combinations within the soil, but nitrate is dissolved in the soil-water, and unless taken up by vegetation much food material passes into the sub-soil beyond the reach of the roots of growing crops. When ammonia salts are used, part of the ammonia is temporarily taken up by the soil, but it is more or less, according to the character of the soil and of the season, converted into nitrates, and is then subject to loss as when nitrate of soda is used. The loss will be less if the manures are applied in the spring months, and to quickly-growing crops.

The gardener must remember that these concentrated nitrogenous manures when used by themselves tend to produce foliage rather than flowers or fruit, especially if the ground has been partially exhausted of its mineral ingredients by previous crops. To obviate this difficulty superphosphate of lime, bone-meal, potash salts, and the like, may be given in addition.

Chief Sources of Potash.

Wood-Ashes constituted for a long time the chief source of the supply of potash used for gardening purposes. The incombustible part, or minerals, of garden crops and of shrubs and fruit-trees contain from one-fourth to one-third its weight of potash. For this reason the ashes of refuse garden stuff forms a capital dressing for Carrots, Onions, and most plants in pots.

Kainit is, on account of its low price, in great favour as a cheap form of potassic fertiliser. The crude kainit found in commerce contains 12 per cent. to 13 per cent. of potash, 27 per cent. to 30 per cent. of magnesia, and 30 per cent. of common salt. It is more valuable in light loam than in heavier soils, which it makes more sticky. A fair dressing per acre would be from 3cwt. to 6cwt., mixed with other fertilisers, and worked well into the soil.

Sulphate of Potash, which is the chief potash salt in kainit, is also sold in a more concentrated form than in that crude salt, and is found in commerce with from 50 per cent. to 54 per cent. of potash, or more than four times the amount per cent. found in kainit. Although its price is considerably higher than that of kainit, growers will find it more advantageous whenever freight and cartage are considerations, the fertiliser being four times more concentrated: 1cwt. per acre forms a good dressing in conjunction with other manures.

Chloride or Muriate of Potash is the most soluble of the various salts of potash, and when purified contains as much as 63 per cent. of potash, or 80 per cent. of muriate of potash. It is obtained as a by-product in the manufacture of chlorate of potash, in the purification of nitre and other manufactures. Its use, however, is said to be harmful on certain crops, such as the Sugar Cane and Sugar Beets, in which it lessens the percentage of crystallisable sugar, while Potatoes are rendered waxy, and Tobacco leaves are deteriorated in value; in the soil it is besides apt to give rise to the formation of common salt, while the sulphate gives rise to the formation of gypsum, which in saline potash especially is of value to plants.

Chief Sources of Lime.

Lime applied to soils has a mechanical as well as a chemical effect. It assists in the decomposition of organic matter, and combining with the nitrates as they are formed, produces nitrate of lime, one of the most active of plant-foods; it sweetens sour soils, such as water-meadow soils and very rich old kitchen-garden soils, by neutralising the otherwise harmful acids; it indirectly supplies plant-food—that is to say, it combines with other substances in the soil, bringing them into an available and assimilable form for the plants to take up; it is a necessity to

the process of nitrification ; it increases the virtue of the soil by retaining moisture, and helps some of the chemical processes in the soil, which result in the more ready absorption of phosphoric acid, potash, and ammonia ; and it promotes early maturity, favouring the vegetative property of plants. A good dressing is from ten to twenty bushels to the acre in ordinary gardens, and from two to three tons in sour soils. Lime may be broadcasted and raked or harrowed in, as it has a tendency to sink into the soil.

Quicklime acts more energetically than carbonate of lime, and is very good on soils especially rich in organic matter, and on sour soils.

Gas-lime contains small quantities of ammonia, also carbonate of lime, sulphate of lime, and sulphites of lime (combinations of quicklime and sulphuretted hydrogen), which are injurious to all forms of life, whether vegetable or animal, and therefore gas-lime must be exposed to the air before applying to the soil, in order to oxidise these deleterious products and change them into sulphate of lime or gypsum. When used as an insecticide, it should be employed as fresh as possible. It will be found exceedingly beneficial if applied to soils affected by the disease known as Club-Root or Anbury, in root crops, and the *Brassica* family. In this case, it may be spread on the land in autumn and ploughed or dug in ; from thirty to fifty bushels per acre may be used.

Carbonate of Lime.—Chalk, shell-sand, and marls are all forms of carbonate of lime. The marls also contain a certain proportion of potash and of phosphoric acid. These forms of lime added to lands deficient in this substance have proved of great value : they are capable of neutralizing the organic acids contained in sour soils, and form a valuable plant-food for many garden crops ; they exert a decided beneficial mechanical influence upon stiff soils, besides consolidating light, sandy soils, liberating the potash and forming the valuable double silicates. Marls are particularly useful in the cultivation of Roses.

Green Manuring.

This is one of the best and cheapest ways of adding humus or organic matter, to poor sandy soils especially. The term is applied to some quick-growing crop, such as mustard, which is ploughed in green. Green manuring adds nothing to the mineral matter of the soil. Its utility is due to its getting organic matter from the carbonic acid of the air ; and also, as in the case of leguminous plants, a certain amount of nitrogen from the same source. The roots of green crops bring up plant-food from the sub-soil to the surface for the use of succeeding crops. Green manuring helps to smother weeds, and it may in some cases destroy insects. Various crops are used

for green manuring: they should be quickly-growing plants yielding a large quantity of green stuff; the crop should be ploughed or dug in when the weather is moderately moist and warm to favour decomposition.

Manures Applicable to Fruit-growing.

It is important that artificial manures should be applied to fruit-trees for their successful growth, as there is little doubt but that the so-called precarious nature of, or failure in, fruit-farming is largely due to improper methods of cultivation. Fruit-trees require manuring as much as ordinary garden crops, and it should always be borne in mind that the soil has to receive back that which has been taken from it in the crops of fruit removed, and this restitution is made by using the proper manures.

The fruit-grower will no doubt desire to ask how he is to tell just what kind and what quantity of fertilisers to apply to his land. This is one of those questions which no person can answer for him. Prof. L. H. Bailey says, having studied the matter carefully, and having observed his orchard from day to day and year to year, the cultivator should be able to discover the treatment which it needs. As a general statement, it may be said that the fruit orchard which is yielding satisfactory results is receiving the very treatment which it requires; but where it is giving unsatisfactory returns some change in the management should be made. An orchard which is in grass and not doing well should certainly be ploughed up and tilled. The beneficial effect of this operation has been fully demonstrated at the Woburn Fruit Farm. An orchard which is tilled and is not doing well may be benefited by seeding down with clover, to be afterwards fed off by sheep, the residue being ploughed in. If the growth is strong and vigorous, and the trees or fruit-bushes seem to be going to wood at the expense of the fruit, it shows that the soil contains too much nitrogen in proportion to the mineral supply. A good dressing of superphosphate, bone-meal, or basic slag, combined with some potash salt, should be given in the autumn or very early spring. In all cases in which the growth is not sufficient, and the leaves are yellow and drop early, it is probable that either more nitrogen or more moisture, or both, are needed, or it may show that the soil contains too much lime in proportion to the other minerals. In these cases a mulching of farmyard manure should be given, or probably quicker and cheaper results may be obtained by the direct application of nitrogenous fertilisers, such as nitrate of soda, sulphate of ammonia, guano, or dried blood.

The fruit-grower should remember further, that the trees need all the elements of plant-food, and not one of them alone. For example, a heavy application of nitrogen upon soil which is deficient in potash and phosphoric acid cannot be expected to

give useful results. In the same way, the application of potash to soils which are very poor in nitrogen or phosphoric acid would be comparatively useless. Then heavy loamy or clay soils nearly always contain an abundance of potash and phosphoric acid in a more or less unavailable condition, and much of these substances may be liberated to the plant by careful tillages, and the incorporation of humus. "However, it is nearly always advisable," says Prof. Bailey, "in orchards which are bearing to add these materials in the shape of concentrated manures." The quickest results following the use of fertilisers will be seen upon sandy soils. Two or three years often elapse after the application of chemical manures to heavy lands before any decided results are observed. In other words clay soils ordinarily show quicker results from tillage operations than they do from the application of fertilisers. The fruit-grower should never rely exclusively upon chemical plant-foods, because they contain no humus, and the soil is apt to become hard and lifeless.

The importance of humus matter as an ameliorator of the soil is obvious, for when humus is absent sandy soils become too loose, hot, and leachy, and the plant-food gets washed away, while heavy clay soils bake in dry weather, and become hard and impervious to the fibrous roots.

In order that fruit may ripen and colour satisfactorily, the roots of the trees should be encouraged to luxuriate as near the surface of the soil as possible, so as to get all the benefit from the action of the sun's rays.

It has been found that diseased and unproductive conditions of Apricot, Nectarine, and Peach trees are largely due to an excess of silica in the soil, and a deficiency of nearly all the other mineral constituents. In other words, an unproductive condition indicates soil exhaustion, which is remedied by the application of suitable manures.

Manures Applicable to Strawberry Culture.

Strawberry-growers sometimes complain that when the plants forced in pots are grown with guano or other phosphatic manure, it is found that, although many blossoms are produced, they do not set, or if they do, the fruit is inferior in size and quality to the smaller quantity produced by less vigorous plants grown in poorer soil. There is no doubt that a small amount of kainit or other potash manure, added to the usual quantity of guano, would greatly improve the size, yield, and quality of the fruit.

For the growth of Strawberries the soil should be naturally fertile, deeply cultivated, and liberally manured every year. High manuring for this crop is an essential condition for successful growth, because not only has the fruit to be provided for, but there is a considerable drain upon the plants in the production

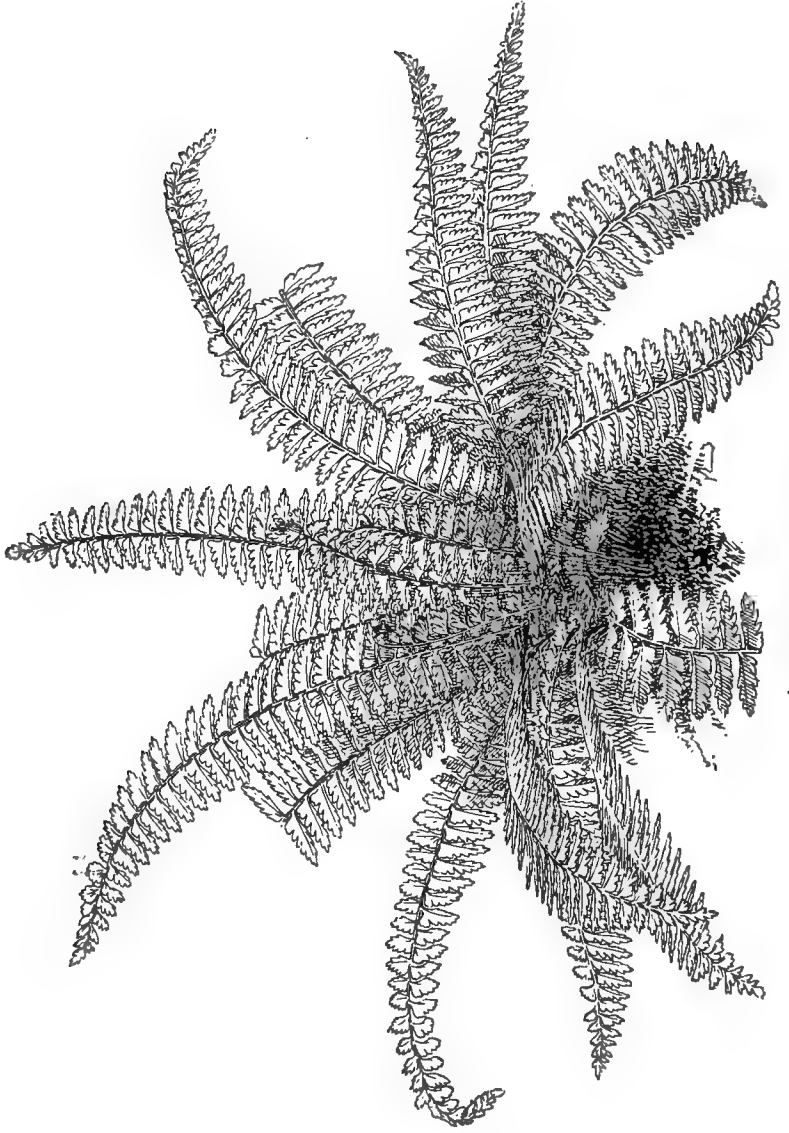
of runners. Then, again, the growing season of the Strawberry is short, and more especially the fruiting period.

During a comparatively brief time there is a large demand for immediately available forms of plant-food, a demand that must be met if the best results are to be obtained; and it may be stated that artificial fertilisers have a great advantage over farm-yard manure in the culture of Strawberries, because they can be varied in their constituents to suit the wants of the plants at each period of their growth, and according to the character of the soil at command.



COPRINUS COMATUS (SHAGGY CAP MUSHROOM).

A most delicious edible native mushroom, extremely fond of manure (hence the generic name), and frequently found in shrubberies and borders. It should be eaten in a young state, and before the inky black fluid, which characterises it at maturity, is emitted.



ASELENIUM FORMOSUM.



Appendix.

WITH a view to giving those who desire it a more extended choice of subject than the body of the work affords in some few chapters, the following additional species and varieties are included by way of Appendix. To economise space, certain frequently-recurring words have been contracted, such as l., leaves; fl., flowers; cr., crimson; sc., scarlet; car., carmine; yel., yellow; mag., magenta; dbl., double.

3.—ON FLORISTS' FLOWERS

(p. 43 to p. 92).

Auriculas—Show

Green - Edged—CHAMPION, JOHN GARRETT, SNITHERFIELD GREEN, and TALISMAN.

Grey-Edged—COLONEL CHAMPEYNS, RINGLEADER, SILVIA, and WILLIAM BROCKBANK.

White-Edged—DR. KIDD, HEATHER BELL, PRINCESS MAY, RELIANCE, and TRUE BRITON.

Selfs—LORD OF LORNE, PIZARRO, REV. CHARLES KINGSLEY, SIR LANCELOT, and VULCAN.

Carnations—Tree

COMUS, white. JEAN SISLEY, buff yel., with red suffusions. JULIAN, deep sc. PATROCLES, sc. PRIMROSE DAY, yel. SARDIS, pink. SCYLLA, pure white. SYLVANUS, purple. URIAH PIKE, cr. WINTER CHEER, bright sc. ZENOBIA, buff yel., edged cr.

— Show

Scarlet Bizarres—DUKE OF YORK, ROBERT MONK, and TOM POWER.

Crimson Bizarres—BRUCE FINDLAY, THADDEUS, and VIRGIL.

Pink and Purple Bizarres—MELODY, NIOBE, PRINCESS BEATRICE, SARAH PAYNE, and SQUIRE PENSON.

Purple Flakes—ADA, BEAUTY OF WOODHURST, FLORENCE NIGHTINGALE, PURPLE GEM, QUEEN VICTORIA, and SQUIRE WHITBOURN.

Scarlet Flakes—ALISEMOND, BAILEY JUNIOR, CERES, HUNTSMAN, RICHARD DEAN, and SCARLET KEET.

Rose Flakes—MAID OF ATHENS, ROSAMUNDI, ST. GATIEN, and TROUBADOUR.

— Picotees—White Ground

Red-Edged—DR. EPPS, ISABEL LAKIN, J. B. BRYANT, MRS. DODWELL, PRINCESS OF WALES, and VIOLET DOUGLAS.

Purple-Edged—ADMIRATION, AMY ROBSART, BARONESS BURDETT-COUTTS, MARY, MRS. MAY, and ZERLINA.

Rose- and Scarlet-Edged—BEAUTY OF PLUMSTEAD, CHARLES WILLIAMS, EDITH D'OMBRAIN, EUROPA, FAVOURITE, NORMAN CARR, PSYCHE, and VENUS.

ON FLORISTS' FLOWERS—*contd.*— **Picotees** (*contd.*) — **Yellow Ground**

EFFIE DEANS, ELDERADO, HARLEQUIN, HORATIO, MISS VIOLET, PRESIDENT CARNOT, THE GIFT, and XERXES.

— **Malmaison**

CALYPSO, soft pink, salmon centre. LADY GRIMSTON, pinkish white, with bright rose; very fragrant. LORD ROSEBERY, deep red; fragrant. LORD WELBY, deep cr. MARGOT, bright rose. NELL GWYNNE, pure white. TRUMPETER, deep sc.; sweet-scented.

Dahlias—Show

ARTHUR RAWLINGS, cr. COLONIST, chocolate and fawn. DUCHESS OF YORK, light yel., edged pink. DUKE OF FIFE, deep red. ECLIPSE, sc. GLOWWORM, sc. JAMES COCKER, purple. JOHN WALKER, white. MRS. GLADSTONE, pink. MRS. LANGTRY, cream, edged red. R. T. RAWLINGS, yel. WILLIAM POWELL, primrose. WILLIAM RAWLINGS, cr.-purple. YELLOW PET. ZELINDA, cr.-purple.

— **Fancy**

FRANK PEARCE, rose, cr. stripes. MATTHEW CAMPBELL, apricot, cr. stripes. MRS. J. DOWNIE, orange, sc. stripes. MRS. SAUNDERS, yel., tipped white. PEACOCK, maroon, tipped white. REBECCA, lilac, striped cr. REV. J. B. CAMM, yel., flaked red. T. W. GIRDLESTONE, lilac, flaked dark maroon.

— **Pompon**

ARTHUR WEST, cr. BACCHUS, cr.-sc. DOUGLAS, dark maroon. E. F. JUNGKER, amber-yel. EMILY HOPPER, deep yel. EURYDICE, delicate pink, edged purple. GEORGE BRINCKMAN, white. HYPATIA, amber, shaded fawn. ISABEL, orange-sc. MARTIAL, cr. NELLIE BROOMHEAD, mauve, lighter ground. NERISSA, rose. PHOEBE, orange. WHISPER, yel., edged bronze.

— **Cactus**

ALFRED VASEY, amber, shaded pink. ARACHNE, white, edged cr. BERTHA MAWLEY, bright red. BRITANNIA, pale salmon, bronzy tint. CHARLES WOODBRIDGE, cr. CINDERELLA, purple. COUNTESS OF GOSFORD, yel., shaded cinnamon. CYCLE, ruby-red. DELICATA, pink. FANTASY, light red. FUSILIER, salmon-red.

HARRY STREDWICK, maroon. LADY PENZANCE, yel. MRS. BARNES, primrose, pink shadings. MRS. WILSON NOBLE, salmon. REGULUS, rich cr. STARFISH, sc. TILLIE, salmon, pale rose shadings.

— **Decorative**

ARTHUR CHEAL, cr. AVALANCHE, white, tinted pink. CONSTANCE, pure white. COUNTESS OF PEMBROKE, lilac. GLARE OF THE GARDEN, sc. MILLIE SCUPHAM, deep orange. MISS WEBSTER, white. MRS. HAWKINS, sulphur. THE QUEEN, pure white. YELLOW A. W. TAIT, pure yel.

— **Singles—Selfs or Shaded**

AMOS PERRY, velvety - maroon. ANNIE HUGHES, yel. at base, rosy-pink outer florets. DEMON, nearly black. DONNA CASILDA, deep orange, shaded rose, maroon ring at disk. GOLDENLOCKS, rich yel. MISS ROBERTS, clear yel. POLLY ECCLES, satiny-fawn, cr. ring, yel. disk. ROSEBANK, cardinal red. THE BRIDE, white. W. C. HARVEY, orange-yel.

— **Singles—Fancy**

EMMIE, white. FOLLY, pale pink, margined bright red. FRED LESLIE, bright red. JACK SHEPPARD, yel., striped red. M.C.C., rich yel. NORTHERN STAR, red, edged deep buff. PHYLLIS, white, striped and flaked dark purple. VICTORIA, white, edged crimson.

— **Singles—Tom Thumb**

DAISY, cr. GOLDEN FAIRY, deep yel. HOOP LA, dark maroon, yel. ring. MAUD, deep sc. MIGNON, pink.

— **Singles—Cactus**

ALICE LEE, pink and white. AMY ROBSART, sc. DANDIE DINMONT, yel. LADY ROWENA, sulphur, shaded rose. MEG MERRILEES, yel. SIR WALTER, rose, orange ring. THE ABBESS, white.

Gladiolus—Gandavensis

ADMIRAL WALLIS, brilliant cr. ALFRED HENDERSON, vermilion. ANDROMEDA, yel., lilac shadings. BENJAMIN HARRISON, orange-cerise. CIVIS, rose-pink, striped violet. COUNTESS CRAVEN, rose, flaked cr. DR. WOODMAN, salmon, flaked and blotched pink. DUCHESS OF EDIN-

ON FLORISTS' FLOWERS—*contd.*

BURGH, purplish-rose, striped pink. JAMES KELWAY, cr., edged maroon. LORD W. BERESFORD, amaranth-purple. MRS. LANGTRY, white, tinged purple. PRINCESS ROYAL, pink, rose mottlings. SHIRLEY HIBBERD, purplish-cr. WILLIAM KELWAY, sc.-cr.

— **Childsii**

AUREA SUPERBA, orange - sc., mottled white. COLUMBIA, sc., flaked maroon. EARL CADOGAN, deep sc. KITCHENER, sc., striped yel. MAJOR DICKIE, sc.-cr. TROS, sc., white lines. WM. FALCONER, pink, spotted cr. and white.

— **Nanceianus**

CARLTON, bright purple. COLONIAL SECRETARY, sc., spotted. HALL CAINE, yel., spotted. J. G. CLARKE, salmon-rose on a cream ground. LORD CURZON, cerise, with yel. centre. MAURICE DE VILMORIN dark blue, purple blotches. ROBERT BONNING, sc., white centre.

— **Lemoinei**

ABIA, cream, with yel. lip. BEAUTY, white, violet spotted. EPEUS, orange-red, spotted. HOLLAND, soft pink, car. spotted. SANT, deep yel. XENIA, rosy-lilac and yel., dark blotch.

Hollyhock

ALBA SUPERBA, white. ALETHA SMITH, soft pink. ALFRED CHATER, mottled rose. AMARANTH, deep pink. BLACK KNIGHT IMPROVED. CRIMSON QUEEN. FIRE KING, bright red and heliotrope.

Pansies—Fancy

ANDREW STRUTHERS, CONSTANCE STEEL, DAVID G. M'KAY, JEANIE R.

KERR, JOHN ROBERTSON, LORD SALISBURY, MISS STIRLING, MRS. J. CURRIE, MRS. M. CUTHBERTSON, MRS. W. STEELE, PRINCESS, and SIR JOHN WATSON.

— **Show**

AGNES KAY, ALEX. BLACK, ALLAN STEWART, A. ROLLAND, BESSIE SMELLIE, BOBBY HARPER, BUSBY BEAUTY, COL. STIRLING, DR. INCH, G. C. GORDON, GRACE DARLING, J. E. MARTIN, LILYBANK GEM, MAGGIE BENSON, MARY MITCHELL, MRS. WILSON, and ROBERT M. WENLEY.

Picotees. See "Carnations."**Ranunculus—Persian**

COMMODORE NAPIER, yel., tipped purple. FIREBALL, sc. MONT BLANC, white. QUEEN CAROLINE, white, striped pink.

— **Turkish**

GRANDIFLORA, pink. ROMANO, sc. SOUCIS DORÉ, orange. VIRIDIFLORA, orange-sc., green centre.

Violas

A. J. ROWBERRY, deep yel., rayless. ARCHIBALD GRANT, deep blue. BORDER WITCH, pale blue. COUNTESS OF KINTORE, deep purple, edged white. CROWN JEWEL, dark purple, edged white. HAMLET, a combination of purple, dark brown, and bright orange. LAVENDER KING. LUCELLA GOLD, pure white, edged deep mauve. NORAH MAY, silvery-white, pale blue rays. ULIDIA, white, edged mauve. WHITE EMPRESS, rayless.

4.—ON ROSES

(p. 93 to p. 135).

Tea

ADAM, blush-rose, very sweet scent. AMELIE POLLONNAIS, satin-rose; new. BORONNE ADA, creamy-white; new. BONAMOUR, bright red; new; very promising. CHRISTINE DE NOUE, deep cr. CLEOPATRA, pale pink. COMTESSE DUSY, pure white. EMPRESS ALEXANDRA OF RUSSIA, bronzy-salmon; new. ENCHANTRESS, soft creamy-white; new. G. NABON-

NAND, soft rose. HATCHET EFFENDI, yel., shaded soft rose. HOMER, rosy-white. ISABELLA SPRUNT, sulphur-yel. ISABELLA RIVOIRE, soft salmon-rose; new. JEAN PERNET, bright yel. JEANNE GUILLAUMEZ, red, shaded salmon. M. ADA CARMODY, white, shaded rose; new. MADAME DE WATTEVILLE, white, shaded salmon. MADAME FALCOT, apricot - yel. MADAME LAMBARD, salmon - pink.

ON ROSES—*contd.*

MADAME RENE GERARD, coppery-yel. MADAME VILLERMOZ, white, shading to salmon. MEDEA, lemon colour. NARCISSE, soft yel. PRINCESS ALICE DE MONACO, creamy-yel. RUBENS, white, shaded rose. SOUVENIR DE CATHERINE GUILLOT, coppery-car. SOUVENIR D'ELISE VARDON, creamy-white. SOUVENIR DE MADAME SABLEYROLLES, rosy-salmon. SYLPH, white, tinted with rose.

Climbing Tea

BOUQUET D'OR, salmon-yel. CLIMBING PERLE DES JARDINS, pure yel. EMILY DUPUY, pale fawn. GROSSHERZOG ERNEST LUDWIG, the red MARECHAL NIEL. KAISERIN FRIEDRICH, the colour of Gloire de Dijon. MADAM MOREAU, coppery yel. VALENTINE ALTEMANN, pure white.

Hybrid Tea-scented

ANTOINE RIVOIRE, rosy-flesh. AUGUSTINE GUINOISSEAU, a white La France, AURORA, salmon pink; new. BEAUTE LYONNAISE, white, shaded with yel. CHARLOTTE GILLET, ivory white. CLARA WATSON, salmon pink. GRUSS AN TEPLITZ, bright scar. HELENA CAMBIER, salmon rose. JOSEPHINE MAROT, white, shaded rose. L'INNOCENCE, pure white. LADY HENRY GROSVENOR, flesh. MADAME EUGENE BOULLET, bright yel. MADAME JULES FINGER, creamy white. MARJORIE, white suffused with pink. MRS. W. C. WHITNEY, deep pink. MARQUISE LITTA, car.-rose. PRINCESS BONNIE, rich cr.; semi-double. SOUVENIR DE WOOTTON, rosy-red. THE METEOR, deep cr. W. F. BENNETT, cr. WHITE LADY, creamy-white.

Hybrid Perpetual

ALPHONSE SOUPERT, bright rose. AUGUSTE RIGOTARD, brilliant red.

BACCHUS, cr. BARON HAUSSMANN, dark red. BESSIE JOHNSON, pale blush. BRILLIANT, rich sc.-cr. CHARLES DICKENS, magenta-rose. CRIMSON QUEEN, velvety - cr. DOWAGER DUCHESS OF MARLBOROUGH, pure rose. DUC D'ORLEANS, deep red. DUCHESS OF BEDFORD, cr.-sc. DUKE OF ALBANY, deep cr. ELLA GORDON, deep cherry. ELISE BELLE, white, faintly shaded rose. EXPOSITION DE BRIE, pale red. FRANCISQUE RIVE, cerise, shaded car. GLOIRE DE L'EXPOSITION DE BRUXELLES, purplish-amaranth. GRAND MOGUL, deep cr. HELEN KELLER, rosy-cerise. INIGO JONES, dark rose. JULES MARGOTTIN, bright cherry. LADY SHEFFIELD, rosy-cerise. LA DUCHESS DE MORNAY, delicate rose. LORD BACON, rich cr. LORD MACAULAY, sc.-cr. LOUIS VAN HOUTTE, blackish-cr. MADAME BOIS, bright rose. MADAME CHARLES WOOD, vinous-cr. MADAME JOSEPH BONNAIRE, silvery-rose. MADAME LACHARME, white, flushed rose. MADAME VERRIER CACHET, bright rose. MDLLE. MARIE RADY, bright red. MAGNA CHARTA, rich pink. MARCHIONESS OF LORNE, rose; MARQUISE DE CASTELLANE, rich rose. MAURICE BERNARDIN, vermilion. MRS. R. G. SHARMAN CRAWFORD, rosy-pink. PIERRE NOTTING, blackish-red. PREFET LIMBOURG, velvety-red. PRIDE OF REIGATE, spotted, and striped white. QUEEN OF QUEENS, soft pink. QUEEN OF WALTHAM, rosy-cherry. RED DRAGON, cr. REV. ALAN CHEALES, pure lake. SALAMANDER, sc.-cr. SILVER QUEEN, silvery-blush. SPENSER, satin-pink. ST. GEORGE, cr. T. B. HAYWOOD, cr.-sc. TOM WOOD, red. TRIOMPHE DE CAEN, velvety-purple. WALTHAM STANDARD, deep car.; new. WILLIAM WARDEN, pink. XAVIER OLIBO, velvety-black.

5.—ON CHRYSANTHEMUMS

(p. 136 to p. 165).

Japanese

ALBANI, deep pink, sweetly scented; 4ft. AMIRAL AVELLAN, fine golden-yel.; 4ft. AMY SHEA, ruby-red, back of petals coppery; 4ft. ANTOINETTE, pure white; 4½ft.

BARON REICHER, apricot-yel.; 5ft. BARON TAIT, clear yel.; 5½ft. BELLE DES GEORGES, rich rosy pearl; 4ft. C. F. PAYNE, yel., shaded with red; 4½ft. CHAS. BLICK, rich yel.; 6ft. CHAS. SHRIMPTON, cr.-brown, 4½ft.

ON CHRYSANTHEMUMS—*contd.*

CHATSWORTH, white, shaded with rose; 5ft. COL. W. B. SMITH, golden-bronze; 5ft. CROWN OF GOLD, deep yellow; 5ft.; late. DUKE OF YORK, deep silver-pink, 5½ft. EDA PRASS, pearly-pink; 5ft. ELLA CURTIS, golden-yellow; 5ft. EMILY SILSBURY, pure white, 4ft.; rather early. EUTERPE, rosy-cerise; 4ft. FASHION, yellow; 4ft. GEORGE SEWARD, deep orange; 4ft. GEORGINA PITCHER, soft lemon-yellow; 4ft. GERTRUDE SALTER, rich rosy-lilac. HELEN BLOODGOOD, lovely clear pink; 6ft. INTERNATIONAL, salmon-rose, 5½ft. JOHN SHRIMPTON, cr.-scar.; 3ft. KING OF BUFFS, buff; 5ft.; LADY BYRON, ivory-white, 6ft.; LORD BROOKE, bronzy-yellow; 4½ft. LOUISE, flesh-pink; 3ft. MARY MOLYNEUX, lavender-pink, 6ft. Mlle. M. HOSTE, soft white, faintly flushed purple; 4ft. MODESTO, bright yellow; 5ft. MONS. E. ANDRE, terra-cotta; 4ft. MONS. JOANNY MOLIN, dark cr.; 6ft.; late. MRS. C. BLICK, pure white, 5ft. MRS. E. W. CLARK, deep purple, sweet scented, very late; 4ft. MRS. J. LEWIS, white; 5ft. MUSTAPHA, white; 4ft. NEVA TRICHMANN, cr.; 5ft. OCEANA, pure yellow; 5ft. PRIDE OF STOKELL, cr., reverse of petals golden; 5ft. PURPLE EMPEROR, purplish-maroon 4ft. REINE D'ANGLETERRE, rosy-mauve; 4ft. ROSE WYNNIE, bluish; 6ft. SECRETAIRE FIERENS, deep cr.-red; 5ft. SIMPLICITY, pure white; 5ft. STORY OF THE PACIFIC, rosy-pink; 2½ft. SUNSTONE, apricot, very pretty; 6ft. SURPASSE AMIRAL, bright yellow; 4ft. S. W. CHILDS, deep cr.; 5ft. THE CONVENTION, terra-cotta; 4ft. THOMAS WILKINS, deep yellow. W. BARDNEY, velvety-cr.; 6ft. WESTERN KING, pure white; 5ft. W. H. LINCOLN, bright yellow; 3½ft. WM. SEWARD, rich cr.; 5ft. W. TOWERS, canary-yellow; 4ft. W. TRICKER, soft rose; 4ft. W. WRIGHT, pink, shaded with yellow; 5ft.

Incurved

ADELE BIFFI, light pink; 3ft. AMI HOSTE, buff, shaded with car.; 5½ft. BARBARA, deep amber; 3½ft. BROOKLEIGH GEM, lilac; 5½ft. BYNUM SCHILTGES, dark red; 5ft. CHARLES GIBSON, bronze-red; 4ft. COUNTESS OF WARWICK, bluish; 4½ft. C. S.

BATES, pure old gold; 4ft. ERNEST CANNELL, deep fawn; 5ft. GENERAL MAURICE, rose and cream; 4½ft. JARDIN DES PLANTES, deep orange; 4ft. LADY ISABEL, lilac-blush; 6ft. L. M. DE LA DROME, golden-yellow; 5ft. MADAM FERLAT, white; 4ft. MAMA PERFECTION, pure white; 3ft. MDLLE. FAURE, creamy-white; 5ft. MRS. AIRDREE, white, shaded with rose; 6ft. MRS. N. DAVIS, yellow; 4ft. MRS. N. MOLYNEUX, ivory-white; 4ft. MRS. R. KING, yellow; 4½ft. MRS. S. OWEN, reddish-brown; 6ft. MRS. W. C. EGAN, lilac-pink; 5ft. MR. W. HARVEY, creamy-white; 4ft. PEARL PALACE, pure white; 4½ft. ROBERT VERDET, yellow, shaded with red; 5ft. ROSE OWEN, rosy-pink; 6ft. VIOLET TOMLIN, purplish-violet; 6ft. W. NASH, yellow-bronze; 5½ft. YVONNE DESBLANE, pure white; 4ft.

Japanese (Early-flowering)

ALEX. DEFOUR, deep purple; 2½ft. AMBROSE THOMAS, cr.-purple; 3ft. ARTHUR CREPEY, soft yellow; 3ft. BOUQUET FÊTIVAL, rosy-purple; 2½ft. BRONZE PRINCE, old gold; 3ft. CHEVALIER ANGE BANDIERA, rosy-pink; 3ft. EDITH ROWBOTTOM, canary-yellow; 3ft. FRANCOIS VUILLERMET, rosy-purple; 2ft. GLOIRE DE MEZIN, chestnut-red; 4ft. IVY ELPHIC, white, tinged with pink; 2ft. IVY STARK, pale orange; 2½ft. LA PERLE, pure white; 2ft. LUTEA, yellow; 3½ft. MADAME GAJAC, mauve; 2ft. MADAME L. COLLIER, orange-yellow; 2ft.; MADAME LOUIS LIONNET, salmon-pink; 2½ft. MDLLE. GUINDUDEAU, pink; 2½ft. MDLLE. SABATIER, purplish-cr.; 4ft. MRS. BURRELL, soft yellow; 2½ft. ORANGE CHILD, deep yellow; 3½ft.

Pompon (Early-flowering)

BLUSHING BRIDE, lilac; 2½ft. CRIMSON PRECOCITE, cr.; 2½ft. DODO, canary-yellow; 1ft. FLORA, golden-yellow; 1½ft. ILLUSTRATION, bluish-white; 1½ft. LITTLE BOB, brick-red; 2ft. MADAME GABUS, lilac and white; 2ft. MAUD PITCHER, bronze-yellow; 2ft. MIGNON, deep yellow; 1½ft. MONS. A. HERLANT, red; 2ft. NANUM, bluish-white; 2ft. ST. CROATS, pale pink; 2ft. WHITE ST. CROATS, white; 2ft. YELLOW GEM, yellow; 2½ft.

6.—ON BEDDING PLANTS.

Summer Bedders (p. 169 to p. 183).

Begonia

BAVARIA, rosy-violet fl. BERTINII, bright vermilion fl. CARRIERII, pure white fl. L'AVENIR, fl. reddish-sc., dbl., of Multiflora type. SEMPERFLORENS VERNON, dark bronze l., brilliant red fl. s. ZULU KING, l. very dark red; fl. bright sc. SURPASSE DAVISI, dbl., very dark red fl.; bronzy l.

Calceolaria

BIJOU, bronzy cr. fl., very free flowering. CANARIENSIS, primrose-yel. fl. CRIMSON QUEEN, bright cr. fl. INVINCIBLE, dwarf compact habit; very large fl. in enormous trusses, canary-yel. PRINCE OF WALES, large bright cr. fl. RUGOSA, yel.; 1ft.

Gaillardia

ADDISON, cr., edged with gold. GEORGE KELWAY, large cr. gold-edged fl. JAMES KELWAY, very large dazzling sc. with gold edge. MR. PITCHER, deep fiery cr. with narrow gold edge. OLIVER WENDELL HOLMES, richly coloured cr. and gold. ORMONDE, cr. edged with yel. SPLENDIDISSIMA PLENISSIMA, dbl., cr. with gold edge; an excellent bedder. ST. BLAISE, blood-red, slightly edged yel. VIVIAN GREY, yel.-fringed fl. WILLIAM KELWAY, large brilliant cr., gold-edged.

Gaura

LINDHEIMERI, long branched spikes of rose and white fl.; 3ft.; June to August.

Heliotrope

BOUQUET PARFUMÉ, deep violet fl., white eyes. LADY MOLESWORTH, dark purple fl. LA LORRAINE, reddish-

violet, yel. eye. MADAME A. SOMERSET, light blue. MADAME BRUANT, bluish-mauve with white centre.

Marguerite, or Paris Daisy

ELEGANS, large white fl. with brownish-yel. centre. FEU D'OR, large golden-yel. fl.; 2ft. GOLDEN GEM, large pure yel. fl. HALLERI, large white Daisy-like fl. KELWAY'S GEM, dwarf, with shining yel. fl. REVE D'OR, yel. fl.

Mimulus

CUPREUS PRINCE BISMARCK, rich deep velvety cr. fl.; 6in. FIRE KING, fl. yel., margined fiery sc. LEWISI, pale purple; 1ft.; June to September. TILLINGI, fine golden-yel.; 1ft.; May to October.

Pelargonium

CANDACE, rich deep cr. fl. FLAMINGO, sc.-shaded rose. JAMES KELWAY, vivid sc., zonal. JOHN FORBES, rich cr.-sc. fl. JOHN GIBBONS, orange-sc., zonal. MRS. HOLDEN, deep rose, upper petals blotched white. MRS. TURNER, purplish - pink; vigorous. WHITE CLIPPER, white; free flowering.

Petunia

COMPACTA ROSE SUPERBE, of bushy growth, brilliant rose-coloured fl.; 1ft. COUNTESS OF ELLESMERE, rose with white throat; 9in. DR. DANIEL, cr. maroon, white throat. ECLIPSE, bright red with white edge. HERCULES, rosy-lilac, veined violet. MRS. S. HIBBERD, white, striped from centre with maroon. SNOWBALL, dwarf, satiny-white fl. SPITFIRE, bright purple-shaded cr.

Sub-Tropical Bedders (p. 183 to p. 191).

Abutilon

BOULE DE NEIGE, white fl. DARWINI MAJUS, bright orange fl., deeply veined. D. TESSELETUM, l. mottled with yel. EMPEROR, fl. rich purple. LADY OF THE LAKE, rich pink fl. SELLOWIANUM MARMORATUM, large Maple-like l., mottled with bright yel. YELLOW PRINCE, rich golden-yel. fl.

Acanthus

LONGIFOLIUS, large spikes of pink fl.; 2ft. to 3ft.; June and July. MOLLIS, heart-shaped l., large fl. in long white spikes; 3ft.; July to September. M. LATIFOLIUS, a robust form of MOLLIS, also known as LWSITANICUS. NIGER, purplish-white; shining green l.; July and August. SPINOSISSIMUS, fl. rose, on large spike; l. spiny, spines

SUB-TROPICAL BEDDERS—*contd.*

white; 3½ ft. SPINOSUS, fl. purplish; 3 ft. to 4 ft.

Agave

AMERICANA, l. 30 to 40 in a rosette, glaucous-green, 3 ft. to 4 ft. long, with a dark brown point; several varieties are grown. A. VARIEGATA, l. dark green in centre, broadly margined with rich yel. FILIFERA, l. 60 to 100 in a dense rosette, edges splitting off into wiry grey threads. SCOLYMUS, l. 20 to 30 in a rosette, very glaucous, terminating in a sharp spine. VIVIPARA, l. 20 to 50, broad at middle, tapering to sharp point. YUCCÆFOLIA, l. 20 to 40, narrow and recurved, pale band down the centre.

Aralia

CHINENSIS, l. leathery, woolly on both sides when young; fl. white in terminal panicles; 5 ft. to 6 ft. EDULIS, l. lower ones pinnate, of three or five leaflets, hairy, spineless; 4 ft. to 6 ft. SIEBOLDI, large dark green shining l. SPINOSA, stem prickly, forming umbrella-like head; l. pinnate, deciduous; 8 ft. to 9 ft.

Canna

ALPHONSE BOUVIER, fine light red fl. CHILDSI, broad yel. petals, spotted with cr.; 3 ft. DUCHESS OF YORK, pale yel., blotched with deep red, in large trusses. VICTOR HUGO, dark green l. bordered with violet; large reddish-sc. fl.

Cordyline

AUSTRALIS, l. 2 ft. to 3 ft. long, striated with numerous parallel veins; stem stout, attaining a height of 30 ft. or 40 ft. in native country. INDIVISA, l. 2 ft. to 4 ft. long, narrow, tapering to a point, dark green. I. ATRO-PURPUREA, dark purplish l. I. VEITCHII, sheath and back of mid-rib deep red. STRICTA, stem slender, attaining a height of from 6 ft. to 10 ft.; l. narrow.

Datura

CHLORANTHA FLORE PLENO, large fragrant dbl. yel. fl.; 2 ft.; August and September. KNIGHTII, large dbl. white pendulous flowers. SANGUINEA, fl. solitary, tube orange-yel., green towards base; l. covered on both sides with soft white hairs; 4 ft. to 8 ft.

Dicksonia

ANTARCTICA, stem several feet high, surmounted by a head of long tri-pinnate l.

Dracæna

CONCINNA, l. narrow, with purplish-red margins. DRACO, l. long and narrow in a crowded head. GOLDIENANA, irregularly banded with dark green and silvery-grey, of a yellowish shade.

Grasses (Tall)

ARUNDO CONSPICUA, fl. silky-white on large drooping racemes; 5 ft. to 7 ft. A. DONAX, large compact panicles of reddish but ultimately white fl. ERANTHUS RAVENNÆ, dense tufts of handsome violet-shaded l.; 5 ft. to 6 ft. EULALIA JAPONICA ZEBRINA, long narrow green l., 3 ft. long, with bars of yel. GYNERIUM ARGENTEUM, narrow glaucous-green l., 5 ft. long, forming dense tufts; fl. whitish, in dense silky panicle. ZEA MAYS, l. broad and flat; 3 ft. M. VARIEGATA, l. striped with white.

Gunnera

MANICATA, l. several feet across, with long prickly leaf-stalks. SCABRA, large wrinkled l.

Heracleum

GIGANTEUM, massive l.; spreading white fl.-heads; 6 ft. to 8 ft. SETOSUM, l. ternate, five-lobed. SIBIRICUM, l. pinnate, with rough hairs; fl. yellowish, in large umbels; 5 ft. to 6 ft.

Hibiscus

AFRICANUS MAJOR, fl. cream with rich brown centre and golden stamens; annual; 2 ft.

Musa

ENSETE, l. of a fine bright green, with broad bright cr. mid-ribs, several feet long.

Palms

COCOS WEDDELIANA, gracefully-arched l., ½ ft. to 3 ft. long; pinnæ (leaflets) long and narrow. C. FORTUNEI, half-orbicular leaves, 1½ ft. in diameter. CHAMÆROPS HUMILIS, usually from 3 ft. to 6 ft., with heads of fan-shaped l. KENTIA BELMOREANA, a well-known pinnate-leaved Palm. LATANIA BORBONICA, large

SUB-TROPICAL BEDDERS—*contd.*

fan-shaped l. *SEAFORTHIA ELEGANS* (*PTYCHOSPERMA CUNNINGHAMIANA*), large pinnate l.

Yucca

ANGUSTIFOLIA, numerous narrow stiff l., 1½ft. to 2ft. long; fl. stem

3ft. to 4ft. long, terminating in a spike of greenish-white fl. *FILAMENTOSA*, creamy-white fl.; 3ft.; July and August. *GLORIOSA*, l. in a dense rosette; fl. white, tinged outside with rose; July and August.

Carpet Bedders (p. 191 to p. 203).**Cerastium**

ALPINUM, l. with silky hairs; fl. white; June and July. *BIEBERSTEINI*, fl. white; 6in.; May to July. *GRANDIFLORUM*, woolly green l., profusion of snowy-white fl. *PENNSYLVANICUM*, l. silvery-white.

Herniaria

GLABRA AUREA, a handsome golden variety.

Mentha

AUREUM, yel. l.; 3in.

Nepeta

GLECHOMA VARIEGATA, dwarf trailing, with handsome variegated l.

Pyrethrum

LACINIATUM, a variety of the Golden Feather with beautifully cut golden l.

Sedum

ACRE AUREUM, l. and tips of shoots bright golden-yel. *ALBUM*, fl. white; fl. stems pinkish. *BREVIFOLIUM*, white fl.; 3in. *COMMOLI*, 4in. *PALLIDUM*, blue-grey l. *RUPESTRE*, l. tinged with red. *SPATHULIFOLIUM*, yel. fl.; 6in. *TERNATUM*, white fl.; 6in.; April and May.

Thymus

CITRIODORUS AUREUS, golden-yel. l.

Spring Bedders (p. 203 to p. 208).**Alyssum**

ALPESTRE, large golden-yel. fl.; 6in.; April and May. *GEMONENSE SULPHUREUM*, pale lemon-coloured fl.; 6in.; suitable also for rockery. *MONTANUM*, yel. fl.; 6in.; June. *SAXATILE VARIEGATUM*, l. variegated. *SERPYLIFOLIUM*, fl. pale yel.; 3in. to 4in.; April to June.

Daisy

MONSTER, very large fl., red, speckled white. *ROB ROY* (*RUBENS*), cr.-sc. fl. *ROSY GEM*, rose-coloured fl. *SNOWFLAKE*, pure white. *THE BRIDE*, large dbl. snowy-white fl. on long stalks.

Iberis

GIBALTARICA HYBRIDA, fl. creamy-white, changing to rosy-purple; 1ft.; May and June. *LITTLE GEM*, dwarf

bushy habit; fl. pure white. *SEMPERVIRENS SNOW QUEEN*, compact habit; large pure white fl.; 9in. *UMBELLATA*, fl. usually purplish but very variable; 6in. to 12in.; May and June; numerous varieties.

Lamium

AUREUM, golden-coloured fl.; 1ft. *GALEOBDELON AUREUM*, golden-bronzy l. *MACULATUM*, l. dark with white stripe; fl. purple; May and June.

Phlox

DIVARICATA (*CANADENSIS*), soft blue; 1ft.; April to June. *REPTANS*, deep rose; 6in.; April to June. *SUBULATA NELSONI*, sheets of snowy-white fl.; 6in.; April and May. *VIVID*, brilliant rose, with car. centre; 6in.

7.—ON ANNUALS AND BIENNIALS.**Hardy Annuals** (p. 212 to p. 240).**Adonis**

AUTUMNALIS, fl. blood-red, with dark centre; 1ft.; May.

Argemone

GRANDIFLORA, handsome glaucous l.; fl. snowy-white, with golden centres;

HARDY ANNUALS—*contd.*

2ft.; July. HUNNEMANNII, golden-yel.; 2ft.

Asperula

AZUREA SETOSA, light blue heads of sweet-scented fl.; 1ft.; June to August.

Athanasia

ANNUA, yel. everlasting fl.; 1ft.; July.

Calandrinia

GRANDIFLORA, greyish l., rose-coloured fl. with golden anthers; 1ft.; July and August. NITIDA, fl. rose-coloured; 6in.

Centaurea

AMERICANA, rosy-lilac fl.; 1½ft.; August. CYANUS CYANOIDES, rich blue, 6in. MOSCHATA, fl.-heads purple; 2ft.

Chrysanthemum

CARINATUM ALBUM, fl. white, with inner ring of yel., and dark centre. C. ATROCOCCINEUM, deep sc. C. AUREUM, bright yel., with dark centre. C. PURPLE CROWN, golden l., fl. purplish-cr., with inner ring of gold. C. PURPLE QUEEN, cr.-purple fl., with yel. ring; about 1½ft.; middle of summer. C. SCARLET PRINCE, fl. velvety-sc., with a golden ring, semi-dbl.; 1ft. C. W. E. GLADSTONE, rich cr.; 1½ft. SIBTHORPII, bright yel. fl.; 1½ft.

Clarkia

ELEGANS PURPLE KING, dark car.; 2ft. E. SALMON QUEEN, salmon shaded with white. E. WHITE QUEEN, pure white; 2ft. INTEGRIPETALA, MRS. LANGTRY, rose, with broad white margin; 1ft.; many varieties.

Coreopsis

BICOLOR ATROSANGUINEA, dark velvety maroon fl. B. GRANDIFLORA, golden fl., with sc. centre; 2ft. B. NANA, yel. fl., with cr. centre; 1ft. B. NIGRA NANA, velvety cr. BURRIDGII, fl. dark sc., edged yel.; 2ft.; August.

Eschscholtzia

ALBA, creamy-white. CALIFORNICA, clear yel. Poppy-like fl.; 1ft.; middle of summer. CROCEA, orange fl. MANDARIN, orange-sc. and gold. TENCIFOLIA, primrose-coloured; 6in.

Gilia

DICHOTOMA, large fl. of purest white; 8in. INCONSPICUA, fl. violet or purple; 9in. to 12in.; August. LINIFOLIA, fl. white, solitary; 1ft. MULTICAULIS, fl. blue; 1ft.

Godetia

GENERAL GORDON, deep rich cr., with light centre; 1ft. GLORIOSA, deep blood-red. MARCHIONESS OF SALISBURY, glowing cr., with broad white margin. WHITNEYI BRILLIANT, rich glittering cr.; 1ft.

Gypsophila

ELEGANS ALBA, white; 1½ft. FASTIGIATA, fl. pale red; 1ft.; July. PERFOLIATA, fl. pink; 1½ft. to 3ft.; July. REPENS, fl. white or pale rose; 6in.; July to September. STEVENII, fl. white; 1ft. to 2ft.; July.

Helianthus

GOLDEN BOUQUET, numerous small golden fl.; 3ft. HUNGARIAN GIANT, large flowered; 7ft. to 8ft. MACROPHYLLUS, dark green l.; yel. fl.; 6ft. to 7ft. UNIFLORUS, golden-yel. fl., with dark centre; 8ft.

Malva

CRISPA, fl. white, pale purple at tip; 2ft. to 5ft.; June. MAURITIANA, fl. deep purple; 4ft. to 6ft.; June. ZEBRINA ATRO-RUBENS, rose-coloured, veined with dark cr.; 3ft.; July.

Mignonette

GARAWAY'S WHITE, fl. white, in long racemes; GOLDEN QUEEN, fine heads of fl.; 1ft. MACHET, dwarf and compact; large fl.-heads of rich colour; 9in. MILES' SPIRAL, fine light-coloured heads; 1ft. PARSON'S WHITE, pure white heads; 1ft. VICTORIA CRIMSON, large heads of fine colour, deep red fl., compact; 6in.

Omphalodes

LINIFOLIA, greyish l.; pure white fl.; 6in.; June to August.

Salvia

BLUE BEARD, fl. in bluish-purple heads, useful for cutting; 1ft.; July and August. HISPANICA, blue fl.; 1ft. to 2ft.; June. HORMINUM, fl. purple; 1½ft.; June.

HARDY ANNUALS—*contd.***Saponaria**

CALABRICA, fl. rose; 6in. to 12in.; August. C. ALBA, fl. white; 6in. SCARLET QUEEN, deep rosy-car.; 6in. VACCARIA, fl. red; 1ft. to 2ft.; July.

Scabiosa

BLACK KING, dark cr.; 2ft. GOLDEN KING, orange fl. SNOWBALL, pure white dbl. fl.; 2ft. VELVETY BLOOD-RED, 1½ft.

Half-hardy Annuals (p. 240 to p. 255).**Abronia**

ARENARIA MACROPHYLLA, Verbena-like heads of sweet-scented yel. fl.; trailing; July and August. UMBELLATA, rosy-pink fl., sweet-scented. U. GRANDIFLORA, deep rose-lilac fl.

Alonsoa

ALBIFLORA, fl. pure white, with yel. eye; 1½ft. to 2ft. CAULIATA, fl. sc.; 1ft.; June. LINIFOLIA GRACILIS, graceful l.; orange-sc. fl.; 1½ft.

Amarantus

BICOLOR RUBER, l. cr.-sc. striped with green; 1ft. HENDERI, fl. rosy-car.; 3ft. SALICIFOLIUS, long graceful l. of bright orange-red; 3ft. S. PRINCESS OF WALES, l. car., orange-green, and bright yel.; 3ft. SANGUINEUS, fl. purple; l. blood-red; July.

Anagallis

LILACINA, lilac; 1ft.; May. LINIFOLIA CÆRULEA, intense blue; 6in. L. EUGENIE, blue fl., margined white. PARKSII, red fl.

Arctotis

CALENDULACEA, orange-coloured Daisy-like fl.; 6in.; July and August. C. SULPHUREA, fl. sulphur-yel.

Aster (China)

GOLD-QUILLED YELLOW KING, intense yel. fl., full and beautifully quilled. JEWEL, globular fl. with incurved petals, of various colours; 1½ft. LADY-IN-WHITE, beautiful white fl., with overlapping petals; 15in. MINIATURE BOUQUET, good for edgings, &c.; numerous small well-formed fl. of various colours; 9in. OSTRICH FEATHER, of branching habit; large snowy-white fl., with curled and twisted petals; 1ft. RAY, white and rose fl., having long thread-like quilled petals; 1½ft. TRIUMPH, deep red, striped white; of compact habit; Pæony-like fl.; 1ft.; also a white variety.

Aster

SINENSIS, beautiful single Aster, forming branching bushes; fl. 3in. across, of a delicate lilac, with yel. centre; 15in.

Aubergine

Handsome in fruit; white, sc., purple, &c.; 1½ft.

Bidens

ATROSANGUINEA, composite plant; cr. fl. FERULÆFOLIA, fl. yel.; 2ft. GRANDIFLORA, beautiful yel. fl.; 1½ft. STRIATA, ray florets white, disk yel.; 2ft. to 3ft.

Capsicums

Ornamental plants, bearing showy, handsome fruits, of various colours; 1½ft.

Cuphea

CYANEA, fl. yel. and red; 'July. JORULLENSIS, fl. red; 2ft. LANCEOLATA, fl. bluish; 1½ft; July. L. ALBA, white; free flowering. MINIATA, l. covered with white bristles; fl. sc.; 1ft.; June to September. PINETORUM, fl. cr. or deep purple; 1½ft.; July.

Impatiens

AMPHORATA, fl. pale purple, speckled with rose-red; August. CANDIDA, fl. white; 6in. HYBRIDA NANA, fl. pale rose to cr.; 1ft. ROYLEI, branching heads of fl., white to purple; 5ft. to 6ft.; August. SULTANI, very free-flowering, sc.; 1½ft.; June to September.

Marigold

AFRICAN QUILLED, 1ft. AUREA FLORIBUNDA, golden-yel.; 9in. LEGION OF HONOUR, large single fl., golden-yel. with dark cr. blotches; 9in.

Nicotiana

ACUTIFLORA, fl. pure white; 1ft. to 2ft. COLOSSA, large deep green l.; 5ft.

HALF-HARDY ANNUALS—*contd.*

GIGANTEA PURPUREA, purple fl.; 4ft. **SUAVEOLENS**, white fl., sweetly scented morning and evening; 2ft.; July and August.

Palava

FLEXUOSA, rosy-pink Mallow-like fl.; 1ft.; June. **RHOMBIFOLIA**, fl. rose-coloured.

Perilla

ATROPURPUREA LACINIATA, deep brown lacinated l.; useful for summer bedding. **OCYMOIDES**, fl. white; July.

Phlox

DRUMMONDI DEFIANCE, cinnabar-red; 6in. **D. SNOWBALL**, pure white; 6in. **D. TRIUMPH**, compact, brilliant sc.; 1ft.

Rhodanthe

MACULATA, rosy-purple with cr. circle; 1½ft. **M. ALBA**, silvery-white fl.

Ricinus

BORBONENSIS ARBOREUS, large bronzy-green l.; 5ft. **CAMBODGENSIS**, l. purple; 5ft. **CINERASCENS**, brown-purple l., changing to dark green. **GIBSONI ATROSANGUINEUS**, l. cr.; 5ft. **MACROCARPUS**, silvery-bronze stems.

Salpiglossis

BEAUTY, fl. cr.-brown, marked with orange. **DWARF MIXED**, various colours; 1½ft. **PRINCESS IDA**, fl. creamy-white, marked with gold. **THE MOOR**, rich copper-coloured fl. **VIOLET QUEEN**, violet, marked with purple; 2ft.

Biennials (p. 255 to p. 259).

Beet (Beta)

BRAZILIAN, large handsome l., suitable for sub-tropical gardening; 2½ft. **DRACÆNA-LEAVED**, with recurved cr. l. **THE SHAH**, very dark cr. l.

Bromus

BRIZIFORMIS, ornamental grass, suitable for bouquets; 1ft.

Carduus

MARIANUS, green and white variegated l.; 3ft. **TAURICUS** (*Onopordon tauricum*), fine ornamental Thistle,

Salvia

COCCINEA, fl. sc.; 1½ft.; July. **PATENS**, rich deep blue; 2ft.

Schizanthus

CANDIDUS, fl. white; 2ft.; July. **GRANDIFLORUS ALBUS**, fl. white with yellow eye; 1½ft. **PAPILIONACEUS**, spotted purple and yellow, shading to cr.; 1½ft. **PYRAMIDALIS COMPACTA**, violet-purple, spotted with black; 1½ft. **RETUSUS ALBUS**, fl. white and yellow.

Torenia

CORDIFOLIA, fl. pale blue, 4in. to 8in.; July. **FLAVA**, fl. yellow, with purple eye; 6in. to 10in. **FOURNIERI GRANDIFLORA**, fl. sky-blue, spotted with indigo and yellow; 9in. **F. WHITE SWAN**, large white fl. **F. WHITE WINGS**, white, flushed with rose.

Tropæolum

LOBBIANUM BRILLIANT, bright sc., with cr. throat. **L. CARDINAL**, small dark sc. fl. **L. SPITFIRE**, bright fiery red; graceful climbers. **TOM THUMB EMPRESS OF INDIA**, brilliant cr., with rich velvety gloss; dark green l.; 9in. **T. T. LADYBIRD**, rich golden-yellow edged with ruby; 1ft. **T. T. TERRA COTTA**, very showy; fl. of a coppery-buff; 1ft.; July to September.

Zinnia

GRANDIFLORA, fl. very large, with broad petals, of various colours; 1½ft. **HAAGEANA**, single golden fl., striped with orange; 1ft.; July and August. **H. FLORE PLENO**, dbl.-flowered form; 1ft. **H. PUMILA FLORE PLENO**, fl. golden-striped orange; 6in. **MINIATURE POMPONE**, various brilliant colours; 6in.

having large woolly silvery l. and golden fl.; 6ft.

Leptosyne

GIGANTEA, of quick growth, yellow. Sunflower-shaped fl.; 4ft. to 6ft.

Michauxia

CAMPANULOIDES, branching spikes of white fl. tinged with rose, somewhat resembling Passion-fl.; 3ft.; July and August. **LÆVIGATA**, fl. white 9ft. or 10ft.; August.

BIENNIALS—*contd.***Cenothera**

BIENNIS, handsome yel. fl.; 4ft.; July and August. BIFRONS, fl. yel.; 1½ft. GRANDIFLORA, yel. fl.; 2ft. ODORATA, fl. at first yel., turning reddish as they fade; 1ft. to 2ft.; April and May. TARAXACIFOLIA, fl. white.

Papaver

ALPINUM, fl. white, yel., rose, &c., useful for rockwork; 6in.; middle of summer. GARIEPINUM, numerous light sc. fl.; 3ft. NUDICAULE ALBUM, white fl.; 1ft. N. MINIATUM, orange-red; 1ft.

Trachelium

CÆRULEUM, sky-blue fl.; 2ft.; August. C. ALBUM, white fl.

Verbascum

BLATTARIA, stem varying from 8in. to 4ft. high; fl. bright yel. CHAIXII, dark green l.; bright yel. fl., lilac stamens; 4ft. LIBANI, large yel. fl.; 5ft. PANNOSUM, large grey l.; fl. yel.; 6ft.

Wallflowers

BEDFORD GIANT, fl. yel.; l. dark green; 1ft. GOLDEN KING, early, golden-yel.; 1½ft. OLD GOLD, fl. clear yel., with dark cr. calyx; 1ft. to 1½ft. SCARLET QUEEN; 1½ft.

8.—ON HARDY HERBACEOUS PERENNIALS

(p. 260 to p. 286).

Acanthus

HISPANICUS, fl. white; 2ft.; August. MOLLIS, large ornamental l.; white fl.; 3ft.

Achillea

EUPATORIUM, fl.-heads golden yel.; 3ft.; MILLEFOLIUM ROSEUM, fl.-heads rose-coloured; 3ft. MONGOLICA, pure white single fl.; 1½ft. PTARMICA SNOWBALL, pure white dbl. fl.; 2ft. P. THE PEARL, pure white dbl. fl.; 2ft. TANACETIFOLIA, large heads of pale yel. fl.; 2½ft.

Aconitum

AUTUMNALE, large lavender blue fl.; 3ft. to 4ft.; late autumn. BRAUNII, fl. bluish-purple; 4ft.; July and August. DECORUM, fl. deep purple. JAPONICUM, fl. flesh-coloured; 6ft.; July to September. PYRENAICUM, fl. pale yel.; 3ft. to 4ft.

Actæa

ALBA, fl. white; 1ft. to 1½ft.; May and June. RACEMOSA, fl. white in long racemes; 3ft. SERPENTARIA, fl. white, small, in long trusses; 4ft.; May and June. SPICATA FRUCTU-RUBRO, small white fl., succeeded by bright coral-red berries; 1½ft.; May and June.

Anchusa

BARRELIERI, fl. blue with white tube and yel. throat; 1ft. to 2ft.; May. B. FOLIA VARIEGATA, fl. blue; l. blotched with gold. ITALICA, rich

Gentian-blue fl.; 3ft.; June to August. MYOSOTIDIFLORA, fine blue fl., throat yel.; 1ft.; July.

Aquilegia

CANADENSIS, fl. sc., tipped with green; 2½ft. C. NANA, deep sc. and yel. fl.; 1ft. CÆRULEA LUTEA, large light yel. fl. NIVEA GRANDIFLORA, white semi-dbl. flowers. SKINNERI, l. glaucous; fl. orange-sc. with long spurs.

Armeria

CEPHALOTES ALBA, white; 1ft.; May to August; C. RUBRA, deep red fl.; 1ft.; May to July. DIANTHOIDES, fl. light pink; May and June. LAUCHEANA, dense compact green tufts, small spikes of red fl.; 6in.; May to August. MARITIMA, fl. pink or lilac; 6in. to 12in.; June to August. M. ALBA, fl. white.

Arnebia

ECHIOIDES, fl. tubular, rich golden-yel., with five black spots, which gradually fade; 1ft.; April to July.

Arnica

CHAMISSONIS, fl.-heads yel.; 1ft. MONTANA, orange-yel.; 9in.; July and August.

Asclepias

INCARNATA, rosy-purple, fragrant; 3ft.; July. TUBEROSA, fragrant, bright orange fl.; 2ft.; July.

ON HARDY HERBACEOUS PERENNIALS—*contd.***Aster**

CORDIFOLIUS, lavender-blue; 2½ ft.; August and September. **CORYMBOSUS**, small creamy-white fl.; 1½ ft. **FORMOSISSIMUS**, rosy-lilac; 4½ ft.; August and September. **LINOSYRIS** (GOLDLOCKS), flax-like l.; showy yel. fl.; 2 ft.; July and August. **NOVÆ-ANGLIÆ RUBER**, cr.; 4 ft.; September and October. **N.-A. WILLIAM BOWMAN**, violet-purple with golden-bronze disc; 3 ft.; September and October. **NOVIBELGII NEPTUNE**, bluish-purple; 3½ ft.; September and October. **N.-B. ROBERT PARKER**, bluish-lilac with yel. centre; 5 ft.; September and October. **PANICULATUS**, lavender; 3 ft.; August and September. **STELLATA**, reddish shade; 3 ft.; September and October. **VERSICOLOR**, white shading to rose; 3 ft.; August and September.

Baptisia

AUSTRALIS, racemes of showy blue Pea-shaped fl.; 3 ft.; June and July. **LEUCANTHA**, fl. white in erect racemes; 3 ft.

Boltonia

ASTEROIDES, fl. flesh-coloured, Daisy-like; 2 ft. to 4 ft.; August. **A. DECURRENS**, pink Michaelmas Daisy-like fl.; 4 ft.; September and October. **GLASTIFOLIA**, fl. pink; 1½ ft. to 3 ft.; September.

Bupththalmum

GRANDIFLORUM, fl.-heads yel.; 1½ ft.; June to September. **SALICIFOLIUM**, showy golden-yel. fl.; 2 ft.; July to September. **SPECIOSUM**, massive l.; large orange-coloured fl.; 3 ft.; June to September.

Caltha

LEPTOSEPALA, fl. white; 9 in.; May and June. **PALUSTRIS FLORE PLENO**, suitable for moist places; dbl. golden-yel. fl.; 9 in.; April and May. **P. PURPURASCENS**, purplish stems and yel. fl. **KADICANS**, bright yel.; 6 in.; April and May.

Campanula

ALLIARIFOLIA, fl. white; 3 ft. **GLOMERATA ALBA**, white; 1½ ft.; May to July. **GRANDIS**, blue fl.; 3 ft.; May and June. **LACTIFLORA**, fl. white, tinged blue; 2 ft. to 4 ft.; June and July. **LATIFOLIA MACRANTHA**, pur-

ple; 3 ft.; June to August. **L. M. ALBA**, pure white fl. **PUNCTATA**, fl. white, spotted red on inner surface; 1½ ft.

Centaurea

ALBICANS, fl. white; 1 ft.; July and August. **BABYLONICA**, silvery-white l.; Thistle-like heads of yel. fl.; 6 ft.; July and August. **PARLATORIS**, l. silvery, deeply-cut; 2 ft. **UNIFLORA**, fl. heads purple; 9 in. to 15 in.

Centranthus

RUBER, rose-coloured fl. in dense heads; 2 ft.; May to August. **R. ALBUS**, fl. white.

Chrysanthemum

ARGENTHEUM, fl.-heads white; 1 ft.; July. **LATIFOLIUM**, large snow-white fl., yel. centres; 2 ft.; July to October. **LEUCANTHEMUM GRANDIFLORUM**, pure white fl.; 2 ft. **L. SEMI-DUPLEX**, fl. with slender white petals in centre; June to August. **MAXIMUM FILIFORME** or **FIMBRIATUM**, white thread-like petals; 2 ft.; June to August.

Chrysogonum

VIRGINIANUM, bright golden fl.; 1 ft.

Cimicifuga

CORDIFOLIA, black stems; spikes of white feathery fl.; 3 ft. to 4 ft.; August and September. **JAPONICA**, feathery white fl.; 2 ft. **RACEMOSA**, large glossy l.; long graceful racemes of drooping white fl.; 4 ft.; July to September.

Codonopsis

OVATA, bell-shaped blue fl., speckled white.

Delphinium

BRUNONIANUM, purplish-blue, Musk-scented; 2½ ft.; July. **CASHMIRIANUM**, fl. lilac-blue; 1½ ft.; July. **C. ALBUM**, variety with white fl. **ELATUM CELESTINUM**, fl. light blue; 3 ft. **GRANDIFLORUM ALBUM**, fl. satiny white; 2 ft. **ZALIL**, branching spikes of clear yel. fl.; 2 ft.; July and August.

Digitalis

GLOXINIÆFLORA, fl. yel.; 3 ft. **G. ALBA**, large white fl. **G. PURPUREA**, purple-cr. spotted fl. **GRANDIFLORA**, yel.; 3 ft.; July and August. **LÆVIGATA**, fl. dull yel., with white lip; 2 ft. to 3 ft.; July. **LANATA**, small whitish

ON HARDY HERBACEOUS PERENNIALS—*contd.*

fl., netted inside with brown; 2ft.; July and August.

Dracocephalum

GRANDIFLORUM (ALTAICENSE), blue; 6in.; July. RUYSCHIANUM (ARGU-NENSE), fl. blue; 1½ft.; June to August. R. SUPERBUM, rich Gentian-blue fl. SPECIOSUM, fragrant, pinkish-blue fl.; 1½ft.; June to August.

Echinops

BANNATICUS (RUTHENICUS), fl. blue; 3ft.; July and August. RITRO, curious hedgehog-like heads of blue fl.; 3ft.; July and August. SPHÆROCEPHALUS, lacinated silvery l.; heads of white fl.; 4ft.; August and September.

Eryngium

AMETHYSTINUM, fl. metallic blue, stems blue; 2½ft.; August. DICHOTOMUM, blue fl., in round heads; 3½ft.; August and September. MARTINUM, silvery grey l.; pale blue fl.; 1ft.; July and August. PLANUM, blue, round Thistle-like heads; 3ft.; July and August.

Eupatorium

AGERATOIDES, heads of white Ageratum-like fl.; 3ft.; August and September. AROMATICUM (MELIS-SOIDES), fl. white; 4ft.; July and August. CANNABINUM, fl. reddish-purple; 3ft.; July. PURPUREUM, fl. purple; 3ft. to 5ft.; August and September.

Gaillardia

AURORA, yel., with orange-sc. disk. COLLINA, cr., with gold edge. JAMES KELWAY, dazzling sc., golden edge. MAGICIAN, orange-sc., with rich yel. border. MR. FITCHER, fiery cr., bright yel. margin. ST. BLAISE, blood-red, edged with yel. VIVIAN GREY, large yel. WILLIAM KELWAY, bright sc., with golden edge.

Geranium

ARMENUM, fl. purple-cr. with black veins; 2ft.; June and July. ENDRESSI, fl. bright rose; 2ft.; May to August. IBERICUM, fl. large purple-blue; 2ft.; June and July. SANGUINEUM, cr.; 1ft.; July. S. LANCASTRIENSE, soft pink fl., veined purple, 9in. WALLICHIANUM, large blue or purple fl.; 6in.; June.

Geum

CHILOENSE MINIATUM, orange-sc.; 1½ft.; July. REPTANS, yel.; 6in.; June and July. STRICTUM, striped; 1ft.; June and July. SYLVATICUM, yel.; 1½ft.; April to August.

Helenium

AUTUMNALE PUMILUM, fl. yel.; 1ft.; August. BIGELOVII, fl. yel. with brown disk; 4ft.; August and September. STRIATUM, deep orange, striped and blotched cr.; 3ft.; August and September.

Helianthus

GIGANTEUS, bright yel. fl.; 5ft. to 7ft.; August and September. MULTIFLORUS BOUQUET D'OR, fl. very dbl, rich golden yel.; 4ft. RIGIDUS GRANDIFLORUS, golden yel., with dark brown centre; 4ft.; July and August. R. MISS MELLISH, large duplex fl., bright orange-yel.; 4ft.; August and September. R. SEMI-PLENUS, handsome golden-yel. semi-dbl. fl.; 4ft.; September and October.

Helonias

LAIIFOLIA, suitable for damp situations; handsome purple fl.; 1½ft.; June and July.

Heuchera

AMERICANA, fl. reddish; 1½ft. GLABRA, fl. white or pink; 1ft.; June and July. MICRANTHA, fl. cream-coloured; 2ft.

Hieracium

AURANTIACUM, heads of deep orange-coloured fl.; 1½ft.; May to August. VILLOSUM, fl. golden yel.; l. downy; 1ft.

Inula

ENSIFOLIA, fl. yel.; 1½ft.; July and August. GRANDIFLORA, bold massive l.; handsome yel. fl.; 2ft. MONTANA, fl. yel.; 1½ft.; August.

Linum

FLAVUM, fl. yel.; 1ft.; June to August. NARBONENSE, drooping habit; mass of sky-blue fl.; 1ft.; June to August.

Lupinus

ARBOREUS, terminal racemes of fragrant bright yel. fl.; 3ft.; June to

ON HARDY HERBACEOUS PERENNIALS—*contd.*

August. POLYPHYLLUS ALBUS, fl. white. P. PURPLE KING, fl. rich purple; 3ft.

Mertensia

PULMONARIOIDES (VIRGINICA), Gentian-blue fl. in long arching cymes; 1½ft.; May and June. SIBIRICA, fl. light blue; 1½ft.; May. S. ALBA, fl. white.

Oenothera

FRUTICOSA YOUNGII, masses of yel. fl.; 1ft.; June to August. F. Y. FLORE PLENO, fl. yel., semi-dbl.; 2ft. ODORATA, fl. yel.; 2ft.; June and July. VENUSTA, fl. golden-yel.; 1½ft.

Orobus

LATHYROIDES, racemes of blue Pea-shaped fl.; 1½ft.; June. MULTIFLORUS, fl. purple; 2ft.; July. NIGER, fl. dark purple; 3ft.; June. TUBEROSUS, fl. purple; 1ft.; June and July. VERNUS ROSEUS, fl. rose; 1ft.

Pæony

CANDIDISSIMA, primrose-yel. with white guard petals, rose-scented. CAROLINE ALLAIN, blush pink. DELICATISSIMA, flesh passing to blush-white. DUKE OF WELLINGTON, yel. with white guard petals. ELEGANS, pink fl. LADY LEONORA BRAMWELL, soft rose, large double fl. MADAME BREON, peach-blossom colour, large and handsome. MADAME DE GALHAU, beautiful soft pink. MIKADO, large rose guard petals, central florets pink edged with gold. SNOWBALL, large snow-white flowers. SOLFATERRE, primrose-yel. passing to pure white.

Pentstemon

CHARLES NORMAND, light rosy-purple. EMILE DESCHANEL, brilliant sc. EMPEROR, rich cr. with white throat pencilled with red. JULES SANDEAU, rich rose-cr., white throat, pencilled rose. MADAME A. STERLING, bright cr. with white throat. MRS. F. GORDON, bright rose with white throat. NEWBURY GEM, deep rich cr. PRESIDENT CARNOT, large purple flowers, white throat. WILLIAM ROBINSON, rosy-sc. with white throat.

Phlox

ABUNDANCE, pale eye; 1½ft. BURNOUF, brick-red, purple centre;

1½ft. CŒUR DE LION, bright carmine, dark centre. DIADEM, pure white; 1ft. DUTREUIL DE RHINS, carmine; 2½ft. ECLATANT, salmon-sc., cr. centre; 1½ft. EMBRASEMENT, orange-sc.; 3ft. FANFLUCHE, soft pink, flushed with rose; 1ft. GRELUCHETTE, bright purple, white centre; JOCONDE, soft heliotrope, violet centre; 2ft. LA SIÈCLE, rosy-pink, white centre; 1½ft. LA VENGEUR, bright car.; 2½ft. LIBERTÉ, salmon; 2½ft. MADAME ANTOINE DENIS, blush-white, cr. centre; 1½ft. MARQUIS DE BRETEUIL, pink, light centre; 1½ft. PONT-BIQUET, fine rich cr. REGULUS, rose-salmon with light centre; 1½ft. SNOWDON, snow-white; 2ft. TOREADOR, salmon-rose, dark centre; 1½ft.

Potentilla

CALIFORNIE, large golden-yel. fl. CENDRILLON, dark red; 2ft. CHROMATELLA, clear yel. FEU FOLLET, orange-sc., broad orange margin. L'ACHERON, velvety-red and yel. LOUIS VAN HOUTTE, very deep cr. MONT D'OR, large yel. ORPHÉE, beautiful self-yel. VERSICOLOR, cr-sc., shaded orange. VERNIANUM, reddish-yel. WILLIAM ROLLISSON, glowing sc., suffused with orange.

Pyrethrum

ALFRED KELWAY, rich cr. APHRODITE, large pure white fl. BEATRICE KELWAY, cherry-rose fl. CELIA, very bright pink. CLEMENCE, deep rich cr. EMPRESS QUEEN, blush; fine broad petalled variety. EVELYN, bright pink. FIGARO, rich cr. FLORENTINE, blush-white. LEONARD KELWAY, soft rose. MAGICIAN, bright pink tipped with gold. MELTON, bright cr-sc. METEOR, cr-sc. tipped with white, MR. SANTLEY, bright cr. ORMONDE, bright rich rose. PETER BARR, glowing cr. QUEEN SOPHIA, flesh colour.

Ranunculus

ACONITIFOLIUS FLORE-PLENO, pure white small dbl. fl.; 1½ft.; May and June. ACIS FLORE-PLENO, yel.; 2½ft.; June and July. AMPLEXICAULIS, large pure white; 1ft.; April and May. ASIATICUS, fl. yellowish; 9in.; May and June. GRAMINEUS, fl. yel.; 1. blue-grey; 1ft.; April to June.

ON HARDY HERBACEOUS PERENNIALS—*contd.*

MONSPELIACUS, large yel. fl.; 1ft.; April and May.

Rudbeckia

AUTUMN GLORY, fl. rich yel. with deep bronze central cone; 5ft.; September and October. **GOLDEN GLOW**, fl. double, bright yel.; 5ft. **LACINIATA GRANDIFLORA**, large clear yel. fl.; 5ft.; August and September. **PURPUREA**, reddish-purple; 4ft.; September.

Salvia

GRANDIFLORA, fl. blue; 2ft.; July and August. **PRATENSIS**, bright violet; 2ft.; June to August. **P. ROSEA**, fl. rose-coloured; 2ft. **VERBENACA**, fl. violet; 1½ft. to 2ft.; July and August.

Scabiosa

CAUCASICA, lilac-blue; 1½ft.; June to September. **C. ALBA**, pure white fl. **COLUMBARIA LATIFOLIA**, fl. rose-lilac; 3ft. **GRAMINIFOLIA**, fl. pale lilac; 1ft. to 1½ft.; June to September. **LUTEA**, light yel.; 3ft.; July to September. **OCHROLEUCA**, fl. sulphur-yel.; 2ft.; July to September.

Silphium

LACINIATUM, fl. yel.; 3ft.; July. **PERFOLIATUM**, large l.; bright yel. fl.; 4ft.; June to September. **SCABERINUM**, fl. yel.; 4ft.; August to October. **TRIFOLIATUM**, fl. bright yel.; 4ft.; August and September.

Thalictrum

ANGUSTIFOLIUM, fl. pale yel.; 3ft.; June. **AQUILEGIFOLIUM ALBUM**, fl. white; 4ft. **A. PURPUREUM**, fl. purple. **FLAVUM**, fine-cut l.; yel. fl.; 4ft.; July and August. **MINUS AFFINE**, fl. pale yel.; 1ft.; June and July.

Valeriana

OFFICINALIS, fl. pink; 3ft.; June. **PHU AUREA**, young l. bright golden-yel; white fl.; 2ft.; August.

Veratrum

ALBUM, massive l.; white fl.; 3ft.; June and July. **A. LOBELIANUM**, fl. greenish-white; 4ft.; June to August. **MAACKII**, fl. dark purple; 2ft. **NIGRUM**, blackish-purple fl.; 2ft. to 3ft.; June to August. **VRIDE**, fl. greenish; 4ft.; June to August.

9.—ON ROCK PLANTS

(p. 287 to p. 302).

Acæna

ARGENTEA, fl. brown; 6in.; June to August. **MYRIOPHYLLA**, bright green fern-like l.; 6in. **PULCHELLA**, fl. inconspicuous; l. bronze; a creeping species.

Ajuga

GENEVENSIENSIS, flesh-coloured; 9in.; June to September. **G. VARIEGATA**, beautifully-coloured l. **REPTANS**, blue; 6in.; May. **R. ATROPURPUREA**, l. dark purple; fl. blue. **R. VARIEGATA**, l. white variegated.

Androsace

FILIFORMIS, fl. white; 1ft.; May. **FOLIOSA**, heads of rose-coloured fl.; July. **LAGGERI**, fl. pink; March. **LANUGINOSA LEICHTLINI**, fl. rose.

Campanula

ERINUS, pale blue starry fl. **FRA-GLIS**, pale blue; 9in.; July and August. **ISOPHYLLA**, trailing habit; bright blue fl.; 6in.; June to September.

PORTENSCHLAGIANA, blue; 4in.; May to August. **PUMILA**, blue; 4in.; July. **P. ALBA**, pure white; 4in.

Cheiranthus

ALLIONI, fl. yel.; 9in.; May and June. **ALPINUS**, heads of fragrant pale yel. fl.; 1ft.; May to August. **A. MARSHALLI**, fl. orange-yel; 6in. **HARPUR CREWE (GOLDEN DROP)**, fl. dbl. yel.; 9in. **MUTABILIS**, purple fl., changing to bronze, 1ft.

Chrysanthemum

CATANANCHE, fl. heads yel.; 4in. to 6in. **CAUCASICUM**, small white Daisy-like fl.; 3in.

Coronilla

CAPPADOCICA IBERICA, trailing; bright yel. Pea-shaped fl.; deep green l.

Crucianella

STYLOSIA, neat trailing; pink fl.; 9in.; July to September. **S. BRILLIANT**, fl. rosy-crimson.

ON ROCK PLANTS—*contd.***Cyananthus**

INCANUS, fl. sky blue; 3in. to 4in.; August. LOBATUS, prefers a damp, peaty soil; large blue fl.; 6in.; August.

Dianthus

ARENARIUS, fl. white with pink eye, fimbriated; 6in. CRUENTUS, fl. blood-red; 1ft. DELTOIDES, rose-coloured; 6in.; June and July. D. ALBUS, white fl.

Epimedium

MACRANTHUM, yel.; 1ft.; May and June. MUSSCHIANUM, fl. dull white; May. NIVEUM, small white fl.; 1ft. N. ROSEUM, fl. rose-coloured. PINNATUM, fl. bright yel.; 1ft.; May and June.

Erigeron

GLAUCUS, blue fl.; 1ft.; July and August. ROYLEI, fl. lavender-blue; 6in. to 12in.; July.

Erodium

CHAMÆDRYOIDES (REICHARDI), fl. white; 4in.; July. HYMENODES, fl. white, veined pink; 9in.; July. MACRADENUM, fl. pale violet; 6in. to 12in.; June and July. MANESCAVI, fl. purplish-red; 1ft.; June to August.

Gentiana

ANDREWSII, clusters of purplish-blue fl.; March to June. CRUCIATA, fl. dark blue; 6in.; June and July. DECUMBENS, fl. blue; 1ft.; June and July. LUTEA, suitable also for the border; whorls of yel. fl.; 3ft.; June and July. TIBETICA, fl. straw-coloured, in clusters; 1ft.; August.

Globularia

NANA, fl.-heads bluish, stem creeping. TRICHOSANTHA, olive-green l.; globular heads of blue fl.; 6in.; June and July. VULGARIS, fl. bright blue; 6in. to 12in.

Hacquetia

EPIPACTIS, bright yel. fl.; 3in. to 6in.; April and May.

Hutchinsia

ALPINA, corymbs of snow-white fl.; 3in.; April to June.

Jasione

PERENNIS, dwarf compact tufts, heads of light blue fl.; 1ft.

Lewisia

REDIVIVA, tufts of long narrow fleshy l.; fl. varying from rose to white; 2in. across, 3in. high; middle of summer.

Linnæa

BOREALIS, trailing evergreen; rose-coloured bell-shaped fragrant fl.; May and June.

Lysimachia

NUMMULARIA, trailing, yel. fl.; June to August. N. AUREA, golden l.

Mentha

REQUIENI, dense green carpet of very fragrant l.

Ourisia

COCCINEA, shady situation, clusters of drooping sc. fl.; 9in.; June and July.

Platycodon

GRANDIFLORUM, deep blue fl.; 1½ft.; June to August. G. ALBUM, pearly-white fl. G. MARIESII, fl. deep blue; 1ft.; June to August.

Pratia

ANGULATA (LOBELIA LITTORALIS), dwarf trailing plant, with white fl.

Pulmonaria

MOLLIS, l. blotched and speckled with white; blue fl.; 9in.; May and June. TUBEROSA, fl. pink; 9in.; May.

Saponaria

OCYMOIDES, numerous rosy-cr. fl.; 6in.; July and August. O. SPLENDIDISSIMA, fl. deep rosy-crimson; 6in.

Saxifrage—Encrusted

AIZOON, white; 9in.; May and June. CÆSIA, resembling silvery moss, with pale yel. fl.; 6in.; May and June. CRUSTATA, white; 6in.; June. LANTOSCANA SUPERBA, panicles of large snow-white fl., spotted cr.; 1ft.; May and June. MACNABIANA, white, spotted cr.; 2ft.; June and July.

— Mossy

CÆSPITOSA, cream; 6in.; April and May. MAWEANA, large pure white fl.; May.

— Oppositifolia

ALBA, pure white fl., creeping habit, SPLENDENS, sheets of rosy-cr. fl.

ON ROCK PLANTS—*contd.***Saxifrage** (*contd.*)—**Various**

APICULATA, primrose-yel. fl. BURSERIANA, pure white fl. on sc. stems. SANCTA, rich golden-yel. fl.

Sedum

EWERSII, purplish-lilac; 4in.; June. PALLIDUM, blue-grey l., rosy-white fl. RUPESTRE, fl. deep yel., l. tinged with red; 4in.; June and July. SEXANGULARE, yel.; 6in.; July.

Sempervivum

CALIFORNICUM, green tipped with brown. FIMBRIATUM, purple; 6in.; July and August. POWELLII (cobweb

variety), creamy-white; 6in.; June and July. TRISTE, dark red-bronze l.

Thymus

AZORICUS, fl. purple; 3in.; July. CHAMÆDRYS MONTANUS, fl. purplish. C. M. ALBUS, white; 4in.; June to August. SERPYLLUM, rosy-purple; 4in.; July. S. ALBUS, white fl. S. COCCINEUS, fl. brilliant crimson. S. LANUGINOSUS, light purple fl.; June to August.

Waldsteinia

GOIDES, fl. yel.; 6in.; March to June. TRIFOLIA, bright yel. fl.; 6in.; May and June.

10.—ON HARDY BULBS AND TUBERS

(p. 303 to p. 355).

Brodiaea

BRIDGESII, purplish-rose, light centre. CALIFORNICA, variable as to colour. CAPITATA ALBA, pure white. CONGESTA, lilac. PEDUNCULARIS, porcelain-white. PURDYI, rose-purple.

Calochortus

AMENUS, rose. APICULATUS, light yel. FRASERI, dark blue. LYONI, white or rose, spotted black. MACROCARPUS, silvery-lilac, dark centre. PULCHELLUS, yel. SPLENDENS, lilac. S. ATROVIO-LACEUS, purple, dark red spot.

Colchicum

AUTUMNALE ALBUM-PLENUM, white, dbl. BIVONÆ, rosy-lilac. SIBTHORPII, rosy-purple, chequered. SPECIOSUM RUBRUM, purplish-rose. VARIEGATUM, rose-purple, chequered.

Crocus

ASTURICUS, purplish-lilac. A. ATROPURPUREUS, dark purple. A. AZUREUS, blue. HADRIATICUS, pure white, and its variety CHRYSOBELONICUS. SALZMANNI, lilac. SATIVUS CARTWRIGHTIANUS, lilac, sc. stigma. STELLARIS, orange, dark purple featherings.

Fritillaria

ARMENA, golden yel. CITRINA, green, shaded citron. DELPHINENSIS BURNATI, dark brown. D. MOGRIDGEI, yel. PALLIDIFLORA, pale yel. PERSICA, dull brown. PYRENAICA,

plum-coloured, with yel. inside. RUTHENICA, blackish. WALUJEWI, deep red inside, silvery-grey outside.

Galanthus

FOSTERI, broad l. and long white fl. LATIFOLIUS, broad l. NIVALIS OCTOBRENSIS. PLICATUS, l. plicate.

Hyacinth

Single Blue—CHARLES DICKENS, CZAR PETER, GRAND LILAS, KING OF THE BLACKS, THE SULTAN, and WILLIAM I.

Double Blue—BLOCKSBERG, CHARLES DICKENS, and LAURENS KOSTER.

Single Red—CARDINAL WISEMAN, CHARLES DICKENS, KING OF THE BELGIANS, LORD DERBY, and SOLFATERRE.

Double Red—KOHINOOR, LORD WELLINGTON, and PRINCESS LOUISE.

Single White—ALBA SUPERBISSIMA, BARONESS VAN TUNL, SNOWBALL, and WHITE PERFECTION.

Double White—EDISON, PRINCE OF WATERLOO, and PRINCESS LOUISE.

Single Yellow—KING OF THE YELLOWS, OBELISK, and PRIMROSE PERFECTION.

Iris—English (*I. Xiphium*)

BLANCHEFLEUR, white, pink tinge. GRAAF BENTINCK, cr. and white. KING OF THE BLUES. MONT BLANC, pure white. VAINQUEUR, lavender, violet spotted.

ON HARDY BULBS AND TUBERS—*contd.***Iris** (*contd.*)—**Spanish** (*I. Xiphoides*)

AVALANCHE, white, golden-blotched. CATHERINA, deep blue, white, and orange. GOLDEN KING, deep yel. LEMON QUEEN, light yel. SNOWBALL, pure white. THE MOOR, purple, brown, and orange. THUNDERBOLT, purple and brown, orange blotch.

— **Bulbous and Tuberous Species**

ASSYRICA, white. ATROFUSCA, dark red and brown, black veinings. ATROPURPUREA, dark maroon. BOISSIERI, purple, yel. blotch. CAUCASICA, light yel.; sunnys sheltered spots. FLAVISSIMA BLONDOVII, light yel. GATESII, creamy-white and rose; robust. HELENÆ, bright lilac and purple, dark blotch and veinings. LONGITANA, shades of blue; sunny sheltered spots. SINDJARENSIS, white and deep blue, crested; early spring.

Ixia

AZUREA, blue, violet centre. CONQUEROR, yel., red shadings. CRATEROIDES, rich sc. EMPEROR OF CHINA, deep yel., black centre. ERUBESCENS MAJOR, deep pink, black centre. VULCAN, orange-red, black centre.

Kniphofia

PFITZERI, orange-sc. SAUNDERSI, deep red, tipped yel. SULPHUREA, sulphur-yel. TUCKII, bright red, fading to yel.

Lilium

ALEXANDRÆ, white; dwarf hybrid. AURATUM PLATYPHYLLUM, a broad-l. richly-spotted variety. A. RUBRO-VITATUM, a red-banded variety of the well-known typical plant. CANADENSE FLAVUM, yel., spotted black. HANSONI, deep yel., spotted cr. HUMBOLDTII BLOOMERIANUM, deep yel.,

purple tips. JAPONICUM COLCHESTERI, pale yel. inside, deep brown outside. LONGIFLORUM, pure white, trumpet-shaped. POMPONIUM, bright sc.; early-flowering. TESTACEUM, apricot, sc. anthers; very fragrant.

Muscari

AZUREUM, light blue; very early. COMOSUM, deep blue, in tassel-like heads. HELDREICHII, deep blue, white mouth. MOSCHATUM FLAVUM, yel.; fragrant. NEGLECTUM MAJUS, bluish-black; early.

Narcissus—Trumpet Daffodils

Yellow—CAPTAIN NELSON, GOLDEN NUGGET, GOLDEN SPUR, HENRY IRVING, JOHNSTONI, MAXIMUS, P. R. BARR, SHAKESPEARE, and WILLIE BARR.

White-Winged—EMPRESS, GRANDIS, PRINCEPS, and TUSCAN BONNET.

White and Sulphur—ALBICANS, MARCHIONESS OF LORNE, PRINCESS. IDA, and W. P. MILNER.

— **Incomparabilis**

AUTOCRAT, LEEDSII, QUEEN BESS, SIR WATKIN, and STELLA.

— **Barrii**

CONSPICUUS, GENERAL MURRAY, GOLDEN MARY, and ORPHEE.

— **Leedsii**

AGNES BARR, BURBIDGEI, DUCHESS OF BRABANT, FALSTAFF, JOHN BAIN, MINNIE HUME, MRS. LANGTRY, PALMERSTON, and VANESSA.

— **Poeticus**

GRANDIFLORUS, ORNATUS, and MARVEL.

— **Polyanthus**

ADONIA, BAZELMANN MAJOR, CHARLES DICKENS, and SCILLY ISLES WHITE.

13.—ON ORCHIDS

(p. 572 to p. 623).

c, cool; I, intermediate; s, stove or hot-house; C-I, cool-intermediate; W-I, warm-intermediate; X, hybrid. The descriptive details apply to the flowers.

Ada

AURANTIACA (C), orange-sc., racemose.

Aërides

HOULLETIANUM (S), creamy-white and rose-pink; fragrant. LOBBII (S),

white and pale rose; fragrant. MACULOSUM (S), white and rose-purple; fragrant. QUINQUEVULNERUM (S), white, with five tips of cr.-purple. RUBRUM (S), rosy-purple; fragrant. SUAVISSIMUM (S), creamy-yel., spotted

ON ORCHIDS—*contd.*

with brown-purple. VANDARUM (s), white; l. terete.

Angræcum

ARCUATUM (s), white; night-scented. BILOBUM (s), white, on a reddish-brown pedicel; night-scented. CHAILLUNANUM (s), white, brown at base of ovary; night-scented. FOURNIERIANUM (s), white; night-scented. HYALOIDES (s), white; very fragrant.

Brassia

BRACHIATA (1), pale green, spotted dark brown. CAUDATA (1), yel., barred brown, spotted greenish-brown. LANCEANA (1), bright yel., blotched deep brown, sometimes red. LAWRENCEANA (1), bright yel., spotted cinnamon and green; fragrant. MACULATA (1), sepals and petals yel., blotched brown; lip white, spotted brown and purple. VERRUCOSA (1), green and white, spotted light brown.

Bulbophyllum

BARBIGERUM (w-1), deep brown, covered dark purple hairs, moving at the slightest disturbance. DEAREI (1), pale greenish-yel. and purple. LOBBII (1), pale yel. MACULATUM (1), green, spotted brownish-purple. RETICULATUM (1), greenish-white, striped and spotted purple. SALTATORUM (1), greenish-brown. SIAMENSE (1), pale yel., striped and lined purple.

Burlingtonia

CANDIDA (1), white; very fragrant. DECORA (1), white, flushed and spotted pink.

Calanthe

BELLA (x, s), white and rose-pink. GIGAS (x, s), large, white and purple. REGNIERI (s), white and rosy-pink. TURNERI (s), white. VEITCHII (s), bright rose, white disk. V. ALBA (s), white. VESITTA RUBRO-OCULATA (s), white, deep purple disk. V. LUTEA (s), white, yel. disk. V. GIGANTEA (s), white, cr. disk; plant very large; rare. WILLIAM MURRAY (s), white and purple.

Catasetum

BARBATUM (1), green, blotched purple; lip greenish-pink, having a dull white bearded fringe. BUNGEROTHII (1), white; very fragrant. CALLOSUM (1),

dull brownish suffusion on a yellowish ground. CRISTATUM (1), dull green, crested lip. FIMBRIATUM (1), yel.-green; very fragrant. MACULATUM (1), green, spotted purple. PILATUM (1), large, almost white; closely allied to, if not identical with, C. BUNGEROTHII.

Cattleya

ACLANDIÆ (1), sepals and petals brown and pale yel., lip deep purple; fragrant. AMETHYSTOGLOSSA (s), rosy-lilac, spotted pink, lip cr.-purple; fragrant. BICOLOR (1), bronzy-green, lip rosy-purple. BOWRINGIANA (1), rosy-purple, lip deeper purple. CITRINA (1), bright lemon-yel.; highly fragrant. DOWIANA (1), creamy-yel., lip cr.-purple, striped gold; fragrant. GUTTATA (1), greenish-yel., spotted cr., lip white, stained with purple. INTERMEDIA (1), blush-white, lip cr.-purple and white. LUDEMANNIANA (1), pale lilac, lip white, yel. and cr.; fragrant. REX (1), creamy-yel., lip yel., purple, with darker veins. SCHRÖDERÆ (1), blush-rose, lip with a darker suffusion of rose in front and yel. at base; fragrant. SKINNERII (1), rosy-purple, lip shading to white at base. S. ALBA (1), white. SUPERBA (s), deep rose-purple and cr.; very fragrant. VELUTINA (1), yel. spotted purple, lip yel., violet, and cr. WARNERII (1), deep rose, lip cr.-purple, yel. at the base, fragrant. WARSCEWICZII (1), deep lilac, lip rich cr., yellow blotches on side lobes; fragrant.

There are many hybrid Cattleyas derived from the inter-crossing of the various species. These generally partake of the intermediate characteristics of the parents.

Chysis

AUREA (1), yel., lip marked cr.; fragrant. BRACTESCENS (1), white, yel. blotch on lip; fragrant. CHELSONII (1), Nankeen-yel., rosy blotch at the apex of the sepals and petals; lip bright yel., reddish-brown spots and markings. LÆVIS (1), yel., sc.-cr. markings on the lip.

Cirrhopetalum

AURATUM (w-1), straw-coloured, striped cr. and yel. CUMINGII (w-1), green and reddish-purple. MEDUSÆ

ON ORCHIDS—*contd.*

(1), pale straw-coloured, spotted pink. PICTURATUM (1), purple and pale greenish-yel. STRANGULARIUM (W-1), yel. and purple. TRIPUDIANS (1), brown, purplish-white.

Cœlogyne

CRISTATA (1), white and yel. C. HOLOLEUCA (1), white. C. LEMONIANA (1), white and pale lemon-yel. DAYANA (1), white and brown. MASSANGEANA (1), creamy-yel. and brown. OCELLATA (1), white and yel. PANDURATA (S), pale green, black marblings on lip. TOMENTOSA (1), yel.-rose and brown. VEITCHII (1), white.

Cycnoches

PENTADACTYLON (S), yel.-green and chocolate; fragrant.

Cymbidium

CYPERIFOLIUM (1), pale green, brown and white. DEVONIANUM (1), brown and purple. EBURNEO-LOWIANUM (X, 1), creamy-yel., purple on lip; fragrant. GRANDIFLORUM (1), pale green, brown and white; fragrant. LOWIANO-EBURNEUM (X, 1), creamy white, purple in front of lip. LOWIANUM (1), green, yel., and purple. L. CONCOLOR (1), pale greenish-yel. TIGRINUM (1), green, white, and brown (dwarf habit). WINNIANUM (X, 1), white and brown.

Cypripedium

ÆSON (X, 1), white, yel., and brown; lip highly polished. ANNIE MEASURES (X, 1), white, rose, purple, and brown. APHRODITE (X, 1), white, suffused rose. ARETI (X, 1), yel., green, and white, spotted brown. ARGUS (S), green, purple, white, and rose, blackish-purple spots. ASHBURTONÆ (X, 1), white, green, and brown, dark brown spottings. AYLINGII (X, 1), white and rose, miniature brown spots. BARBATUM (S), white, purple, and purple-brown. BEHRENSIANA (X, 1), green, white, purple, and brown. BELLATULUM (1), white, spotted purple. B. ALBUM (1), creamy-white. BOOKERII (X, 1), white, green, purple, and brown. CALYPSO (X, 1), white, rose-purple, green, and brown. CARRIERII (X, 1), green, white, and purple. CERES (X, 1), white, rose-purple, and brown; very fine. CHAMBERLAINIANUM (S), yel., brown, and rose-purple. CHARLES CANHAM

(X, 1), white, green, and rosy-purple, dark brown spots. CHARLES RICKMAN (X, 1), white, rose, and deep purple, dark spots. CHARLESWORTHII (1), deep rose, white, and brown. CILIO-LARE (S), pale green and purple, darker purple spots. CLINKABERRYANUM (X, 1), white, green, and deep purple. CONCOLOR (1), yel., spotted brown. COWLEYANUM (X, 1), white and deep rosy-purple. CURTISII (S), pale green and brown purple. DAYANUM (S), pale green and light brown. DIBDIN (X, 1), white, green, and two shades of brown. DRURYI (S), yel. and purple. EDWARDII (X, 1), white, green, purple, and deep brown. EURYALÆ (X, 1), white, green, purple, and deep brown. EURYANDRUM (X, 1), white, green, purple, and dark brown. EXCELSIOR (X, 1), white, green, and brown, dark brown spottings. EXUL (1), white, yel., and brown. FAIRIBANO-LAWRENCEANUM (X, 1), white, deep purple, and brown. GERMINYANUM (X, 1), a most distinct variety, heavily suffused rose-purple. GIGAS (X, 1), white, brown, and purple; very fine. GODEFROYÆ (X, 1) (Nat. Hyb.), white, thickly covered purple spots. GODEFFIANUM (X, 1), green, white, and brown, purple suffusion. HARRISIANUM (X, 1), white, brown, and deep purple. H. SUPERBUM (X, 1), a superior form to the type. HAYNALDIANUM (S), white, brown, and rose-purple. HERA (X, 1), white, green, and brown, beautifully spotted. H. ADRASTUS (X, 1) and H. EURYADES (X, 1) have larger spotted segments. HIRSUTISSIMUM (1), green, purple, and brown. INDRA (X, 1), white, green, brown, and yel. INSIGNE (C), varying from white and pale yel. to pale green and purple; one of the most useful. IO-GRANDIS (X, 1), white, green, and brown, spotted purple. J. H. VEITCH (X, W-1), white, brown, green, and purple; very rare. JUNO (X, 1), white, suffused purple, green, and brown. LACHMEE (X, 1), white, green, brown, and purple. LATHAMIANUM (X, 1), white, green, and brown; highly-polished lip. LAWREBEL (X, 1), white and deep rose-purple, darker purple veinings. LAWRENCEANUM (S), white and purple, spotted black and purple. LEEANUM (X, C-1), white, green, brown, and purple spots; one of the finest and most use-

ON ORCHIDS—*contd.*

ful of the Hybrid *Cypripediums*; there are extensive duplications in variety, but all are worthy of consideration. *LOWII* (s), white, brown, and rose. *MACROPTERUM* (x, 1), white, suffused rose-purple, green, and brown. *MASSIANUM* (x, 1), white and green, thickly spotted and suffused brown. *MASTERSIANUM* (s), yel. and purple. *MAYNARDII* (x, 1), white, green, and purple. *MEASURESÆ* (x, 1), white, suffused rose-purple, spotted deep purple or claret. *MEASURESIANA* (x, 1), white and greenish-yel., suffused brown in two shades. *MILO* (x, 1), white, green, deep purple, and rich brown; very fine. *MORGANIÆ* (x, 1), white, green, and brown, deep purple spots. *NIOBE* (x, 1), white, rose-purple, green, and brown. *NITENS* (x, 1), white, green, and brown, in different tints; very variable. *NIVEUM* (s), white, minute brown dots. *NUMA* (x, 1), white, purple, and brown in two shades. *ØENANTHUM* (x, 1), white, purple, green, and brown; very variable in its different forms. *ORPHANUM* (x, 1), white and rosy-purple, suffusion green and brown. *PITCHERIANUM* (x, 1), white, brown, and purple on greenish ground. *POLYSTIGMATICUM* (x, 1), white, brown, and green. *PORPHYROCHLAMYS* (x, 1), deep rosy-purple, spotted dark brown. *PURPURATUM* (s), white and purple. *RADIOSUM* (x, 1), white, green, brown, and purple. *ROTHSCHILDIANUM* (s), greenish-yel., purple, and blackish-purple. *SALLIERII* (x, 1), white, green, and brown in two shades, yel. tracings. *S. HYRANUM* (x, 1), larger and brighter in colour than the type. *SHILLIANUM* (x, 1), white, green, brown, and dark purple. *SMITHII* (x, 1), white, green, bright purple, and brown. *SPICERIANUM* (1), white, brown, and violet. *STATTERIANUM* (x, 1), white, suffused rose-purple, green, and brown. *STONEI* (s), white and reddish-brown. *SUPERBIENS* (s), white, green, and purple-brown. *SUPERCILIARE* (x, 1), white, green, and brown, dark brown spots. *SWANIANUM* (x, 1), white, two shades of green, and deep brown. *SWINBURNII* (x, 1), white and brown, deep purple spottings. *T. B. HAYWOOD* (x, 1), white, green, and brown, darker brown spots. *TESSELLATUM* *PORPHYREUM* (x, 1), rosy-purple, suffused darker shade of purple.

TONSUM (s), greenish-white and purple. *T. W. BOND* (x, 1), white, green, and brown, purple suffusion. *VENUSTUM* (1), green and purple. *VEXILLARIUM* (x, 1), white, rose-purple, and brown. *VILLOSUM* (1), white, greenish-yel., and brown. *V. BOXALLI* (1), similar, dark spots. *WINNIANUM* (x, 1), white, bright yel., and brown; fl. highly polished. *WOTTONII* (x, 1), white, suffused rich rosy-purple, veined darker shade; lip claret. *W. R. LEE* (x, 1), white, green, and brown in two shades; very fine. *YOUNGIANUM* (x, 1), green, white, brown, and purple. *ZEUS* (x, 1), white, rich purple, and deep brown.

The South American section, or *Selenipediums*, will be found under that heading.

Cyrtopodium

ANDERSONIANUM (1), yel. and green. *PUNCTATUM* (1), yel., spotted brownish-purple.

Dendrobium

AINSWORTHII (s), white and purple, maroon disk; fragrant. *ALBO-SANGUINEUM* (s), creamy-yel., maroon disk; fragrant. *ASPASIA* (s), buff-yel., purple to maroon disk; fragrant. *ATROVIOLACEUM* (s), greenish-white and violet-purple. *AUREUM* (s), creamy-yel., brown disk; fragrant. *BENSONÆ* (s), white, maroon disk. *BRYMERIANUM* (s), deep yel., heavily-bearded lip. *CAMBRIDGEANUM* (s), yel., maroon disk. *CASSIOPE* (s), white, small purple disk; fragrant. *CHRYSOTOXUM* (s), yel.; fragrant. *CRASSINODE* (s), white, tipped purple, yel. disk. *C. ALBUM* (s), white, yel. disk. *CYBELE* (s), rose, deep maroon disk. *C. NOBILIUS* (s), deep rose-purple, intense maroon disk. *DENSIFLORUM* (s), deep yel. *D. ALBUM* (s), creamy-white. *DEVONIANUM* (s), white and orange, tipped purple. *DOMINII* (s), pale rose, small maroon disk. *DULCE* (s), pale rose-purple, yel. in front of maroon disk. *ENDOCHARIS* (s), white, brown-purple disk; fragrant. *EUOSMUM* (s), pale rose, cr.-purple disk; fragrant. *E. VIRGINALE* (s), white, intense maroon disk. *FALCONERI* (s), white, tipped purple, yel. in front of large maroon disk. *FARMERII* (s), pale rose, white, and yel.; fragrant. *F. AUREUM* (s), pale yel.; fragrant. *FIMBRIATUM* (s), yel.

ON ORCHIDS—*contd.*

F. OCULATUM (s), *yel.*, rich cr. disk. INFUNDIBULUM (c), white, *yel.* disk. JAPONICUM (c), white and brown; fragrant. JUNO (s), rose, tipped purple, *yel.*, large maroon disk. LITUIFLORUM (s), deep rose, rich cr. disk; fragrant. LODDIGESII (s), pale rose and *yel.* LOWII (s), bright-*yel.*, veined reddish-brown. LUTEOLUM (s), primrose-*yel.* MAC-CARTHÆ (s), pale cerise and purple. MICANS (s), deep rose-purple, darker tips, rich disk. NOBILE (s), pale rose, white, maroon disk; fragrant. N. ALBUM (s), white, primrose disk; fragrant. N. AMESIÆ (s), white, deep maroon disk; fragrant. N. BALLIANUM (s), almost white, salmon disk; fragrant. N. COOKSONII (s), petals blotched similar to disk; fragrant. N. NOBILIUS (s), intense rose-purple; one of the best of the darker forms. PARISHII (s), rose-purple, dark purple disk; fragrant. PRIMULINUM (s), blush-pink and white; fragrant. ROLFÆ (s), pale rose, maroon disk. SCHNEIDERIANUM (s), buff, *yel.*, purple disk; fragrant. SPECIOSUM HILLII (s), white, violet spotted; fragrant. SPLENDIDISSIMUM (s), rose, deep maroon disk; fragrant. S. GRANDIFLORA (s), larger and more highly-coloured; fragrant. SUAVISSIMUM (s), *yel.*, deep maroon disk; fragrant. SUPERBUM (s), deep rose, dark purple disk; fragrant. TORTILE (s), light rose or creamy-*yel.*, suffused rose-purple. VENUS (s), pale rose, tipped deep cr., large maroon disk. WARDIANUM (s), white, tipped purple, *yel.* in front of deep maroon disk. WIGANÆ (s), blush to creamy-white, maroon disk.

Epidendrum

COCHLEATUM (I), creamy-white and purple. ELEGANTULUM (I), creamy-*yel.*, rose, and purple. ENDRESII (I), white and violet-purple. ENDRESIO-WALLISII (I), *yel.*, white, and reddish purple. MACROCHILUM (I), white and purple. NEMORALE (I), rosy-lilac, striped violet-purple. O'BRIENIANUM (I), deep sc. RADICANS (s), deep orange-red. VITELLINUM MAJUS (c), orange-sc. and *yel.* WALLISII (I), *yel.*, white and purple.

Eulophiella

ELIZABETHÆ (s), white and bright rose-purple. PEETERSIANA (s), deep rose-purple and white.

Grammatophyllum

MULTIFLORUM (s), green, brown, and purple; fragrant. SPECIOSUM (s), *yel.*, purple, and red streaks.

Lælia

ALBIDA (I), white and rose; fragrant. CINNABARINA (I), orange-sc. CRISPA (I), pale lilac and cr.; fragrant. DAYANA (I), deep rose and cr. DIGBYANA (s), creamy-white; bearded lip; very fragrant. FLAVA (I), *yel.* GLAUCA (I), creamy-white; fragrant. HARPOPHYLLA (I), orange-sc. and white. LATONA (I), orange, purple, and cr.; MAJALIS (I), pale lilac and purple; fragrant. MONOPHYLLA (c), orange-sc. PERRINII (I), lilac, white, and cr. SUPERBIENS (I), pale lilac and purple; fragrant. TENEBROSA (I), various, *yel.*, deep purple, and cr. to rose; fragrant. XANTHINA (I), *yel.*, white, and orange.

There are numerous hybrid Lælias which have been derived from the intercrossing of the various species. These have the intermediate characteristics of the parents, and form useful additions to this lovely class.

Lælio-Cattleya

AMESIANA (I), lilac-rose, *yel.*, and cr.; fragrant. APHRODITE (I), deep lilac, *yel.*, and cr.-purple. CALLISTOGLOSSA (I), deep rose, *yel.*, and cr.; fragrant. CANHAMEANA (I), rosy-lilac, *yel.*, and cr.-purple; fragrant. DECIA (I), light rose-purple, white, and cr.; fragrant. EXIMIA (I), rosy-lilac, *yel.*, and deep cr.; fragrant. HIPPOLYTA (I), orange-sc. and purple. LADY ROTHSCHILD (I), rose-purple, *yel.* and purple; fragrant. NYSA (I), pale lilac and cr.-purple; fragrant. PALLAS (I), deep rose, *yel.* and velvety cr.; fragrant. STATTERIANA (I), lilac, *yel.*, and purple; fragrant. WELLSIANA (I), pale lilac, *yel.*, and cr.; fragrant. ZEPHYRA (I), creamy-*yel.* and purple.

Lycaste

AROMATICA (c), light clear *yel.*; very fragrant. CUNEATA (c), greenish-*yel.* and orange; fragrant. DEPEI (c), white, *yel.*, and brown; fragrant. GIGANTEUM (c), creamy-white; fragrant. LANIPES (c), white; fragrant. PLANA (c), creamy-white. P. MEASURESIANA (c), creamy-white and purple.

ON ORCHIDS—*contd.***Masdevallia**

AMABILIS (C), deep cr. BELLA (I), brown and white. CAUDATA (C), yel., purple, and green. CHIMÆRA ROEZLII (C-I), deep purple. C. WINNIANUM (C-I), reddish-purple and yel. EPHIPIUM (C-I), purplish-brown and yel. ESTRADÆ (C), mauve-purple and yel. GAIRIANA (C), yel. and violet-purple. IGNEA (C), yel., streaked orange. MACRURA (C), light yel. and purple. MACULATA (C), yel., green, and purple. POLYSTICTA (C), yel., white, and purple. RACEMOSA (C), bright sc. SCHRÆDERIANA (C), yel., white, and purple. TOVARENSIS (C-I), white. WAGNERIANA (C), yel.

Maxillaria

GRANDIFLORA (C), white and yel.; fragrant. HARRISONÆ (C-I), white and rose-purple; fragrant. SANDERIANA (C-I), cr. purple and white; fragrant. VENUSTA (C), white and orange; fragrant.

Miltonia

BLUNTII LUBBERSIANA (C-I), white, yel., and cr. CANDIDA (C-I), creamy-white and pink. CLOWESII (C-I), creamy-yel., brown, and purple. CUNEATA (C-I), brown, yel., white, and pink. REGNELLI (C-I), white, lilac, and rose. SPECTABILIS (C-I), white and rosy-violet. S. MORELIANA (C-I), deep purple, brighter veins.

Odontoglossum

CERVANTESII (C), white and brown. CIRRHOSUM (C), white, spotted dark brown. INSLEAYI (C-I), yel. and brown. LUTEO-PURPUREUM (C), yel. and purple-brown. POLYXANTHUM (C), yel. and deep brown. UROSKINNERII (C), creamy-white, brown, and purple. WILCKEANUM (C), white or cream, brown markings.

Oncidium

AUROSUM (C-I), yel. CAVENDISHIANUM (S), yel. and red. CRISPUM (C), brown and yel. CUCULLATUM (C), white and purple. CURTUM (C), brown and yel. DASYSTYLE (C), light yel. and purple to brown. DIVARICATUM (C), yel., blotched and barred brown. FLEXUOSUM (C-I), yel., spotted brown. JONESIANUM (C-I), white and brown. LAMELLIGERUM (C), brown and yel. LOXENSE (C), dull olive, barred cinnamon and yel. MACRANTHUM (C), yel.

brown, and purple. PHYMATOCHEILUM (S), yel. and reddish-brown. SARCODES (S), bright brown and yel. SERRATUM (C), bright yel. and brown. SPLENDIDUM (S), green, brown, and yel. SUPERBIENS (C), light yel., brown, and plum-purple. TIGRINUM (C), brown and bright yel. WENTWORTHIANUM (C-I), yel., spotted brown.

Paphinia

CRISTATA (I), brown and yel. GRANDIFLORA (I), yel. and chocolate-purple. RUGOSA (I), light yel. and red-purple.

Pescatorea (Zygopetalum)

CERINA (S), bright yel.; fragrant. DAYANUM (S), yel. and cr.; fragrant. KLABOCHORUM (S), white, brown and crimson, purple.

Phaius

GRANDIFOLIUS (S), brownish-white and brown-cr. HUMBLIOTII (S), rose, white and red, purple. IRRORATUS (S), white and dull rosy-purple. MACULATUS (S), rich yel. WALLICHII (S), orange-yel. or buff, tinged purple.

Phalænopsis

ESMERALDA (S), rose to purple. INTERMEDIA (X, S), white, shaded and suffused rose. JOHN SEDEN (X, S), creamy-white, dotted light brown sepals and petals; lip white, pale rose, purple, and yel. LOWII (S), white and deep rose; deciduous. LUDDE-VIOLACEA (X, S), rosy-purple, mottled white and purple. MANNII (S), greenish-yel., brown bars and dots. ROSEA (S), bluish-white, violet, and yel. SANDERIANA (S), rosy-pink and white, brown markings. TETRASPIS (S), creamy-white.

Platyclinis

FILIFORMIS (S), bright yel.

Pleione (Cœlogyne)

HUMILIS (C-I), white, rose, streaked with brown; fragrant. LAGENARIA (C-I), white, striped and barred yel. and cr.; fragrant. MACULATA (C-I), white, barred cr.; fragrant. WALLICHIANA (C-I), pale-rosy lilac, lip striped white; fragrant.

Promenæa (Zygopetalum)

STAPELIOIDES (S), yel., barred and spotted purple.

ON ORCHIDS—*contd.***Schomburgkia**

CRISPA (1), brown, yel., and white. LYONSI (11), white, purple, and yel. TIBICINIS (1), mauve, cr., white, and rose.

Selenipediums

ALBO-PURPUREUM (X, 1), white and rose-purple. CALURUM (X, 1), white, green, and rose-purple. CARICINUM (1), green and white; small, but beautiful. CARDINALE (X, 1), white and bright rose-purple. CAUDATUM WALLISII (1), altogether a whiter ground-colour, and more delicate markings than in the type. CLIOLA (X, 1), white, green, and rose. CONCHIFERUM (X, 1), green and brown. DOMINII (X, 1), green and brown, purple spots. GRANDE (X, W-1), green and brown. LEUCORHODUM (X, W-1), white and rose; one of the best. LINDLEYANUM (1), deep brown; small. LONGIFOLIUM (W-1), green, purple, and brown. L. HARTWEGII (W-1), brighter-coloured fl; larger. MACROCHILUM (X, W-1), green and brown, long tails; very fine. NITIDISSIMUM (X, W-1), green and brown. PERSEUS (X, W-1), rose, distinct bronzy suffusion. SCHLIMII (1), white and rose. SCHRODERÆ (X, W-1), white and rose; one of the most distinct. SEDENII (X, 1), rose and white; one of the oldest from which most of this section have their origin.

Sobralia

KENESTIANA (1), white. LEUCOXANTHA (1), pale yel., dark yel. throat. MACRANTHA (1), rose, white and yel. in throat. VEITCHII (1), rose, mottled purple and yel. XANTHOLEUCA (1), light yel., deep yel. in throat.

Stanhopea

EBURNEA (1), white; very fragrant. TIGRINA (1), deep orange, spotted purple; very fragrant. WARDII (1), golden-yel., spotted purple; very fragrant.

Thunia

ALBA (1), white and yel. BENSONÆ (1), deep rose, purple, and yel. MARSHALLIANA (1), white and yel.

Trichopilia

COCCINEA (C-1), red and white; fragrant. FRAGRANS (C-1), white; highly fragrant. GALEOTTIANA (C-1), pale yel. MARGINATA (C-1), reddish-purple, yel. and white; fragrant. SUAVIS (C-1), white, rose, purple, and yel.; very fragrant. S. ALBA (C-1), white, yel. throat. TORTILIS (C-1), yel.-green, white, and purple; fragrant.

Vanda

BENSONI (S), yel.-green, reddish-brown, and violet; fragrant. CÆRULESCENS (S), mauve-blue and violet. CONCOLOR (S), cinnamon-brown, rosy dots. CRISTATA (S), yel.-green, buff, and purple. LAMELLATA BOXALLI (S), creamy-white, reddish-purple, and rose; fragrant. PARISHII (S), yel. and deep brown; very fragrant. P. MARRIOTTIANA (S), deep purple and white; very fragrant. ROXBURGHII (S), olive-green, brown, violet-purple, and white.

Zygopetalum

CRINITUM (1), green, brown, creamy-white, and violet-purple. MACKAYI (1), yel.-green, brownish-purple, white, and bluish-purple. MAXILLARE (1), green, chocolate, and bluish-purple.

14.—ON PITCHER PLANTS

(p. 624 to p. 637).

Sarracenia—Species and Varieties

FILDESII, yel.-green, purple veinings; very fine. FLAVA MAXIMA, much larger, and with more prominent markings than the type; one of the finest. PURPUREA, fl. purple; l. dark green, suffused and veined deep purple; hardy. RUBRA, fl. reddish-purple; l. deep green, suffused purple, reticulated with darker purple veinings. VARIO-LARIS, fl. yel.; l. green, spotted with white, near the yellowish summit light reticulated with purple.

Sarracenia (contd.)—Hybrids

ATKINSONIANA, fl. light rose and yel.; l. pale green. CHELSONII, fl. deep red; l. pale green, becoming heavily suffused with dark purple; one of the most effective varieties. COURTII, l. green, becoming suffused cr.-purple and veined a darker shade of purple; a most desirable kind. CRISPATA, l. narrow, of a light green colour. EXONIENSIS, l. very large, green suffused with purple, veined a darker shade of

ON PITCHER PLANTS—*contd.*

purple; one of the finest. MITCHELLIANA, l. green, shading to purple and becoming heavily veined with deep purple; it resembles *S. melanorhoda*. MOOREI, fl. greenish-yel. suffused with different tints of pink; l. green, thickly netted cr. veins and mottled white. POPEI, fl. greenish-yel. flushed with pink; l. green, very narrow. STEVENSII, l. very large, green, with prominent straight deep purple veins, netted smaller veinings of the same colour. SWANIANA, l. green with a network of prominent purple veinings. TOLLIANA, l. green becoming wholly suffused deep purple, red veined with a darker shade of colour. WRIGLEYANA, l. long, recurving at the apex, showing the influence of *S. psittacina*, green becoming suffused with a bright shade of purple, reticulated with a darker in the veinings, mottled white on the upper portions; one of the most distinct and desirable kinds in cultivation.

Nepenthes

ALBO-MARGINATA, pitchers light green, reddish suffusion above. AMPULLARIA, pitchers of a uniform light green. ATRO-SANGUINEA, pitchers reddish-cr., spotted yel. COURTII, pitchers dull green, spotted red. DOMINIANA, pitchers dark green, spotted reddish-brown. HYBRIDA, pitchers dark green. INTERMEDIA, pitchers green, spotted red. KENNEDYANA, pitchers reddish-purple (very distinct); cool-growing. LAWRENCEANA, pitchers pale green, spotted profusely dark cr. OTRAMIANA, pitchers pale yel.-green, densely spotted deep red. PHYLLAMPHORA, pitchers bright green. RATCLIFFIANA, pitchers green, spotted red. RUBRA, pitchers bright red; very large. RUBRO-MACULATA, pitchers yel.-green, spotted claret-red. SUPERBA, pitchers green, thickly spotted reddish-brown. VILLOSA, pitchers dull green, slightly spotted reddish-brown.

15.—ON STOVE PLANTS

Flowering (p. 641 to p. 663).

Achimenes.

ARGUS, rich plum, orange eye; large and free. AURORA, rosy sc., yel. throat. DAZZLE, vivid sc., pale yel. eye; small fl., but very profuse; good habit. ECLIPSE, orange-sc., car. spots; abundant bloomer and good habit. GEM, rich car. purple; small, but very free. GRANDIS, purplish lilac and mauve, throat orange spotted; medium size and free. LEOPARD, bright mag. rose, throat copiously spotted. LONGIFLORA ALBA, white; good habit. LOVELINESS, rich mag., shaded cr., golden-yel. eye, maroon spots; edges fringed. MAGNET, deep orange, cr. spots and zone of car.; distinct and free. MARGARETTA, pure white; medium size. PHŒBUS, purple, merging to orange, throat dark yel., dark cr. spots. PINK PERFECTION, rosy-pink, bright red eye, yel. throat, spotted orange, rays of violet; excellent. ROLLISSONII, deep lav. blue, throat yel., cr. spots; an effective variety. ROSE QUEEN, rosy-lake, shaded deep purple, orange throat; large and attractive. STELLA, deep mag., orange eye; edges fringed; large fl., and freely produced. UNIQUE, rosy-pink, pale orange eye, sc. spots;

fringed; large and handsome. VIOLETTA, rich violet-purple, dark veins.

Amaryllis (Hippeastrum)

ASPASIA, white, feathered light sc. BRENDA, rich cr. DAONES, bright orange-red, margined white. DORIS, dark cr. and maroon. DR. MASTERS, bright car-sc., shaded purplish-cr.; good form and substance. DUKE OF YORK, dazzling sc. EXCELLENT, brilliant sc. and cr., pure white rays. HON. MAURICE GIFFORD, deep cr-sc.; good substance and fair size. J. R. PITCHER, cr.-car., reticulated a deeper tint. KINETON, light red, large white star. LATONA, cr.-sc., green eye. LEOPOLDI, large cr. fl., white star in centre; tips of segment creamy-white. MORNING STAR, scape four-to six-flowered; cr.-sc., bands of white. PERA, brick-red, white markings. QUEEN OF HOLLAND, rose-sc., white stripe. SULTAN, segments reflexed maroon-cr. THE CZAR, rich velvety-cr. VISCOUNTESS HAMBLEDON, bright red, green eye; large, and good shape.

Amherstia

NOBILIS, fl. in drooping racemes, rich var. spotted yel., ephemeral; requires

FLOWERING STOVE PLANTS—*contd.*

great heat and moisture, with plenty of space; evergreen tree of unsurpassed magnificence.

Amorphophallus

CAMPANULATUS, fl. brown, red, and black; herbaceous perennial.

Aphelandra

AURANTIACA, fl. orange-sc. in terminal spikes in winter. *CRISTATA*, fl. orange-sc. Evergreen shrubs.

Arisæma

FIMBRIATA, brownish-purple spathe and slender spadix covered fine purplish threads; tuberous-rooted perennial.

Begonia

ACERIFOLIA, l. lobed liked an Acer semi-transparent, pale green veins; interspaces dark bronzy-green, a silvery blotch; fl. light rose-pink, 2in. in diameter. *ARTHUR MALET*, handsome bronzy l.; rose-pink fl. *CARMINATA*, fl. bright car. pink; very decorative. *MADAME LEONNET*, young l. rose-cr., changing to silvery white; fl. pale flesh colour. *MONSIEUR HARDY*, handsome pink, green, and, bronzy l.; light rose fl. *MYRA*, male fl. bright rose-car., 2½ in. to 3in. in diameter, opening in succession; female fl. a little smaller, and slightly lighter shade; winter fl. *NAOMI MALLETT*, handsome bronzy l.; pale flesh-coloured fl. *WINTER CHEER*, dwarf, compact and free; fl. rose-car., semi-double, 3in. across, useful for cutting and lasting a long time in perfection; an autumn and winter fl. hybrid.

Cienkowskia

KIRKII, fl. pale rose-purple; sweet-scented; herbaceous perennial.

Columnea

KALBREYERIANA, fl. yel., of striking and ornamental appearance; evergreen.

Crossandra

UNDULÆFOLIA, fl. reddish-orange; erect habit; evergreen shrub.

Curcuma

CORDATA, reddish-yel.; herbaceous perennial. *ROSCÆANA*, sc., orange bracts.

Cyrtanthus

SANGUINEUS, fl. orange red and yel., red streaks; bulb.

Cyrtoceras

REFLEXUM, fl. whitish, wax-like; shrub.

Dalechampia

ROEZLIANA ALBA, an evergreen shrub with pretty white bracts. *R. ROSEA*, rose-coloured bracts.

Exacum

AFFINE, fl. bluish-lilac, sweet-scented; a neat-growing and free-flowering perennial. *MACRANTHUM*, fl. 2in. across, rich purple, large bright yel. stamens; annual; sow seeds in April. *ZEYLANICUM*, fl. violet, in panicles; a beautiful annual.

Globba

ATROSANGUINEA, fl. yel., sc. bracts, in terminal racemes; herbaceous perennial.

Gloxinera

BRILLIANT. This is a bigeneric hybrid raised from seed obtained by fertilising a *Gesnera* with *Gloxinia* pollen. It produces good-sized brilliant car.-cr. fl., disposed in a horizontal position.

Gloxinia—Spotted

CIRCE, white, spotted light rose-purple; extra large. *CLARINDA*, white, spotted cr. and purple, and marked cr. lines; distinct and good. *CLIO*, white, mottled ro-y-red; large, good form, and free. *CORDELIA*, violet-purple, densely spotted and freckled in the throat. *HERMIA*, deep violet-purple, shaded maroon, light purple margin; throat white, spotted cr. *MRS. ATKINSON*, rich plum, pure white margin, densely spotted purple. *OCTAVIA*, light blue, profusely spotted violet.

— Drooping-flowered

DIADEM, brilliant sc.-cr., shaded purplish-maroon; extra large. *ECLIPSE*, brilliant cr.; throat lighter, and spotted deep cr. *EXCELSIOR*, flowing cr., shaded sc.; throat white-mottled and spotted cr.; robust and free. *JAMES BARBER*, lower segments rich dark purple, upper violet-purple.

FLOWERING STOVE PLANTS—*contd.***Gloxinia** (*contd.*)—**Erect-flowering**

BEAUTY, purple, white edge, profusely spotted. **CLARIBEL**, white, speckled rose; large, and fine form. **CREOLE**, dark violet-purple, shaded maroon; light blue margin, with darker spots; one of the best in size, form, and substance. **CROWN PRINCE**, delicate blush, cr. blotch on segments; throat pure white. **DUCHESS OF CONNAUGHT**, sc.-cr., margined white; throat spotted cr. **EMPEROR WILLIAM**, deep blue, pure white margin; large, and good substance. **GAJETY**, cr., white-edged; throat light, dotted, cr. **KING OF THE REDS**, bright rosy-red; large, and good form. **MARCHIONESS OF ABERGAVENNY**, white, spotted and freckled purple; large and well-formed fl. **MERIMAC**, deep cr., the narrow pale border freely spotted, cr.; one of the best. **MONT BLANC**, snow-white; free. **MRS. ABBEY**, rich car., dashed white; very large blossoms. **MRS. BAUSE**, pure white, circle of rosy-pink in the throat; large and good. **MRS. NEAL**, cr.-sc., the white border spotted rose; throat stained cr. **NE PLUS ULTRA**, violet-purple, edges lighter; throat well coloured. **NESTOR**, bright sc.; fine-formed fl. **PRINCESS MAY**, pure white; good substance. **RADIANCE**, inside of limb rich velvety-car., outside pale pink; medium size. **ROSE QUEEN**, rose, scarlet flush; brilliant colour and good shape. **ROSY MORN**, rosy-sc.; fine form. **UNIQUE**, magenta-cr., white throat. **VESUVIUS**, sc.-cr., throat lighter and spotted deep cr. **VIOLACEA**, deep, rich, glowing violet; large and free. **VIRGINALIS**, white; free.

Gordonia

JAVANICA (*Schima Noronhæ*), a compact white-fl. shrub.

Griffinia

BLUMENAVIA, fl. white in umbels, streaked and pencilled with rosy-car.; bulb. **HYACINTHINA**, fl. bluish-lilac; the variety *maxima* has larger fl., white, tipped with rich blue.

Hæmanthus

CINNABARINUS, fl. vermilion-red. **HIRSUTUS**, fl. pure white, in dense heads. **INSIGNIS**, orange-sc. **KAL-**

BREYERI, fl. cr., in large umbels. Cape bulbs.

Heterocentron (**Heeria**)

ROSEUM, in panicles of bright rose fl.; an autumn-flowering evergreen shrub.

Hymenocallis

MACROSTEPHANA, a bulbous plant allied to *Pancratium*, fragrant pure white fl., lasting a long time.

Imantophyllum (**Clivia**)

EXCELLENT, orange-sc., with white eye. **FAVOURITE**, light orange-yel. fl., broad segments; of excellent form and very distinct. **LADY WOLVERTON**, fl. bright orange-red, yel. centres. **METEOR**, fl. bright cr.-sc., base of segments yel. - white; excellent. **MODEL**, fl. orange-sc., of good form and substance. **OPTIMA**, fl. bright orange-sc., marked with yel. and white at base; a very superior variety.

Liebigia (**Chirita**)

SPECIOSA, a pretty Gesneraceous plant; fl. white and purple.

Ochna

MULTIFLORA, fl. yel. fragrant, succeeded by attractive fruit; shrub.

Pavonia (**Gœthea**)

MAKOYANA, bracts cr. **WIOTI** (*Gœthea multiflora*), an evergreen, with numerous pink and red bracts.

Portlandia

GRANDIFLORA, fl. white, fragrant, trumpet-shaped, a red tinge inside; shrub.

Ruellia

BAIKIEI, fl. sc. in terminal panicles; a winter flowering sub-shrub. **MACRANTHA**, fl. trumpet-shaped, rosy-purple, prettily veined in the throat; shrub. **ROSEA**, fl. rose in terminal spikes.

Sarmienta

REPENS, fl. sc.; a creeping plant with slender stems; cool, moist position.

Solandra

GRANDIFLORA, (Peach coloured Trumpet Flower), fl. large, greenish-white; requires plenty of space.

FLOWERING STOVE PLANTS—*contd.***Stenogastra (Sinningia)**

CONCINNA, corolla purple and yel., spotted within; thrives under same treatment as Gloxinias. MULTIFLORA, fl. lilac-blue; a garden variety.

Tachiadenus

CARINATUS, fl. white and violet; in terminal cymes; in October.

Uroskinnera

SPECTABILIS, fl. rosy-violet, in close spikes; of easy culture.

Utricularia (Bladderwort)

ENDRESII, fl. bright yel. and orange, much resembling an Orchid, and for which it is often mistaken; a capital basket-plant. HUMBOLDTII, fl. large, pale bluish, on long spikes. MONTANA, fl. white and yel.; suited for a basket near the glass; very handsome.

Xeronema

MOOREI, a Liliaceous plant; fl. bright cr., tubular.

Ornamental Foliage (p. 663 to p. 683).**Aglaonema**

COSTATUM, l. 4in. long, dark green, white spots and midrib. CURTISII, l. broad, ground-colour green, white markings. PUMILUM, l. broadly-lanceolate, deep green, blotched light silvery-green; a charming little plant. VERSICOLOR, an attractive species with different shades of green and milk-white patches.

Alocasia

MARGINATA, l. broadly heart-shaped, 18in. to 24in. long, 1 1/2in. to 1 1/4in. broad, upper surface dark green, midrib and veins reddish, under surface tinted purple, petiole and sheath marked with blackish-brown. PRINCEPS, l. sagittate, margins deeply sinuate, upper surface metallic olive-green with darker midrib and veins, under-surface greyish-green, brown margin, petiole greyish-green, marbled brown. SANDERIANA, leaves somewhat arrow-shaped and lobed on each side, midrib and veins white, ivory-white border on each side, surface glossy green with metallic blue reflections, petiole striated and mottled; very distinct and handsome.

Ananassa

ORTEANA, l. armed with spines, deep olive green with a broad pale yel. band running down the centre.

Anthurium

KALBREYERI, l. rich green, palmate, 2 1/2ft. across; very handsome where room can be spared for its full development; a climbing species.

Aphelandra

MEDIO AURATUM, l. ovate-lanceolate, bright green with a band of yel. PICTURATUM, l. green, rich yel. and creamy-white variegations.

Artocarpus

INCISA (Bread Fruit Tree), an evergreen with dark green l., deeply lobed and cut. LACINIATUS METALLICUS, upper surface of l. bronzy-green, reddish-purple beneath.

Bertolonia

ADOLPHE DE ROTHSCHILD, l. dark green, veins bright rose. ARGYRONEURA, l. bright green, silvery spots and veins; very handsome. COMTE DE KERCHOVE, l. elliptical, dark green, veined and spotted bright pink. COMTESSE DE KERCHOVE, l. dark green, copiously spotted and veined pink. MARGARITACEA SUPERBA, l. brownish-green, silky-white spots. SOUVENIR DE GAND, l. deep green, rosy-magenta veins. TRIOMPHE DE L'EXPOSITION, l. small, red and green, handsomely veined.

Caladium

DONNA CARMEN MACEDO, l. transparent, pink and rich red, dark green veins. DUCHESS OF CONNAUGHT, l. light silvery-green, shaded rose, and veined rose-pink. DUCHESS OF TECK, l. greenish-white, translucent, with reddish-brown spot at the apex of the petiole; a distinct variety of medium habit. DUKE OF YORK, footstalks dark cr., blade bright car., with darker mid-rib and veins. EDITH LUTHER, l. broad, bronzy pink and bright car.

ORNAMENTAL FOLIAGE STOVE PLANTS—*contd.*

veins; distinct. GASPARD CRAYER, l. cr. centre, green margin, veined bright cr. LADAS, midrib and veins car., interspaces lighter and mottled pink. LADY MOSLEY, rose-car. blade with a narrow green margin, veins bright car. LADY STAFFORD NORTHCOTE, an effective variety with arrow-shaped blood-red l. shaded with cr.; one of the best. LE NAIN ROUGE, a small-l. bright copper-red variety. MARQUIS OF CAMDEN, large l. with dark-blood red veins, interspaces glowing red, green margin and a few whitish spots. MARTIN LUTHER, rose-cr., dwarf and compact. MRS. ICEION, l. sulphur-yel., white blotches, violet and cr. tints; a handsomely delicate light variety. MRS. MCLEOD, l. cr. marked darker veins; an excellent variety, belonging to the dwarf section. MRS. MORTER, light pink suffused white, deep car.-red veins and pale green margin. SILVER CLOUD, silvery-white, green spots, and short car.-red veins. SIR JULIAN GOLDSMID, large blade, bright red veins and reticulations, interspaces suffused red as they mature; dwarf and good habit. SIR WILLIAM BROADBENT, veins brilliant car., interspaces green, copiously spotted white. THE MIKADO, centre of blade dark car., shaded with maroon and margins bright green; an effective variety. THOMAS PEED, l. bright rose suffused green at the edges, veins car., good and distinct; of dwarf habit.

Croton (Codiaeum)

DISRAELI, l. trilobate, about 1ft. long, middle lobe elongated, and broadest near the extremity, midrib golden, with a band of yellow on each side, the green portions become bright sc. with age, and beautifully splashed and mottled with rich orange-yel. HER MAJESTY, straight, narrow, clear yel.; l. tipped green. MME. ERNEST BERGMAN, a short broad-l. variety, beautifully marbled with green, bright yel. and cr. MAYI, l. narrow, rich yel., blotched green. MRS. ICETON, a broad-leaved variety in which various shades of yel., green, rose, and car. are attractively blended. MRS. MCLEOD, l. narrowly-linear, 6in. to 10in. long, gracefully arching; midrib bright-coloured, a band of yel. on each side, deep green margins, with various tints

and colourings in l. in different stages of maturity; a very effective decorative variety. M. E. FOURNER, centre of l. rich golden-yel., margins bright green, veined with yel. SHUTTLEWORTHII, l. long, narrow, pendent, slightly twisted, cream and green, with rosy-red midribs. UNDULATUS, l. oblong acuminate, 8in. to 9in. long and 1½in. to 2in. wide, with undulated margins, most handsomely blotched and mottled with cr., pink, and yel., midrib purplish, very handsome.

Curmeria

PICTURATA, dwarf-growing, l. heart-shaped, light green, a prominent white band running the entire length. WALISII, l. ovate-oblong, spreading, irregular patchings and markings of dark green, yellowish-green, and greenish-grey; dwarf and distinct.

Dieffenbachia

BRASILIENSIS, l. 18in. long, 9in. wide, deep green, suffused and spotted with greenish-yel. and white. ILLUSTRIS, l. lanceolate-acute, dark green, irregularly blotched and mottled with white and yel.-green; excellent exhibition. IMPERIALIS, l. deep green, irregularly blotched and spotted with creamy-yel., and white and greyish mid-rib; a bold-growing, handsome kind. JENMANII, l. broadly lance-shaped, deep green, with transverse white lines and blotches; distinct and ornamental. MAGNIFICA, l. shining sombre green, with dense spots and blotches of silvery-white occurring in the spaces between the secondary nerves; of compact habit. TRIUMPHANS, l. ovate lanceolate, attenuately acuminate, 12in. long, 5in. wide, dark green, with large angular blotches of yel.-green; of somewhat spreading habit.

Dracaena

A. LAING, l. gracefully arching, 2½ft. long, 1½in. broad, cr.; decorative; of good constitution. DUCHESS OF YORK, l. 10in. to 15in. long, 1in. broad, when young light green with cream-white margins, tinted with rose-pink; mature l. dark olive green, with bright car. margins; a good table plant. MALLETTII, lower l. slightly drooping, upper erect, 2ft. long and 4in. broad, bronzy-green, with car. margins; young

ORNAMENTAL FOLIAGE STOVE PLANTS—*contd.*

l. highly and brightly coloured; vigorous habit. MRS. LAIRD, l. narrow, somewhat erect, and bright cr. when quite young; decorative. THE SIRDAR, l. 8in. to 10in. long by 3in. broad, olive-green, with car. margins, young leaves whitish, tinted with rose; of dwarf, compact, arching habit. WARRENII, l. 15in. to 20in. long, deep bronzy-cr., young leaves margined with bright car.-red; a sturdy hybrid, thriving and growing freely in small pots; hence useful for vases and table decoration.

Ficus

RADIANS VARIEGATA, l. irregularly margined with creamy white; an effective pot or basket-plant, of easy culture.

Graptophyllum

HORTENSE (NORTONII) (Caricature Plant), l. variegated and marked in such a curious manner that portraits of individuals are easily imagined.

Maranta

LEOPARDINA, l. yel.-green, with oblong pairs of dark velvety-green blotches on each side of the midrib; semi-deciduous. LINDENII, l. 6in. to 12in. long, dark green, with yel.-green blotches on each side of the midrib, under-surface purplish-rose; free-growing species. MAKOYANA, l. 6in. to 8in. long, 4in. broad, marked and freckled with white and dark-green blotches, under-surface cr.; of dwarf, dense, spreading habit. MASSANGEANA, l. with silvery midrib and veins; various shades of green and velvety-maroon are attractively displayed in the markings; dwarf and distinct. ROSEO-PICTA, midrib bright rosy-red, a rosy band running round within and almost parallel with the margin. SPLENDIDA, l. shining dark green, blotched with light green or greenish-yel. TUBISPATHA, l. ovate-elliptic, 8in. to 12in. long, light-green, with oblong deep brown blotches on each side of the midrib; of easy culture; semi-deciduous. VEITCHII, l. ovate-elliptic, 18in. long, rich glossy-green, with crescent-shaped designs along each side of the midrib, consisting of different shades of green, yel., and white; a highly-desirable species. VITATA, l. ovate-acuminate, 9in. long, 2½in. wide, with transverse silvery-white lines on each side of the midrib; good habit and constitution.

Miconia

HOOKERIANA, l. olive-green, silvery midribs; an ornamental shrub.

Monstera

DELICIOSA, l. dark green, often curiously perforated with holes; a well-known evergreen Aroid noted for its delicious tropical fruits.

Nephtytis

PICTURATA, an Aroid, with variegations resembling Fern fronds in white on a green ground between the nerves of the leaves.

Pandanus

BAPTISTII, l. gracefully arching, spineless, 1ft. to 2ft. long, and not more than 1in. broad; sometimes wholly green, but occasionally traversed throughout the whole length with white lines. JAVANICUS VARIEGATUS (syn. P. CANDELABRUM VARIEGATUS), l. narrow and pendulous, white spines, bright green ground, pure white bands of variegation. PACIFICUS, l. glossy-green, spines on the margins and midnerve; of bold aspect and compact habit. VANDERMESCHII, l. stiff, somewhat erect, glaucous green, margins and spines reddish; nice habit when young.

Ravenala

MADAGASCARIENSIS (TRAVELLER'S TREE), l. blue-green; called Traveller's Tree on account of the water found stored up in the sheaths of the l.-stalks when pierced with a knife; a bold Musa-like plant.

Schismatoglottis

CRISPATA, l. oval, 12in. long by 7in. broad, of a pea-green ground, silvery-green variegations; a distinct Aroid, of dwarf and compact habit.

Sonerila

FRANCIS MARCHAND, l. dark brownish-green, heavily mottled grey. HENDERSONI MARMORATA, l. ovate, silvery pearl-like markings on a dark olive-green ground; dwarf and compact. H. WALTER, l. 3in. long, 2in. broad, greyish-veined, spotted dark green, under-surface reddish-purple. LADY BURTON, l. silvery, green reticulations. MRS. H. WALTER, l. pale brown, numerous grey spots.

ORNAMENTAL FOLIAGE STOVE PLANTS—*contd.*

MADAME LANGENHOOL, l. dark brown, grey spots.

Terminalia

ELEGANS (POLYSCIAS PANICULATA), l. pinnate, bright green, handsomely netted reddish-brown; a fine handsome shrub, best known in gardens under the first name, which is not, however, correct; of a very attractive character when well grown.

Theophrasta

IMPERIALIS (CHRYSOPHYLLUM IMPERIALE), l. 3ft. long and 8in. wide, sharp spines at the margins; a handsome shrub. JUSSÆI, l. spreading, linear-oblong, armed on the edges with rigid spines. MACROPHYLLA (CLAVIJA REIDELIANA), l. deep green, rigid, 2ft. long; a handsome shrub.

Climbers (p. 683 to p. 696).

Abrus

PRECATORIUS, l. pinnate; fl. pale purple; seeds bright shining sc., with a shining black spot; these are used for making necklaces and rosaries in tropical countries; deciduous.

Camoensia

MAXIMA, fl. white, drooping, the margins of the petals tinged with yel.; very handsome.

Cissus (Piper)

PORPHYROPHYLLUS, l. heart-shaped, 4in. to 6in. long, and 3in. to 4in. broad, rich bronzy-green, with numerous pink spots and freckles, under-surface purple.

Dioscorea

DISCOLOR, l. heart-shaped, prettily mottled with different shades of green, under-surface rich cr.-purple. RETUSA, l. digitate; leaflets oval, veined; fl. creamy-white, in slender pendulous axillary racemes; fragrant; suitable for growing on an umbrella trellis or as a roof-rambler in an intermediate temperature.

Echites

RUBRO-VENOSA, l. emerald-green, with bright red and golden venation; of neat habit.

Hexacentris (Thunbergia)

MYSORENSIS, fl. purple and yel.; free-growing. M. LUTEA, a variety of the former; fl. rich yel.

Mimosa

ARGENTEA, l. silvery-grey; of neat habit.

Pergularia

ODORATISSIMA, fl. greenish-yel.; very fragrant.

Philodendron

ANDREANUM, l. large, green and bronzy, 2ft. to 3ft. long and 10in. broad; a striking and effective Aroid; very useful for decorative purposes. LINDENI (VERRUCOSUM), l. heart-shaped of a satiny-green, with metallic blendings, under surface pale green, with bands of maroon.

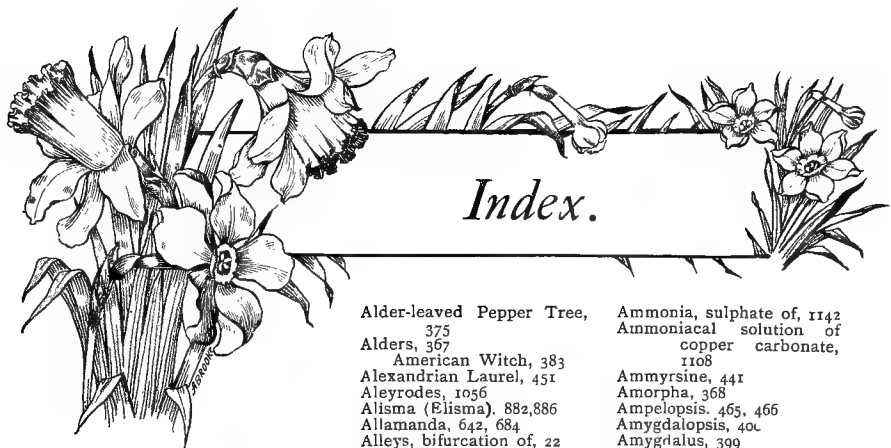
Smilax

ORNATA (S. MACROPHYLLA MACULATA), l. somewhat heart-shaped, deep green, with silvery-grey markings between the veins, branches armed with prickles. There is O. MARMOREA, l. prettily marbled.

Stigmaphyllon

CILIATUM (GOLDEN VINE), l. cordate, glaucous, ciliated on the edges, fl. rich orange-yel.; in large umbels.





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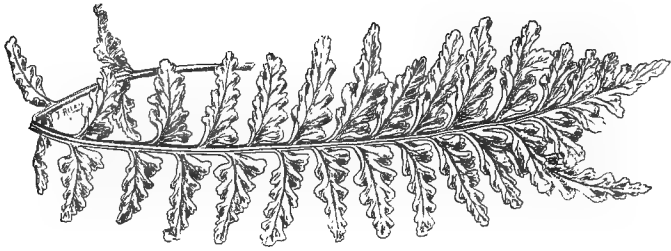
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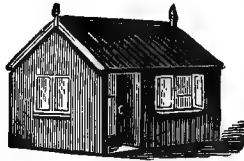
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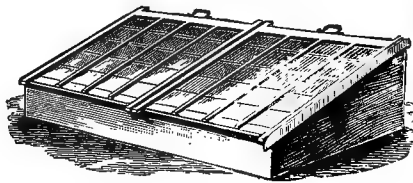
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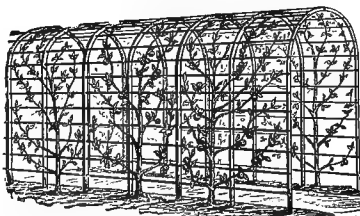
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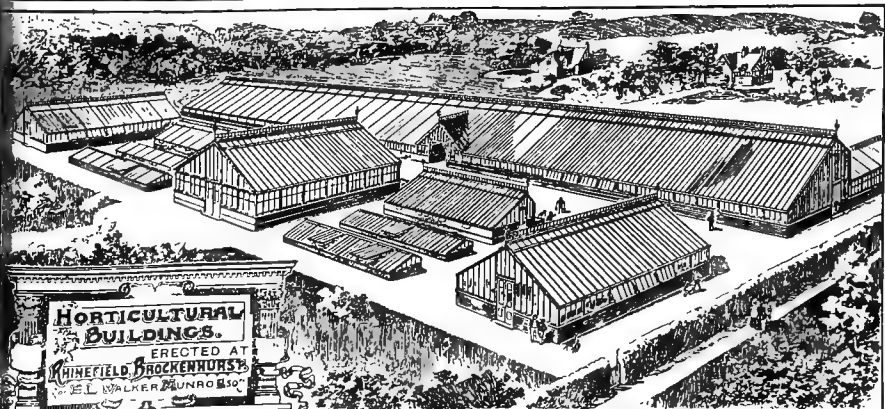
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