

# **Plant Culture**

**C. W. OLIVER**

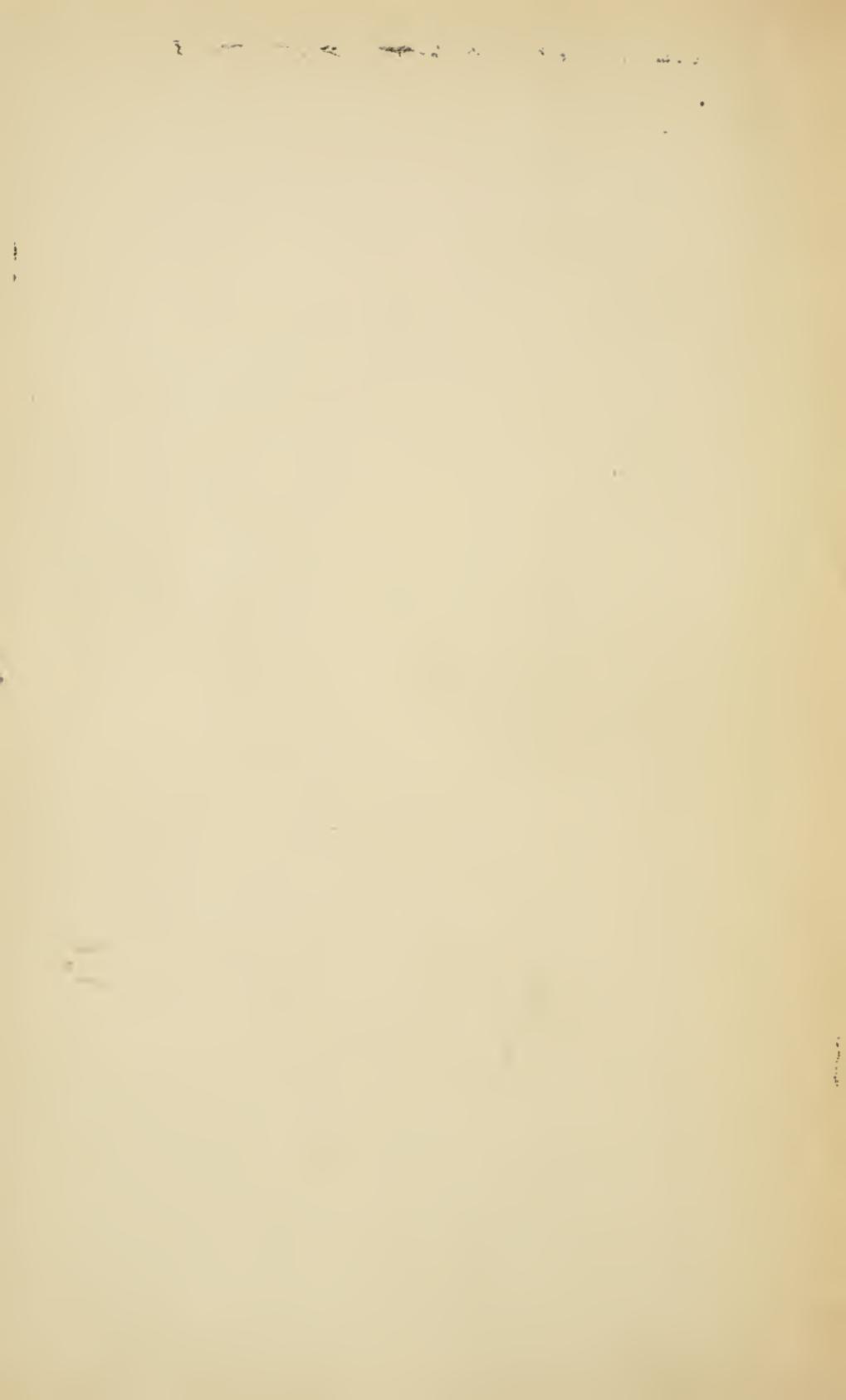
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# PLANT CULTURE.



# PLANT CULTURE

A WORKING HAND-BOOK OF EVERY  
DAY PRACTICE FOR  
ALL WHO GROW FLOWERING AND  
ORNAMENTAL PLANTS  
IN THE GARDEN AND GREENHOUSE

BY

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## PREFACE.

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In nearly all of the recent works of this nature, appearing in America, the subjects dealt with have been confined, more or less, to those plants that can be and are cultivated by commercial florists for profit, or by those who own conservatories. And while the present book includes all this class of information it has a far wider scope treating, as it does, on the care and management of a diversity of plants not touched upon by other writers, all equally necessary in the adornment of our gardens and homes and, for this purpose, as beautiful and interesting as those that generally receive the greatest attention from authors of most horticultural works. Divested of superfluous verbiage, and shorn of perplexing technicalities which tend to confuse, the cultural directions here given can be easily and successfully followed, the results contributing to the perfect enjoyment of "the purest of human pleasures," by some, and affording to others a lucrative occupation.

What I have given here are teachings gleaned and sifted from the experience of many years' work as a gardener and florist. The methods described are such as have been successfully practiced by me and can be safely relied on as up-to-date and thoroughly applicable to American conditions and requirements.

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While the notes have been made short, they will, nevertheless, in most cases, cover the essential points in the methods of raising and caring for the plants named, and be understood by the average reader as easily as if they had been dealt with in longer articles. Hitherto, the information available on the subjects treated upon has, for the most part, been widely scattered in numerous magazines and books, many of which are expensive; and it is often found necessary to search through a mass of technical details in order to find the required information. It is to be hoped that the present volume will, in great measure, reduce the difficulties referred to, and render the art of plant cultivation profitable and enjoyable to the many whose tastes are horticultural.

GEORGE W. OLIVER.

Washington, July, 1900.

# CONTENTS.

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	PAGE
Stove and Greenhouse Plants	9
Bedding Plants	50
Vase and Basket Plants	65
Vines, Hardy and Tender	67
Bulbous Plants	79
Ornamental Grasses	92
Water Plants—Aquatics	96
Ferns and Lycopods	101
Hardy Perennial Plants	111
Hardy Shrubs	147
General Directions	176
Propagation	176
Seeds	176
Grafting	178-180
Budding	180
Layering	181
Hybridization	182
Potting Plants	182
Soil	185
Mulching	185
Watering	186



## Stove and Greenhouse Plants.

**ABUTILON**—Several of the varieties having ornamental foliage, such as *A. Darwini tesselatum*, *A. Sellonianum marmoratum*, *A. vexillarium* and *Eclipse*, are good bedding plants. The last two are useful for vases and boxes. All of them have the leaves blotched with yellow. *Souvenir de Bonn* and *Savitzii* are variegated with white. Cuttings are rooted in the Fall, or may be taken in early Spring from lifted and cut back plants. The varieties grown for their flowers are numerous; the colors are pink, red, white and yellow. They are everblooming.

**ACACIA**—Seedlings of Acacias are not to be recommended for small flowering plants, on account of their lanky growth. Not only are plants from cuttings most floriferous, but they are easier trained to any desired shape. They should be taken from the half-ripened shoots during the month of June. A peatty soil mixed with half sand should be used, as the roots will take nourishment from it immediately they are formed. Make the cuttings with a sharp knife and take off the leaves from the part which is to go in the soil with a small pair of sharp scissors. The pots for rooting the cuttings in should be prepared carefully—rough crocks in the bottom and finer above, until they are filled to within two inches of the rim. The remaining space should be filled with finely sifted peat and sand in equal parts topped off with pure sand. Dibble in the cuttings to the depth of about an inch and not too crowded. They must be kept "close" during the operation of rooting, and as cool as possible. The pots, which may be plunged in sand, should be covered with a movable glass structure. A good plan is to have two sets of those hand-light or bell-glasses, and instead of wiping the moisture from them daily, remove the wet ones and slip over them those which are dry. After the first watering the cuttings will take but little more during the process of rooting; when they do require it the foliage should be allowed to dry before putting back the covers. *Acacia Riceana* is perhaps the finest greenhouse species for very large plants. *A. pubescens*, *A. Drummondii* and *A. paradoxa* are all good greenhouse species, flowering well on moderate-sized specimens. Sandy loam, to which a goodly quantity of leaf soil or peat is added, will suit them. Firm potting and good drainage are necessary. Plunge the plants outside during Summer, and give liberal supplies of water when the plants are well established.

**ACALYPHA HISPIDA**—Large plants in pots are speedily produced by using a goodly quantity of bone meal in the soil. Grow in a high temperature. If tall plants are wanted, keep nipping out the flower spikes as they appear in the axils of the leaves. When the plant reaches the desired height nip out the ends of the shoots; this will cause branching.

**AGAPANTHUS UMBELLATUS**—The African blue Lily is a desirable plant for cool greenhouses, and ornamental either in or out of bloom. In general appearance it resembles the *Imantophyllum*, but the flowers

are bright blue, a great number of them being produced in an umbel supported by a long, stout stalk. The Agapanthus is one of those plants which have the appearance of doing well with cramped root room, so there is a temptation when potting other things to leave the plants for another year; but this practice is carried on at the expense of the magnificent heads of flowers, which get smaller and smaller until a season goes by without any being produced. This species sometimes stands the Winters at Washington, D. C., in sheltered positions. There are several varieties—the white, double-flowered and the variety with variegated leaves being the most conspicuous.

**AGATHÆA CŒLESTIS**—A cool greenhouse, low-growing shrub with blue, daisy-like flowers produced principally in Winter. Cuttings should be taken from the soft wood in Fall and Spring. It will stand full sun at all seasons.

**AGAVE AMERICANA** and its variegated forms, together with several other more or less ornamental species, are much cultivated in pots and tubs. They grow best in rather poor but well-drained soil, and are increased by seeds and offsets. The flowering period of adult specimens is hastened by keeping them in a pot-bound state. On the other hand, growth of foliage is accelerated by giving abundant root room.

**ALLAMANDAS**—Among the select flowering plants for temporary or permanent use in tubs we must include the large flowering allamandas known as Cathartica, Schottii and grandiflora. They will thrive in shade or sun; where a little shade is available the flowers naturally last longer. The flowers are large, almost the size of the moonflower, but more lasting, the shoots ramble over the sides of the tubs. Procure some young plants in the beginning of May and a little later plant in the open to make growth for cuttings. After cutting them back for propagation lift and pot, partly resting them for the Winter. For immediate effect after planting out start early in the Spring; one plant to a tub, among other things, is sufficient. The best upright growing species is named Williamsii, a grand plant either for boxes, tubs or for bedding out; it is easily propagated in the Fall from ripe cuttings. The larger flowered kinds, when represented by large plants, are very desirable for isolating on a lawn. A good, rich, light soil is necessary, and if a tub is used for the plant put enough drainage in the bottom so that the plant when knocked out of the pot will rest on the drainage. Ram the soil firmly around the ball, shorten back the strong growths and stand the plants in a partly shaded spot, syringing frequently. In a few weeks' time, the kinds grown under the names Wardleana, Hendersoni and Schottii, will give an abundant display of their wide, trumpet-shaped, yellow flowers. When trained near the roof of a warm greenhouse they may be had in bloom the greater part of the Winter months. In fact, they can be so managed as to have them bloom at any time of the year, by first resting the plants, pruning back and encouraging the root growth. Cuttings of the ripe wood will root in a warm propagating house at any season.

**ALOCASIA**—Although among the most ornamental of stove plants, none of them can be put to much use outside of these structures. Out

of a large number of species and forms, *A. metallica*, *A. Sedenii*, *A. Thibautiana*, *A. Sanderiana* and *A. macrorhiza variegata* are well known. The two last named are increased by offsets; the others, by cutting up the succulent stems of old plants. Put the pieces in damp moss, in a propagating frame, with a temperature of 80 degrees. After sprouting put them in a potting mixture similar to that given for *nepenthes*. The plants must be shaded from the sun at all times, and grown in a minimum temperature of 60 degrees.

**ALOYSIA CITRIODORA**—The sweet-scented verbena, grows very strongly when planted out, finishing up the season by covering itself with myriads of small, insignificant flowers. It is a very popular plant, on account of its sweet-smelling leaves, being almost identical in this respect with those of the lemon grass and *Eucalyptus citriodora*. Keep some old plants over Winter; start them early in Spring and root the growths, as soon as they get enough length to them, in warm sand bed.

**AMARYLLIS**—See Bulbous Plants.

**ANANAS**—*Ananas Porteana* is hardly worth growing for its variegation when we have the splendid variegated forms of the common pineapple—*A. sativa*. In a warm, sheltered place all of the kinds do well out-of-doors in Summer, where they put on exquisite colorings. If grown large enough the plants will fruit in the same way as the green-leaved forms. In fact, it is best to allow them to fruit, as subsequently they form suckers the more readily. These suckers may be rooted in sand, not too moist, but very warm. After being potted off and taken with the soil a little they will stand full sunlight without injury.

**ANTHERICUM VARIEGATUM** is a good all-round plant for vases, bedding, or potted for window decoration, although for the last-named purpose it is surpassed by the variety known as *A. media picta*. If the plants which were lifted in the Fall are allowed to bloom, and the flower stalks remain on the plants afterward, a good opportunity to increase the stock of plants presents itself during February. All along the flowering stems will be found a crop of small rosettes of leaves which, if cut off, stems and all, and laid on the sand in the shaded part of a warm house, will send out roots in a short time. Large clumps of *A. variegatum*, which have been hibernating under benches, should be broken up about the end of January and potted in 3 and 4-inch pots. They may be placed under benches where the light will strike them for at least a portion of the day.

**ANTHURIUM**—The species of this genus are grown either for foliage or flower. None of them has handsome foliage and showy flowers combined in the same plant. *A. crystallinum*, *A. Veitchii* and *A. Warocqueanum* are very beautiful foliage plants, but the flowers are inconspicuous. On the other hand *A. Andreanum*, *A. ornatum* and their numerous hybrid progeny, together with *A. Scherzerianum* and varieties, have rather ordinary-looking leaves; but in each case the inflorescence is exceedingly attractive. The showy part of the inflorescence is what is termed the spathe, answering the same purpose as calyx and corolla in other flowers. Their cultural needs are: temperature, 65 to 85 degrees;

shade at all times, lightest in Winter. The potting mixture should be rough, fibry peat, sphagnum, decayed cow manure and sand, except for *A. Scherzerianum*, which needs less sphagnum and more peat. Water should be copiously supplied in the growing season. Toward the end of January, with increasing sun heat, these plants will soon commence active growth for the season. Before this takes place they should be looked over for the purpose of repotting or for rooting any tall or straggling growths which have grown away from the sphagnum in the pot. In this condition the roots, which are formed at the bases of the lea stems, shrivel up for want of moisture and the plant becomes shy in blooming. Cut off the shoots that are in this condition and put in a mixture of sphagnum and sand in a warm part of the propagating bench; keep moist and roots will form in abundance in about three weeks, when they should be potted up in the usual way. Old plants should have the lower part of the stem and roots removed and sunk lower in the pot, using a mixture of fibrous peat, sphagnum, well decomposed cow manure, charcoal and sand. This treatment applies only to such kinds as *A. Andreanum*, *A. ornatum* and their numerous hybrid progeny, all of which produce very showy flowers which may be used to advantage associated with those of orchids. Their cultivation is exceedingly simple where sufficient heat is at command, a minimum temperature of 65 degrees F. being necessary.

**APONOGETON DISTACHYON**—This is not a greenhouse plant, but, where opportunities offer, it certainly should be grown as such. It is known as the Cape Pond Weed. The flowers, arranged much in the same way as those of the *Ouvirandra*, have large, showy white bracts; very sweet smelling. In its native haunts the seeds germinate on the surface of the water, forming very small tubers which, when the leaves decay, sink to the bottom of the pond and become established there.

**ARALIA**—*Aralia Veitchii* and *A. gracillima* are readily rooted if the cuttings are taken at the proper time; that is, when young shoots develop on a cut-back plant, and they are removed with a heel and kept in a close, warm propagating frame. But this is a slower method than grafting if the necessary stocks are at hand. *A. Guilfoylei*, or any of the woody species of *Panax*, make good enough stock on which to work them. Select long, wiry wood for cions—that which is not too thick and well ripened. In the cions a piece of the stem to each leaf is all that is necessary. Cut the stock clear across and down to as near the soil as possible; make an incision in it downward for three-quarters of an inch. Make the wood of the cion wedge-shaped to fit the incision, and tie to keep in position till united, during which process they should be kept in a rather warm, humid atmosphere—a moderately warm propagating frame will answer. The leaves of the cions, if too large, should be shortened back a little. March is the best month in which to perform the operation.

*Aralia Chabrierii*, so called, strikes so readily from cuttings put in a cool house that there is no necessity for grafting them.

*Aralia (Fatsia) japonica* is conceded to be one of the best plants for decorative purposes, but like several other good things in this line it is

not got up in any very great quantity, possibly from methods of propagation not being evident. It is rather backward in producing seeds in this country, although moderately large plants flower freely enough. From cuttings, by topping old plants, it is rather slow. It is said to vegetate from pieces of the roots. I have not tried this method. Seeds are obtainable from some of the European firms at reasonable prices. These should be got hold of during March or April and sown then, as they do not retain their vitality for any great length of time. Firm the soil in the seed pans before sowing, and cover with a mixture of loam and sand; place in a temperature suitable for warm greenhouse plants, shaded from the sun. The seedlings, as soon as large enough to handle, should be potted off singly into 2-inch pots, and when in 4-inch pots they should be plunged outside during the Summer, in a frame covered with slats, or with sash-tilted top and bottom alternately. When large enough for a shift they should get it, as they suffer from being root-bound. Old plants will stand considerable frost, but the young plants are always more tender and should on the approach of cool weather be given protection.

**A. J. variegata** is a highly ornamental form.

**ARAUARIAS**—In the propagation of the Araucaria a good plan is to procure seed and sow at the end of the year. The seedlings are, of course, not well-furnished at the base, but they make good stock plants and cheaper ones than can be procured otherwise. The finely ripened tops of the seedlings are so easy to root that, with ordinary care, it is almost impossible to lose a cutting. Moreover, the cut-back plants will immediately begin to throw up good leaders, which in turn are used for cuttings. In taking cuttings from plants which have attained considerable size, the lateral branches may be rooted along with the tops—not for making specimen plants, because this is impossible, but for the purpose of providing material for cuttings; for, when cut back, they will throw up leaders, which are as good as the best. The soil for propagating should be sandy, and pressed firmly about the base of the cuttings, which should be kept in a frame shaded from sunlight, with enough moisture in the atmosphere to keep them from wilting. Keep the temperature a little higher after the cuttings have callused. Most of the plants used in this country (principally *A. excelsa*) are imported from Europe. This Araucaria is a native of Norfolk Island and is known as the Norfolk Island Pine. The best place for the plants in Summer is under a structure covered with slats, in which similarly constituted plants may pass the hot months.

**ARDISIA**—The red-berried ardisia, *A. crenulata*, continues to be one of the most attractive Christmas plants. It can be recommended as a first-class window subject, owing to its apparent indifference to a little cold or occasional neglect in the way of watering. Seeds may be sown during the latter part of January. Plants over one year old are never without a crop of seed at any season, if they are in good health; and frequently we see them with two crops at one time along with the flowers, which in a short period produce the third crop of berries. The old fruits have usually a grimy appearance from hanging so long on the

bush. When there is any choice in the matter the oldest berries should be taken for sowing, as they will be the first to fall from the plant. Wash the pulp from around the seed and sow immediately, affording a quarter of an inch of soil above the seeds, firming well and giving the pots or boxes a position in a cool house. Keep the soil moderately damp, with abundance of air during mild weather. Conditions such as these will give the seed ample time to germinate and make plants in 4-inch pots by the following Fall. Cuttings root freely in sand, but do not make as symmetrical plants as seedlings. When the old plants get leggy the tops are easily rooted by making an incision in the stems and tying moss around them. These tops make very fine dwarf specimens.

**ASPARAGUS**—As pot plants there are only three species of any value; these are *A. plumosus nanus*, *A. tenuissimus* and *A. Sprengerii*.

**A. plumosus** is a very distinct plant from *A. plumosus nanus* and probably is a distinct species. (See Vines).

**A. plumosus nanus** makes a profusion of short growths from the base, and may be kept in this condition by pot culture and pinching shoots that show a tendency to run up; for it will grow 30 feet high under proper conditions. Dividing starved plants is the readiest method of increasing stock. Wash out the roots and place the divisions in moderately wet sand, to make a few roots before potting.

**A. tenuissimus** should be rooted from cuttings. Unlike the other kinds it is easy to manage in this respect.

**A. Sprengerii** does best where its branches are allowed to hang down instead of being planted in a bed like the better known *A. plumosus nanus*. The ideal method is to have the plants in large wire baskets suspended from the roof of a house; and where the plants underneath don't suffer from drip or shade this system will work all right. Where a large supply of this green is wanted the north wall of a house may be used economically by erecting trough-like receptacles running the entire length of the house. The top one may be as near the glass as possible, the next in front 6 or 8 inches lower down, and so on, giving enough room to prevent crowding of the branches. Old plants may be divided for planting out, and for small specimens in pots, which are useful in associating with ferns. Seedlings are easily raised. The plants ripen seed in midwinter. If cleaned and sown as soon as ripe the seeds germinate quickly.

**ASPIDISTRA**—The usual way to increase the stock of these very valuable decorative plants is to divide up large specimens into small pieces, potting and keeping close until they make fresh roots. A method requiring a little more work, certainly, but giving salable plants in a shorter period, and more of them, as every small piece will grow, is to shake the old plants out, disentangle the rhizomes as carefully as possible, and wash clean, saving every little piece that is likely to grow. Cut the rhizomes into small pieces, with roots attached, and put in the sand bed to make fresh roots; subsequently put in small pots and keep close for a few days. *A. elatior* and *A. elatior variegata* are the ones most com-

monly grown. It is said that *A. lurida* is hardy as far North as Philadelphia.

**ASPLENIUM**—See Ferns.

**AZALEA**—Indian Azaleas used so extensively for Winter and Spring flowering are European grown. They arrive in the Fall in wonderfully good condition, as a rule.

**The Newly Imported Plants**—These should not be potted in the first kind of soil that comes to hand; rather choose that which is as far as possible like the material in which they have been grown. Firm potting is very very important. The rootlets are exceedingly fine and they make but little progress in loose soil when in pots. Examine the roots carefully before potting, and if the balls are at all dry, stand them in a tub of water until wet through; allow to drain, then pot. This treatment should be given to all plants of the same family, such as Andromedas, Kalmias, Ericas, Epacris and Rhododendrons, as they all have roots of the same nature. For the first week or two after potting put the plants in a deep frame with the sash kept on; and for those which are meant for later flowering this frame, if frost can be kept out of it, will be the proper place to Winter the plants.

**Removing Side Growths**—Azalea plants which for forcing purposes are in a comparatively high temperature, and otherwise under conditions with which they are unaccustomed, will push out growths at the bases of the flower buds; especially is this the case with plants the roots of which are in perfect order. This tendency is shown less earlier in the season than later on, but whenever it does occur, the sooner the growths are removed the better are the chances for the perfect development of the flowers.

**Treatment During Summer**—Azalea plants left unsold in Spring will increase in value if they are properly handled during the Summer months. It pays to grow on imported Azaleas, from small plants into big ones, because, when lifted in the Fall, they are equally as good as, if not better than, imported plants for general use, and much better for forcing. About the beginning of May stand the plants which have been in the greenhouse in a cold frame or a sheltered spot outside, to gradually harden them off previous to putting them in the ground, so that when that operation is performed they will not get chilled at the roots. In a few days prepare a bed for them; dig a trench of sufficient size for the balls, keeping the sizes together. Scatter a couple of inches of leaf mould and sand in the trench; knock the plants out of their pots, if necessary reduce the balls a little; place in the trench, fill in with a mixture of leaf soil, sand and loam, ramming it firm around them. Some lath slats on very hot days, pinchings when necessary and frequent waterings with the hose, will be all that is required for the next five months. At the expiration of that time they will have ripened their growth for the season, when they may be lifted and the balls reduced in size so as to go comfortably into the proper-sized pots.

**BEGONIA**—This genus is a deservedly popular one, as it possesses numerous species and varieties, useful either as greenhouse, window or

bedding plants. Nearly all of them will grow in a wide range of soils. Two parts loam and a third of equal parts decayed cow manure and sand will be found to answer the requirements of most of them.

**Sowing Seed**—The seeds of all Begonias are very minute and should be sown on finely sifted and previously watered soil, without covering, excepting perhaps a very fine dusting of silver sand. The pan may be covered with glass until germination takes place.

The tuberous rooted section behave grandly in some parts of the country when planted out. In the warmer localities they do not thrive. The tubers are Wintered much in the same way as those of Caladiums or Gloxinias. Young plants are raised from seed in Spring, but they bloom late.

**Winter Bloomers**—*Begonia Gloire de Sceaux* is a hybrid between *B. subpeltata* and *B. socotrana*, the latter being one of the parents of the wonderfully floriferous *Gloire de Lorraine*. *Gloire de Sceaux* is a trifle miffy and that is probably the reason we see less of it grown than we did a few years ago. Flowering wood is not the best for cuttings. Young plants are best started from the leaves. When well flowered it is a very effective plant for decorations, owing to the bronzy color of the foliage and bright pink flowers. Paul Bruant is one of the best flowering of the genus, and one which does well in a house window; the foliage slightly resembles that of *B. Gilsonii*, another good Winter bloomer, with double flowers, said to have been raised before the War of the Rebellion by a colored man named Gilson. Its history would be interesting, seeing that it is a shrubby kind with the flowers double. President Carnot, after having grown this hybrid since it was sent out a few years ago, I have come to the conclusion that the best way to manage it, in the absence of a place in the greenhouse, where it can be planted out, is to put it out in the open lot in the Summer, where it is encouraged to make all the growth possible; lift with a good ball, pot carefully, when it will flower in midwinter most profusely. The large clusters of female flowers are one of the most attractive features in the greenhouse in midwinter. Two other good Winter blooming species for house culture are *B. manicata aurea* and *B. acuminata*; the former has light pink flowers and yellow spotted leaves; the latter small, crisp-looking foliage and pure white flowers.

**Begonia Corallina**—To grow this species from seed is rather unsatisfactory; it takes the best part of a year to bloom and then, as a rule, many of the seedlings are inferior to the forms already in cultivation, the most noticeable point being their lack of free-blooming qualities. Cuttings of this, the queen of shrubby Begonias, either for bedding purposes or pot plants, should always be preferred, as they begin to flower shortly after being potted off. It is a species which stands very rich soil. Other good shrubby kinds are *B. nitida* and *B. nitida alba*, *B. incarnata*, *B. fuchsioides*, *B. Saundersii* and *B. semperflorens gigantea rosea*.

**Begonia Gloire de Lorraine** was raised about nine years ago. It is a hybrid between *B. socotrana* (a species discovered in the Island of

Socotra, by Professor Baley Balfour) and the old B. Dregei. As a Winter bloomer it is perhaps the finest of all recent hybrids. The first growths made by the rooted cuttings all go to flowers, afterward some growths more or less vigorous are made from the base. These make excellent material for cuttings. Young plants are also raised from mature leaves. The shoots should be allowed to be well above the sand before being potted. The floriferousness of this Begonia may be partly accounted for by the fact of its being almost without female flowers, and also by the stamens producing little or no pollen. Among a large number of plants I have seen only a very few female flowers, and these are, so far as noticed, only produced at the very ends of the flowering stems. The pollen is produced exceedingly sparingly, many of the flowers having none at all.

**Rex Begonias, Leaf Cuttings of**—After the rush of propagating the soft wooded plants in the Fall the cuttings of the Rex Begonias may be put in the sand bed. Select the mature leaves of those plants which are growing in a rather cool house. The pieces for cuttings will answer all right if they be cut in a triangular shape, three inches each way. The part to be inserted in the sand should end with one of the thick ribs or veins which are prominent on the undersides of the leaves. From a medium-sized leaf eight or ten cuttings can be got. Put them in the sand to the depth of about an inch and maintain a moderately humid atmosphere to prevent wilting. Place in thumb pots as soon as the leaves show above the sand. The old leaves are sometimes used entire, first by giving a few cuts across the principal ribs, then placing them flat on damp sand or moss. The other method is to be preferred, because more plants can be got from one leaf. It is equally as quick, and takes up much less room on the propagating bench. So far as color is concerned few of the newer sorts are improvements over the better known kinds, such as Philadelphus, Inimitable, Silver Queen, Fire King, Mrs. Rivers and Marshalli.

**BOUGAINVILLEA**—There are at least five kinds in cultivation. *B. spectabilis* is as free blooming as any, but only on large specimens. It is very useful for training along the roof in the same way as *B. glabra*. A season of rest, followed by severe pruning, usually induces an abundant flowering growth. *B. glabra Sanderiana* differs from the type in being smaller in the flower and more floriferous in a small state. Small specimens from cuttings, rooted in the beginning of the year, will bloom the following Winter; but larger plants take a couple of years to develop. They should be allowed to make their growth out-of-doors, either in the small or large state. There is not much to be gained by planting out, as they make few roots. Plunging answers well enough, with a shift in midseason, if necessary. After the plants are brought indoors the large, soft growths may be shortened, and an intermediate temperature maintained until the plants are started into growth, when more water and heat are given. After they have made a start, doses of weak liquid manure are beneficial. When in bloom, gradually harden off, or the flowers will fall in showers.

**BOUVARDIA**—A much grown Winter-flowering plant some years ago; now comparatively few are to be seen. Young plants are raised early in Spring, from small pieces of the roots, placed in flats of sand and kept in a warm house. For the first week or two cover the surface of the sand with damp sphagnum moss; this will encourage the formation of buds on the roots. When the growths are of sufficient size, put in 2-inch pots, shifting into 3-inch pots, and plant outside during the latter part of May. To make bushy plants the leading shoots should be pinched repeatedly. About the middle of September, or earlier, according to location, the plants are lifted with balls of earth attached, and either planted on benches or put in pots. Keep the atmosphere moist and close for the first few days, and the plants shaded from the sun. A minimum temperature of 55 degrees is necessary for perfect development. Pink, white and red are the prevailing colors.

**BROWALLIA**—*B. Jamesoni* is a useful plant for late Winter flowering. It is naturally a low-growing soft-wooded evergreen shrub, with a rather straggling appearance. When grown as a standard it is an extremely ornamental subject. For this purpose take strong shoots for cuttings, and grow to single stems, removing the side shoots and stopping the main shoot when the desired height has been attained. In Summer the plants may be plunged in a bed of ashes and frequently fed with liquid manure. They need full sun. *B. elata* will bloom all Winter in a cool conservatory. It is annual in duration. Seeds should be sown the latter part of August; a few in a 4-inch pot. Discard the weakest seedlings, leaving three or four in a pot, and shift into 6-inch pots to bloom.

**BRUNFELSIA**—About half a dozen species are common in cultivation. Out of this number there are at least two well worthy of attention as pot plants—*B. (Franciscea) latifolia* and *B. eximia*. The former is very free in producing flowers, and is one of the best plants to put out in the permanent bed of a warm conservatory. The plant flowers during the late Winter months from the wood made the previous Summer. On first expanding the flowers are light purple, changing as they grow older to pure white. Old plants sucker freely, and if severed an inch or so beneath the surface of the ground and put in the propagating bed, they will quickly form new roots and develop into specimens large enough for 5-inch pots within a year. These plants should be grown indoors all the year round. Winter is their resting period, and during that time they should be watered but sparingly. The soil should be of fibry loam, sand and lime rubble; a small quantity of leaf mould may be added. In rooting any of the kinds, take very large pieces; dust the cut part with powdered charcoal; allow it to dry, then put in a pot of dry sand and keep dry till rooted.

**CALADIUM**—See Bulbous Plants.

**CACTUS**—This name is applied to all the members of the family. Formerly it was the adopted generic name of a large number of plants which are now divided into several genera. Quite a number are hardy in the Middle Atlantic States, among these are *Opuntia arborescens*, *O. Rafinesquii*, *O. vulgaris*, *O. missouriensis*, and one named *O. phæacantha*.

Some of the gaudy-flowered greenhouse kinds, such as *Cereus flagelliformis*, *C. speciosissimus*, and the much admired night bloomers *C. grandiflorus* and *C. Macdonaldiae*, when in good condition, so far as the drainage and soil in the pot are concerned, may be plunged in a sunny spot out-of-doors, where they will make growth much superior to that attained in the greenhouse. If the plants are in good health wet seasons will do them no harm.

**CALATHEA**—Usually known as Marantas. They are grown solely for their ornamental foliage, nearly all of the species having beautiful markings. It is doubtful if any other genus shows greater variation in this respect. Most of the kinds are stove plants, growing in shade all the year round, with a minimum temperature of 60 degrees. They need an abundance of water at all times. In Winter, when the benches are apt to get dry quickly, the pots should stand on a layer of sphagnum moss. Some of the species will succeed in a temperate house, and a few of the stove kinds may be subjected to a lower temperature, without injury, after they have made their growth. Some of the best-known stove kinds are as follows: *C. Baraquiniana*, *C. bella*, *C. fasciata*, *C. Kerchoviana*, *C. Lindeniana*, *C. Makoyana*, *C. albo-lineata*, *C. roseopicta*, *C. splendida*, *C. zebrina*, and *C. Veitchiana*. Those which may be grown cooler are *C. tubispatha*, a species which loses its leaves and goes to rest for the Winter; *C. illustris*, *C. Leitzei*, *C. Massangeana*, *C. pulchella* and *C. intermedia*. The last two resemble *C. zebrina* in the upper portions of the leaves, but the inferior margins are almost green. None of the species should be allowed to flower, as this only weakens the plants; and seed is not necessary, as they all divide very freely. During the growing season, if drained thoroughly, they can hardly be over-watered.

**Propagation**—Calatheas, which are freshly divided, should not be potted in fresh soil until new roots have been formed. This condition may be brought in the following manner: Knock the plants out of the pots before growth commences; wash the soil from among the roots; prune out those not wanted, and divide into clumps, not too small, say large enough to go into a 5-inch pot, and put in the propagating bed. Let the air be close and moist, and the glass shaded. When a few fresh roots have been formed they take very quickly with the soil after potting.

**CALCEOLARIA**—The Calceolaria, both shrubby and herbaceous, is as well known in western Europe as the Zonal Pelargonium in America. The shrubby kinds are there much used in bedding, producing very gaudy effects. They delight in a cool, moist atmosphere, and our hot Summers make short work of them. The herbaceous hybrids are raised from seeds sown about the month of August. The seeds are very small and should be sown on the surface of the soil and pressed down, covering with glass until the seed leaves can be seen. At all times the plants require a cool, airy spot when in the greenhouse. From the seedling stage until the plants are likely to get hurt by frost they should be kept in a frame. Greenfly is their greatest insect enemy, and must be prevented from gaining a foothold on them by fumigation. Several of the

species of *Calceolaria* are much easier to grow than the hybrids, and some of them are very ornamental. *C. scabiosæfolia* may be flowered a few weeks from the seedling stage by starving in small pots. It may, however, be grown 3 feet high by shifting when necessary. Seeds may be sown from August to January. The soil should be of an open nature; cow manure and leaf mould should form one-fourth of the mixture.

**CALLISTEMON SPECIOSUS**, and one or two other species, make interesting flowering plants in early Spring for a cool conservatory. Young plants are gotten up from seed, but they take a longer time to flower than when raised from cuttings; neither are they so free blooming. They may be treated much in the same way as *Acacias*.

**CAMELLIA**—Some old plants of these relics of the past will occasionally be found in old-established greenhouses. They are kept, especially the white varieties, solely for the flowers, which are used in making up designs. In private and public gardens we see them oftener, and in such places they should be more grown, as they are capable of making exceedingly attractive displays during the Autumn and Winter months. The varieties are perpetuated by cuttings of the ripe growths in late Summer, or by grafting before the growth starts, using stocks of strong-growing kinds, raised from cuttings. Potting is best done after the flowers fall off. Loam two parts, peat or leaf mould one part, and about one-sixth of the whole, sand, will make a good potting compost. They thrive best with limited root room.

**CANNAS FOR WINTER BLOOMING**—During Winter these plants respond very readily when anything like fair treatment is given, in the production of large heads of bloom. In fact, in a warm, sunny house, many of the kinds are equally as fine as they are in Summer, and some of them last longer in bloom, owing to the conditions for the production of good flowers being more under control. The orchid flowered Cannas, that is, those having *C. flacelida* blood in them, are not well suited for outdoor work, as their flowers are too soft to withstand the glare of the hot sun; but for pot plants in Winter they are useful. The plants may be started in small pots, giving larger ones as growth is made. They are gross feeders, and will take rich soil supplemented by occasional waterings with liquid manure.

**CARLUDOVICA**—About six species are in common cultivation. They are usually taken for palms, so closely do they resemble some kinds in the foliage; but they are not even related. The one most commonly grown, and perhaps the most useful for the florist, is named *C. palmata*; in leaf somewhat resembling a *Livistona*. From the seedling stage they develop rapidly into specimen plants. Old plants flower freely. The seeds are small and thin, about the size of those of *Mignonette*. Wash carefully from the surrounding pulp and sow in a box of finely chopped sphagnum. They germinate in three weeks. Let them grow in this until large enough to put three round the edge of a 3-inch pot, from these shift into 5-inch pots. With us the plants are useful for planting outside in shaded places in Summer, and if slightly hardened off they may be used in decorating. All the kinds are stove plants.

**CENTRADENIA**—Of this there are three species, combining handsome foliage and rather pretty flowers. *C. grandifolia* has the largest leaves, and is the most useful for decorative work. The other species are *C. floribunda* and *C. rosea*. Cuttings will root at any time of the year. To get good growth on the plants during Summer they should be started from cuttings in March. An intermediate house suits them; they require but little shade.

**CENTROPOGON**—*C. Lucyianum* is said to be a bi-generic hybrid. The parents are given as *Centropogon fastuosum* and *Siphocampylus betulaefolius*. It is one of the very best stove or warm greenhouse herbaceous perennials. There is no great difficulty in its cultivation; but it is seldom seen in collections. The flowers are rosy carmine, produced in midwinter. After blooming numerous small shoots will usually appear along the branches; these taken off with a heel root with bottom heat. The young plants will thrive in heat and moisture during the first two or three months; they may afterwards be grown in a frame. After the blooming season is over the old plants may be given a period of rest, and then repotted, using a light, rich material.

**CESTRUM CORYMBOSUM** and ***C. NEWELLI*** may be used for flowering about Christmas, if young plants are started about the end of August, the wood to be taken from old specimens planted out. As soon as rooted put in 3-inch pots, afterward placing three together in a 6-inch pot to bloom. Keep in a sunny house, or the plants are apt to make too much foliage.

**CINERARIA**—For coming into flower during March and April sow the seed during September. As soon as large enough the seedlings should be put in 2-inch pots, and from that time on they must not be allowed to get in a pot-bound state. The coolest house, with a maximum amount of light and air, is what they need. Soil should be light and well enriched.

**CONVOLVULUS**—This genus possesses many weedy plants which, when once they gain a foothold in the garden, are difficult to eradicate. Several are very ornamental when in bloom. One of the best, especially for baskets, an evergreen, with short pendulous growths, is named *C. mauritanicus*. The flowers are blue, and about an inch across. This plant is usually increased by division, or cuttings of the ripe growths early in Spring. Seeds are also offered.

**CORDYLINE**—The greenhouse Cordylines, such as *C. australis*, *C. indica* and its forms, are best raised from seeds which are easily procurable. Sow thinly, as they will not require to be transferred during the earlier stages of growth. They are good decorative plants, from 5-inch pot plants up, having long, narrow strap-shaped drooping leaves. Small plants are useful for mixing with other subjects in vases and baskets, as they stand full sun.

The ornamental leaved kinds, which need a higher temperature for their perfect development, are very numerous. Some of the best known are *C. Baptistii*, *C. Cooperii*, *C. porphyrophylla*, *C. Youngii* and *C. terminalis*.

nalis. Especially from the last-named species many varieties have been raised. Propagation is quickest brought about by cutting up the long stems into pieces about 3 inches in length; put in warm sand and keep moderately damp. They will throw up shoots from each eye; these should be taken off and put in the sand to form strong, fresh roots, as they are provided, when attached to the parent stem, only with very weak roots and sometimes none at all. They will root quickly, and may be potted according to their size, in 2 or 3-inch pots, and grown on quickly in a high, moist temperature. When they reach a marketable size the hardening-off process is necessary, or they will not stand long when used for decorating. In *C. neo-caledonica*, *C. brasiliensis* and *C. amabilis* the thickened root stocks may be cut up into pieces along with the stems for propagation. *C. Cannæfolia* does not succeed so well when cut up into small pieces. It is a splendid decorative plant, standing much rough usage. Moss the tops and afterward place pieces of the stems, at least a foot long, in the bench of a cool house, as they take their own time in sending up growths. The species and forms with highly colored foliage will need a minimum temperature in Winter of at least 55 degrees. The others will do all right with the thermometer 15 degrees lower. With the greenhouse kinds loam should predominate in the potting soil, but the others should get a greater quantity of leaf soil.

For other kinds commonly grown see *Dracæna*.

**CROTON**—The Croton or *Codæum*, as it is now called, has in the warmer parts of the country forged its way to the front as a choice bedding plant, and very deservedly so, as the species and varieties are a very satisfactory class of plants and much easier to handle than was generally supposed a few years ago, when they were coddled all the year round in hothouses. Several of the kinds are so easily grown that they can be got up with as little trouble and as cheaply as geraniums; but they are, of course, not the choicest varieties. Those stock plants which were planted out early in May (that is a safe period here, but, of course, later in colder latitudes) will, by the middle of August, have made good ripened wood, which should be selected for propagating early in September. The cuttings at that period should be large and put in the bed with only a few of the lower leaves removed. Let them form quite a large bunch of roots in the propagating bed before being potted, as they are a trifle miffy to take with the soil when they have only a scanty supply of roots—enough to comfortably fill a 4-inch pot will be about right. Those plants will need shifting during the Winter, and if kept in a warm, moist house, will be well furnished plants in 5 and 6-inch pots by bedding out time. The principal batch of the commoner kinds for bedding may be put in by the middle of January. The old plants which were lifted from the beds in the Fall should be pruned back severely, and all the growth available for propagating selected. A good bottom heat and a humid atmosphere are necessary to root the cuttings at this time, as the wood is not in a very ripe condition. Cuttings put in at any time should not be taken from plants which are dry at the root, as they are then apt to lose leaves in the cutting bed. Cuttings 8 or 10 inches in length root as easily as the easiest rooting soft-wooded plants if given a good bottom heat and a depth of 4 or 5 inches of sand. There

is no necessity to have a frame; the open propagating bed will answer nicely. Those plants which are intended to be planted out-of-doors should have the hardening-off process begun by the end of April; if taken directly from a hothouse the bottom leaves will fall off. Old plants which did duty during the Summer months as bedders, and which were planted out instead of being plunged in pots, should be kept well syringed after being potted and housed, as they are very liable to the attacks of thrips and red spider. When plants intended to be lifted in the Fall are put out in May, I believe it is the best plan to sink pot and all. They seem to thrive best with restricted root room so that when lifted, although a few roots may be developed on top and outside the pot, it is safer when lifted to shift them into larger pots than to lift and pot plants which have been growing in the soil of the bed. With these it is almost certain to be the case that a considerable number of leaves will be lost. Most of the finer kinds will need a temperature of at least 60 degrees by night, keeping the air moist and giving water by frequent syrингings. Large cuttings in the sand bed or propagating frame should be examined now and then, to guard against thrips and red spider. If these pests appear, a syringing with a weak solution of the old reliable Gishurt's Compound will prove beneficial.

**Ringing Crotons**—This simple operation is brought into requisition when it is desired to root the top part of any particularly fine specimen. The stem of the parent plant may be destitute of leaves for a considerable distance above the pot, making the plant comparatively useless as a specimen and only useful as a stock plant. Ringing, if successfully performed, will give an almost perfect plant a foot or so high with large leaves right down to the soil—a condition we can hardly hope for from cuttings. Moreover, the rooted top sends out such a mass of working roots that the succeeding growth is not stunted, but continues making leaves every bit as large as the lowest ones—a condition much to be desired when an evenly built up plant is wanted. Plants, then, should be selected which have good, healthy tops with finely-colored, well-developed leaves, and if the bottom part near the pot has lost its leaves this is the only use it can be put to. The house in which the operation is performed should be a warm one and shaded from the sun, so that the material used to produce roots will not dry up too quickly. Select those pieces which are dormant or have made their growth, because if plants are taken during the process of making leaves they are bound to carry some disfigurement afterward. The stem at the place to be rooted should be denuded of the leaves for two or three inches of its length, and with a sharp knife remove a small section of the bark; or, just as good, make an incision in the wood upward of about three-quarters of an inch in length, and in depth from one-third to one-half the diameter of the stem. Insert a little sphagnum moss to keep the incision open, then tie a small quantity around it, not too much or it will be apt to keep too wet. After being tied small enough, so that the fingers can easily close on it, stand the plant back in its place and see that the moss does not suffer for want of water, because should this happen the tender tips of the roots will be lost and the process of rooting will to a certain extent have to be begun again.

As soon as the roots show through the moss the plants should be potted, but not potted in the ordinary way. Many pots are broken trying to get plants out of them, but in this case we will have to break pots to get the plants in. Thumb pots are quite large enough for the first shift; and these must be broken into two pieces lengthwise. One-half of one pot and one-half of another will not do, as the pieces must fit closely, therefore break as many pieces as are wanted, and lay the pieces one on top of the other before beginning the operation of potting. Supports must also be supplied, consisting of two sticks, one on each side, and reaching to the mossed part of the stem. On one of the sticks, just about where the middle of the pot will reach, twist a piece of wire, then clasp the moss with the two pieces of pot, twist the wire firmly around these and then on to the other stick. This will keep the pot in position until the time to sever the top from the plant. This condition will be indicated by the roots appearing through the bottoms of the pots. If the tops are not of the largest size they can be cut off and placed in a close frame for a few days before potting on; if, instead, they are large, a further application of material to the mossed part will be necessary. For this purpose 3-inch pots will have to be used, and the material should be fibrous peat, sand and loam mixed. When the roots show, the tops may be cut off. Stand the pots inside of others of the same size in the frame, until they recover to a certain extent, then pot and keep close for a while longer, gradually giving air.

**CURCULIGO**—From the general appearance of the foliage one would suppose that these plants were members of the Palm family instead of being related to the Amaryllis. The leaves resemble those which are undivided of *Cocos flexuosa*. *C. recurvata* is the only species grown. The form with variegated leaves is one of our handsomest variegated plants. During growth they require stove temperature for their perfect development. They stand in a dwelling house fairly well. Propagation is by division. Almost any kind of soil will answer; but as the plants need large quantities of water the drainage should be perfect.

**CYCAS**—*Cycas revoluta* stems are often spoiled as a result of the treatment they get in the way of potting immediately after being imported. Having few or no roots they should not be placed in large receptacles, as the soil when once watered takes too long a time to dry out, and is apt to become sour, which is anything but a favorable condition to tempt the growth of fresh roots. Put the stems into as small pots as they will go, leaving just enough space to ram the soil tightly around them with a thin piece of wood. They will start into growth best when in a warm, moist house, and require little water until they show signs of sending up a crop of leaves. Plants of this class make their annual crop of leaves, not one after the other, as is the case with Palms, but simultaneously, and at this period they require close watching, so that the foliage may be prevented from being deformed in any way from insect attacks, cold drafts, or coming in contact with other things during development. The temperature should be higher at this period than at any other. When roots are formed and a sufficient time has elapsed after the development of the fronds, the plants may be given

larger pots. A minimum temperature of 50 degrees will suffice during Winter.

**CYCLAMEN**—Cyclamen seeds, to insure even germinating, should be sown as soon as convenient after ripening. The seeds ripen from April to June. The sowing season is from September to the beginning of December, and the seeds, between the harvesting and sowing periods, should be kept in an open-mouthed bottle, mixed with dry sand. Although the seed may be held for years it loses in vitality the longer it is kept. The best flowered Cyclamens are varieties of *C. persicum*. Several named varieties are offered by the large dealers, but when once a satisfactory strain is secured the best plan is to set aside a few plants of each color, and by artificial pollination each flower will ripen a capsule of seed. To have plants in bloom by Christmas the seedlings will consume from 12 to 14 months in completing their growth, and during that period they should never be allowed to rest by withholding water, or be subjected to other conditions unfavorable to continuous growth. The seed should be sown in shallow pans or boxes, in light sandy soil, and covered to very little more than their own depth with finely sifted soil and sphagnum, two parts of the former to one of the latter. The swollen root-stock is formed before the first leaf makes its appearance, and when the first leaf is fully developed the seedlings are ready for pricking off. During this process a minimum temperature of 55 degrees will be sufficient. The seedlings may be put directly into thumb pots, pricked off around the sides of 4 or 5-inch pots, or into shallow boxes, keeping them at all times near the light, and in as uniform a state of moisture at the roots as possible. By the middle of May those in the most advanced stages of growth should be in 4-inch pots. At this time they should get the full light from the north side of a house, the plants being placed on inverted pots, and as near the glass as possible. The glass on the south side should be shaded. For Summer quarters frames are the best. The bottom should have a few inches of ashes to retain moisture. The sash may be raised a few inches above the woodwork by running pieces of wood along top and bottom. The best shading device is probably a piece of cloth fixed to a roller, so that it may easily be stretched over the glass during the hottest part of the day, or the glass may be covered with one of the shading mixtures. Heavy rains should not strike the plants, but they will be benefited by removing the sash in the evenings, replacing them as the temperature gets too warm the following morning. Greenfly, the cyclamen's greatest insect enemy, may be removed by periodical syrings, or by scattering tobacco stems among the pots. The plants should be shifted on as necessary, the very latest ones getting their last transfer about the 1st of November, the earliest plants at least a month sooner. Well-developed specimens should easily fill an 8-inch pan. The soil should consist of loam mixed with lesser quantities of old manure and leaf mould; a little sand and crushed charcoal will help to keep the mass in a porous condition. In potting, the corm, or swollen stem, may be half buried in the soil; careful drainage is necessary. As soon as there is danger from frost the plants are removed indoors; and to give good stiff stalks to the flowers

full light and an abundance of air should be afforded on all favorable occasions.

**CYTISUS** in one or two forms is mainly grown as a midspring flowering plant. Cuttings are rooted in February. The young plants may be grown on in frames. Frequent syringings are necessary to combat the attack of red spider. Pinch back the strong growths as soon as they show a tendency to outgrow the others. Keep cool during Autumn and the early Winter months.

**DALECHAMPIA ROEZLIANA** belongs to the same family as the Poinsettia, and, like it, grown solely on account of its bracts, which are rose colored. It is a warm house plant, but may be plunged outside in Summer to make abundant growth.

**DESMODIUM GYRANS**—A plant of little beauty, but very interesting because of the movements of its lateral leaflets, which are continuous in a suitable temperature. Propagated by seeds or cuttings in a warm house.

**DRACÆNA**—*D. Godseffiana* is a plant of recent introduction; the leaves are short, somewhat resembling in shape and coloring those of the old *D. phrynioides*. *D. Godseffiana*, however, has the markings lighter. When planted out in Summer, and well supplied with water, it makes considerable growth. Every small twig may be rooted. Perhaps the best use to which it may be put is in association with small ferns in pans.

**Dracæna Sanderiana** I am afraid will never occupy a very important place among decorative plants, because single plants do not make much of a show in 5 or 6-inch pots. On account of its variegated foliage and slender habit it can be used among ferns and mosses for jardiniere work. Pieces of the stem with two or three leaves attached root quickly with bottom heat. If wanted for filling pots above 5 inches, three or four must be potted together.

**D. Goldieana** is a handsome stove plant with short, broad leaves, irregularly marbled with dark green and dull white. Tops may be rooted and the canes left to sprout; or they may be cut up, sprouted and rooted, as in the case of *Cordyline terminalis*.

**D. fragrans**, the most useful of the genus, grows 12 feet high, but small specimens are well furnished with leaves. The plants will stand much rough usage.

**D. Lindenii** and **D. Massangeana** are variegated forms. In propagating, when the stems have leaves, cut into lengths with a leaf or two to each, and root like ordinary cuttings. These make stock plants. Long leafless stems should be cut into lengths of about a foot and buried in warm sand and moss. They sprout freely; the sprouts should be taken off and rooted afresh before potting. The plants need slight shade in Summer. All three require abundant root room and well enriched porous soil, else they will show a sickly yellow hue on the leaves.

**DROSERA BINATA**, the finest of all the Sundews, a native of Australia, growing about 1 foot in height, will succeed in a cool greenhouse. Give soil same as recommended for *Nepenthes*, covering with live moss. This is an exceedingly attractive plant for private greenhouses. In early Spring the leaves catch myriads of male greenfly; and the plant may be regarded as a friend of the horticulturist.

**DICHLORIZANDRA THYRSIFLORA**—Of the *Tradescantia* family, and usually grown as a stove plant. In this capacity, unless given abundant root room, the flowers are not produced in abundance. South of Philadelphia it may be used as a choice subject for the open border in Summer. The flowers, of a rich dark blue and the stamens yellow, are borne on the upright shoots of the current year's growth, which is about 2 feet in height. The flowering shoots may be cut in pieces, with a single leaf to each if necessary, and rooted in the hot propagating bed. They may be kept in a semi-dormant state during the Winter, as the plants will form thick tuber-like roots.

**DIEFFENBACHIAS**—Some of the old plants of these ornamental aroids will, by the end of Summer, have grown lanky, bending over the pots, with only a few leaves terminating the stem. Take the tops off and put them in the sand bed; lay the stems aside in a warm, airy place to dry for three or four days, then cut them into lengths of about 2 inches. Lay these aside to dry for a similar period, first rolling them in powdered charcoal to lessen the danger of decay. Put in a box of nearly dry sand, cover over about an inch and stand on the floor of a warm house. When a few small leaves have been made to each sprout, pot in a mixture containing at least one-third of its bulk of chopped sphagnum moss; keep warm and moist. The tops, as soon as fairly well rooted, should be potted, not in ordinary soil, but in a mixture of chopped sphagnum, manure, leaf mould and sand. In this mixture the roots fairly revel, provided a strong moist heat is given. In potting Dieffenbachias put them into as small pots as possible, and when a shift is necessary they may be placed three together in a pot, making a well furnished appearance in a comparatively short time. *D. Barquiniana*, *Jenmanii*, *Veitchii*, *Bausei* and *grandis* are among the best. They won't stand much rough usage, being somewhat soft in the foliage; they are, however, easily got up in quantity.

**ECHEVERIA (COTYLEDON) GIBBIFLORA METALLICA** takes a prominent place among serviceable flowering plants during January and February. It is one which is attractive either in or out of bloom, and its cultivation is unattended by any serious difficulties. When done blooming, which will be in a short time, its propagation may be gone about as follows: Take off the top of the main growth with as much stem attached as will enable it, when rooted, to go 2 or 3 inches into the soil; to root them, take as many 4-inch pots as there are tops, stand them on the bench, put a little moss in the bottoms, and then place a cutting in each; this will cause the cut part to callus over without the danger of rotting. In a short time the stems will give out hair-like roots, and when these are from one-half to three quarters of an inch long, the cuttings may be potted, using soil on the dry side, and kept rather dry

until the plants have made roots enough to demand water. On the old stumps rosettes of leaves will form, which in time may be taken off and potted.

**EICHORNEA**—The Water hyacinth, *Eichornea crassipes* may be utilized as a most attractive tub plant in the following manner: Put, say three plants, in as many 5-inch pots of rich soil; fill a tub with water and sink the pots just under the surface. Beyond wanting water to replace that lost by evaporation they will take care of themselves; the surface will become a thick mass of plants, with fresh flowers opening every morning. Although this plant floats on water naturally, without the roots being fixed in soil, it also flourishes in saturated ground at a surprising rate, keeps a fresh, green appearance, and produces myriads of flowers; it is well worth a trial for unsightly marshy spots.

*Eichornea azurea* is an interesting relative of the above, with darker colored flowers. It is useful for planting around the margins of ponds, covering quite a large water surface during a Summer's growth. Both species are easily kept over Winter by placing a few on the surface of a warm tank. They increase very rapidly during early Spring.

**EPIPHYLLUMS**—Epiphyllums are usually grown as standards; that is, grafted on the stems of other plants. This method is necessary, because the branches have a procumbent habit when the plants are on their own roots. Rooted cuttings may be grown on and used in baskets or other hanging receptacles. The species, three in number, and the numerous varieties make very handsome Winter-flowering plants. Their cultivation is simple. The stocks for grafting are usually *Pereskia aculeata* and *P. Bleo*. The latter is the more robust grower, and therefore most suitable for tall specimens, *P. aculeata* being used for dwarf ones. Cuttings of the Pereskias, which, of course, belong to the Cactus tribe, may be rooted any time after the wood is fairly ripe. They may be put in a dry and warm part of the propagating bed, and given water only after they show signs of sending out roots. To graft, select stock in which the wood is sufficiently firm; cut off the top part, make a cut down the center for three-quarters of an inch or so, then insert a piece of the ripened growth of the Epiphyllum, and run one of the *Pereskia* spines through the whole to keep it firmly together, or tie with raffia until the union is completed. This will be effected in a few weeks in a good growing temperature. Have the Pereskias in as small pots as possible at the time of grafting, so that when the union between stock and cion takes place the plants will start growing quickly by being shifted into larger pots. The potting mixture should be very porous, as the least stagnation is fatal to the roots. Sandy loam, broken brick, old manure and a little leaf soil will be found best.

**ERANTHEMUM PULCELLUM** produces one of our brightest blue flowers. It is at its best in the greenhouse during late Winter. Put in cuttings during early Spring; plant in the open border as soon as weather permits, lift and pot in the Fall. Splendid specimens may thus be secured.

**ERICAS**—Several years ago the growing of these plants in this country for commercial purposes was regarded as an impossibility, even by those who were familiar with their culture in Europe. But now, we have them grown here as well as anywhere, simply by studying their needs, and carefully attending to their wants. Propagation of the several varieties may be effected during April before the active growth of the season gets too far advanced. Have no undesirable vegetable humus or mud in the sand. Secure a good-sized bucket, fill with sand and push the end of the hose to the bottom, allowing the water to run with considerable force for a few minutes. This will clean the sand of all impurities. Pans or pots for the cuttings should have perfect drainage to within two or three inches from the surface; give about an inch of peat or leaf mould and sand at the bottom, covering with an inch or so of sand, which should be made firm. Keep close under glass while rooting at a temperature never above 60 degrees F. During the Summer months keep the roots cool by plunging the plants in some porous material, never allowing them to get too wet or too dry. It may be stated here that roots of plants are divided into four classes—nutritive, attachment, contractile and storage. In the Ericas the nutritive roots are most abundant next the flower pot, so that an equable condition of moisture is necessary to their existence.

*E. persoluta*, *E. melanthera*, *E. gracilis* and *E. hyemalis*, are a few of the very many kinds grown.

**ERYTHRINAS** which are planted out in the back part of a cool frame adjoining a greenhouses, for the sake of their flowers in Summer, should get a mulching of stable litter to keep their roots snug for the Winter. In the colder parts of the country the covering should extend a foot or more up the stems, so that there will be no danger from freezing. In pruning leave as much of the stem as possible, only cutting off enough to enable the sash to slide into place. *E. crista-galli* and the variety *E. laurifolia*, together with *E. Hendersoni*, are the best for this purpose. Old plants which have been bedded out for the Summer will Winter all right beneath a bench, in a cold house, with some soil thrown over the roots. *E. Parcelli* and *E. marmorata*, both varieties of *Indica*, have variegated foliage.

**Propagation**—By the beginning of February start some of the old plants of *E. crista-galli*, or any of its forms; they are far the best for Summer work. If not in pots the old stumps may simply be covered over at the roots with moss and given a minimum temperature of 55 degrees. Syringe occasionally to encourage growths for cuttings. As soon as these growths are in the neighborhood of 4 inches in length take them off with a heel, put in 2-inch pots, using a sandy mixture, and keep them confined in a warm propagating case until they root; shift into larger pots and gradually harden off.

**EUPATORIUM PROBUM** is the name of a species of this popular Winter flowering genus which we do not see much of, and which may be grown to come in after the well-known *Stevia serrata* goes out of flower. The flower heads are as large as those of *S. elegans*. The only drawback to

its use as a cut flower is the clammy or viscid nature of the stems and leaves. The plant is said to be a native of Peru; it was introduced nearly thirty years ago, but has never become popular, supposedly from its being confined to European gardens ever since. Two desirable Winter bloomers with dark lilac or purple flowers, are known as *E. ianthinum* and *E. macrophyllum*. They are of little service for cutting from. Plant out in late Spring after they are done flowering. This will give good material for cuttings in September. *E. macrophyllum* is the stronger of the two. Cuttings grown on in a warm, sunny house will fill 5-inch pots by the first of March, and have very large panicles of flowers.

**EUPHORBIA (POINSETTIA) PULCHERRIMA** —Poinsettias are grown not on account of the flowers, which are small and inconspicuous, but for the highly colored bracts which surround them. The flowers are produced in midwinter. Both for cutting and as pot plants Poinsettias are highly popular. There are three kinds in cultivation—*E. pulcherrima*, which is most commonly grown; *E. p. plenissima*, having a larger number of bracts, and *E. p. alba*, with creamy white bracts. The kinds are propagated in two ways, from dormant wood and from green cuttings. In employing the former method the old plants, after the flowers have been cut, or in the case of pot plants, after the flowers have decayed, the stems should be allowed to ripen thoroughly, by gradually withholding water and subsequently placing them beneath the stage of a warm house; while there they should be kept free from moisture at the roots. During March the canes which can be spared should be taken off and cut into lengths of about 4 inches. After the milky sap has stopped exuding from the lower part of the cuttings, they should be washed in warm water and dipped in powdered charcoal previous to being placed in the warm propagating bed. While rooting the sand should be kept on the dry side, only giving enough water so that the roots will obtain sufficient nourishment. Instead of being allowed to make long, spindling roots in the sand they should be potted in thumb pots immediately the roots appear. Put a small quantity of rough screenings in the bottom of each pot, and have the soil (loam and sand in equal parts is best) in a fairly moist condition, so that a very slight sprinkling through a fine rose will suffice for the first few days. When green cuttings are preferred the plants may be started into growth after the end of April. Shake the soil from the roots and repot in rather small pots. In removing the old soil it will be found that the nutritive roots are decayed and only the storage roots remain. On coming into contact with moist soil these storage roots speedily send out feeding roots, followed by the expansion of the dormant buds on the canes. When the growths are a few inches long they may be taken off with a heel, potted singly and put in a close frame; or simply rooted in the sand bed and potted when roots are formed. If kept growing without a check plants from green cuttings will give the largest heads of bracts. Batches of cuttings may be put in at intervals during the Summer. When well started in pots all the plants may be placed in a sheltered position out-of-doors, but in the full sun. When the pots in which they are to bloom get full of roots clear liquid manure may be given with good effect.

Plants rooted during midsummer from green cuttings may be grown on benches, much in the same way as single-stemmed Chrysanthemums are grown. Before the approach of cool weather all the plants should be removed indoors, as they will lose their leaves on being subjected to low temperatures. The wilting of the flowers of Poinsettias, or rather of the gaudy colored bracts which surround the flowers, is due to the milky sap secreted from the cut part. This hardens to a greater or less extent, and clogs up the vessels through which the water should ascend to keep the flowers and foliage fresh. A good way to circumvent this is as follows: Some little time after the stems have been cut and a goodly quantity of the milky sap has run out, cut off a small piece from the end of the stem and stand the cut ends in warm water for a few minutes. This will leave the cut part free to absorb all the water necessary for their support. Blooms which have been drooping for a considerable time may be revived in the same way.

**Euphorbia Elegans** (better known as *E. jacquiniaeflora*) is less easy to manage than the Poinsettia. A start should be made with soft cuttings, with a heel or piece of the old wood attached. They should be put in the open propagating bed instead of a frame, as their leaves are very liable to decay, owing to the dampness. Place in 2-inch pots and gradually shift on, keeping the plants in the full sun. Too much water at the root should be guarded against. After midsummer the plants may be plunged in an open frame to ripen their growth, and removed indoors before the weather shows signs of getting cool.

**EURYA LATIFOLIA VARIEGATA**—Put in cuttings of this about the same time as given for Azaleas. It is a plant very useful for decorating and one which we see too little of. Give the same treatment in Summer as recommended for Araucarias.

**EXACUM AFFINE** is the name of a compact bushy Gentian-wort, which gives a very good account of itself for Winter flowering in a moderately warm house. The flowers are bluish purple with yellow stamens protruding from the center of the flower. It doesn't have the provoking habit of some of the Gentians in closing its flowers during the latter part of the day. Seed sown beginning of July will make fine plants by the Fall. As soon as the seedlings are large enough they may be plunged in a frame, where they will need but little attention, as they do not suffer from an occasional drying out.

**FICUS ELASTICA** is one of the most popular house plants, and one of the most suitable for this purpose. The leaves are large and leathery and not easily hurt through occasional neglect. Complaints are sometimes made of plants losing their lower leaves; in old plants this is natural, as evergreen plants have their season of leaf shedding. Young plants will lose leaves through insufficient or too much moisture or lack of nourishment.

**Mossing Out-of-Doors**—Between old stocks of rubbers planted outside and those kept in pots there is quite a difference in the quality of growth. Those given unlimited root room in the open lot have a somewhat succulent growth with the leaves far apart, and altogether not in the best

condition for purposes of propagation. These may merely be notched below every second leaf previous to inserting in the sand bed later on. Plants growing in pots or tubs have much firmer growth, well ripened, with the leaves quite close together; elegantly suitable for providing tops which may be rooted in large pieces and make salable plants in a short time. To go about this operation successfully make preparations during the first half of August by tying the growths to supports. Those which answer the purpose best are pieces of wire stakes tied along the stem, then at the point where it is desired to root the pieces remove just enough of the leaves and make an incision in the stem upward toward the growing point. Insert a little sphagnum moss, wait a day or so, remove the moss; bathe with warm water to remove the congealed sap, which, if left, will hinder a complete callusing of the cut part. Insert fresh moss and tie a handful over the incision; keep moist until the roots are showing through. The pieces should then be cut off, put in small pots and placed in a close stucture for a few days until the roots begin to take with the soil. Syringe only during that period. This is a very important point. After potting either mossed shoots or cuttings (if the soil is in a good working condition; that is, neither too wet nor dry) absolutely no water should be given for a day or two; the atmosphere kept moist, and an occasional syringing will be all that is necessary.

**House-Grown Plants**—Rubber plants which are grown all Summer in a house in a moist, high temperature, have a very different appearance from those which are grown out-of-doors in the full sun, and the difference is by no means in favor of the house-grown stock. The leaves are naturally weaker, without the well-developed appearance of the outdoor grown plants, and if the root conditions of the outside plants are perfect, with a good mulch over the sunken pots, the growth will be every bit as rapid in young plants, if not more so, with the addition of a constitution which enables them to stand a whole Winter in a dwelling house without injury. The variegated rubbers are indoor plants, as they are apt to get scorched by the sun's rays unless given a partially shaded situation. For keeping stock plants of these variegated varieties it will be found a good plan to have them in rather small pots and encourage roots from the stems, especially from those of old plants. These stem roots, when they get among a mixture of manure and moss between the pots, or even among wet gravel, make astonishing growth, causing the plants to give an abundant supply of material for cuttings, which they are otherwise slow to do when grown in the ordinary way. Cuttings notched for a few weeks, taken off and placed in sand with a brisk bottom heat, root quickly. Rubber plants will keep in a dormant stateeven in a high temperature, with abundant humidity in the atmosphere, by being kept dry at the roots.

**Indoor Rubbers for Stock Plants**—Reserve a place at the end of a warm house for large over-grown plants. They make quicker growth indoors during the warm months than they do outside, and for the purposes of single-eye cuttings, the wood is preferable, as the spaces between the leaves are longer. They should be planted in a solid bed. If the old soil be unsuitable remove it to a depth of about 18 inches; put some broken brick, clinkers or stones in the bottom for drainage,

some old leaves on top of this, and fill up with rich porous soil. Plant moderately close together, pruning back those which require it; with a few good stock plants a plentiful supply of growth for cuttings, or for mossing, will be the result. The rubber when well grown can always be depended upon as a ready selling plant.

**Cuttings** root poorly sometimes, and there are several causes. Single-eye pieces are dibbled in an open bed with the leaf pierced by a stick to keep it in an upright condition. During the process of rooting the cutting is nourished to a large extent by the moisture taken in by the under part of the leaf; that is, when it lies flat on the sand, which it should do. They will in this position root quicker and better. Another cause of frequent failure is in taking the cuttings at the wrong time. The plants have a period of rest and a period of growth. When a shoot is in the process of developing a leaf rooting should not be attempted; better wait till every part is ripened, then rooting is an easy matter. In potting off do not allow the roots to get beyond an inch in length while in the bed. They sustain injury easily when coming in contact with anything. In lifting from the bed place the cuttings in a box with the rooted ends resting on one side of the box, and not too many of them together. Use soil of the same temperature as the sand. Two-thirds loam and one-third sand is a good medium to start with; 3-inch pots should be used. A shift will be necessary within three weeks.

**Slow Rooting Species**, and there are several of them in common use for sub-tropical bedding in Summer, will be resting by the end of January unless they are kept in a very warm house; and in this condition ringing and mossing, as the best means of increasing the number, had better be attended to. Those which are slow in taking root in the cutting bed, but quick to respond to the ringing process, are as follows: *F. dealbata*, *F. Porteana* (a shade tree from the Philippines, by the way), *F. nymphæfolia*, *F. macrophylla*, *F. ferruginea* and *F. eburnea*. While on the subject of Rubbers I may mention that for covering damp walls in greenhouses for ornamental effect *Ficus repens* has been employed for a long time, but there is a species, new to me, which is a better one for the purpose, judging by what I have seen of it. It is named *Ficus falcata*, and is well termed, as the leaves resemble nothing so much as a short knife blade. The plant grows very fast, has very dark green foliage and sticks close to the substance against which it is placed. A good way to start young plants climbing, so that they may be easily transferred to permanent positions, is to fix the end of a piece of board inside of a pot, allowing a space above the pot 6 inches broad and 12 inches long; then pot the young plants close against the wood.

**FUCHSIA**—Old plants of Fuchsias should be started by the middle of December to provide wood for cuttings. The plants should be knocked out of their flowering pots, the balls reduced and given fresh soil. Place them in heat and syringe freely. The growths for cuttings will start almost immediately. Do not take growths for cuttings which have been on the plants all Winter, as the wood is bound to be a trifle hard and does not turn out the best plants; better wait till the growths are tender enough. Even young growth, with the wood on the hard side,

does not make good cuttings. These should be taken off during the period of fairly rapid growth and kept growing right along, or they will be apt to remain stunted and come into flower before the plant is fully developed. Fuchsias will bloom in 3-inch pots, but by keeping them in a growing state, with abundant root room, they can easily be grown, according to the variety, from 2½ to 4 feet in height, before the flower buds make their appearance. If wanted to bloom in 5-inch pots, pinch back the leading shoots, and when the pot is well filled with roots give weak liquid manure frequently. This will prolong their blooming season. A single supporting stick for the main stem will be all that is necessary, with perhaps a few supporting strings for the lateral shoots in the case of those varieties having large double flowers. The soil should be well enriched with manure.

**FURCRÆA**—A genus of plants closely allied to the Agaves. They thrive with a little more heat than is usually given Century Plants, otherwise their cultivation is pretty nearly the same. There are about ten species in cultivation; those most commonly seen are *F. cubensis*, *F. gigantea* and *F. longæva*. The variegated form of *F. gigantea* is an exceedingly handsome subject.

**GARDENIAS**—These are only grown nowadays in general collections of plants. In Summer young plants will make good growth by being plunged among some porous material in a frame. Cuttings are taken from ripe growths. Plants will thrive in a warm, sunny greenhouse.

**GLOXINIAS**—So easily do the leaves of the Gloxinia produce tubers, when properly manipulated, that it seems a roundabout way to get up a supply of plants from seeds. The only drawback to the first-named method, is that leaves are not always available in sufficient quantities for propagating purposes. When plants are wanted in bloom before midsummer, the seed should be sown in early Spring. The process of raising seedlings is simple enough, if given the necessary attention; a little neglect, however, when in the younger stages of their growth, is very apt to occur, and that is the end of them. The seedlings are very fragile for some time after germinating, and if the soil gets a trifle too wet, or too dry, they suffer beyond repair. In preparing boxes or pans for seed, let the soil be very porous and light, leaf mould largely predominating. Make very firm; give a watering, then sow; and if a covering be given it should be of the lightest possible nature. If the atmosphere gets at all dry, cover the receptacles with panes of glass, to prevent drying. If care be taken the seedlings may be allowed to grow until large enough to be potted off singly in 2-inch pots, or they may be pricked off thickly into boxes previous to potting off. For flowering late in Summer or early in Fall, sowings may be made as late as the beginning of July. In propagating from the leaves, various methods are employed. The one most commonly in use is to take the entire leaf, make incisions in the under parts of the principal veins (or they may be cut through); lay the leaves flat on the sand with the stalk buried, and give only enough water to prevent drying up. Small tubers will form at the incisions and at the end of the stalk. During this process no leaves are formed, and the tubers should be harvested and rested for the Winter in

dry sand. This operation is best performed after midsummer. Another good method to get up stock of extra fine varieties from leaves, is to cut them in sections resembling the letter V, the lower part to consist of at least an inch of the midrib, and the leaf cut obliquely to the margin. Treat them similarly to the triangular-shaped cuttings of the Rex Begonias, so far as potting them in the sand goes; but keep on the dry side while forming tubers. Smaller tubers are made by this method than if the leaves were laid flat on the sand; consequently it should only be used when it is desired to make the most of extra good kinds. Old tubers are successfully wintered over in the pots in which they have flowered; or, to save room, they may be taken from the pots, the soil removed, and stored in boxes of dry sand, keeping in a minimum temperature of 60 degrees. In starting, bring to the light and give water, potting up when about an inch of growth has been made.

**Diseases**—The plants are liable to the attacks of a disease concerning which little appears to be known. It first shows itself in the leaves, small brownish spots appearing, as if the foliage had been burned by the sun. The diseased surfaces gradually enlarge until the health of the plant suffers to such an extent as to stop the growth of the flower buds. Probably careless watering at the roots has something to do with the trouble. Each plant should be examined at least once a day, because the broad leaves lying over the surface of the soil are apt to hide a very dry ball; and if the plants go without water for any length of time when dry their usefulness is ended.

**Soil**—The *Gloxinia* is fond of leaf soil, and it may be used to the extent of one-half the bulk, loam, sand and cow manure making up the balance. They are not deep-rooting plants. Large seed pans should be provided for the full-sized tubers. In saving seeds the capsules should be carefully watched else the seeds will be lost. Up to the time of bursting open the seed vessels are green; they split down the middle, suddenly exposing the seeds, which are easily displaced.

**GREVILLEA ROBUSTA**—This would be a popular plant were it not that its general appearance is suggestive of the rag-weed. It is a first-class house plant, and one very easy to get up. Seeds are sown in March. Pot singly when quite small, and when in 3-inch pots plunge in a frame until large enough for 5-inch pots. The plants will stand the full sun. A cool greenhouse will suit them in Winter.

**HAMELIA PATENS**—A tender shrub very well suited for growing in tubs. When the plants are in good health they are covered with flowers during the greater part of Summer. Propagated from ripe wood in early Spring.

**HEDYCHIUM**—These have long been grown in conservatories, where plenty of room is at command. In small conservatories they are not desirable. *H. coronarium* has pure white, sweet-smelling flowers. *H. Gardnerianum* and its hybrid form are useful for planting near the margins of ponds, where their roots get an abundant water supply. They may be rested under a bench during Winter.

**HEERIA ROSEA** and **H. ALBA** are easily managed greenhouse plants. They may be depended upon to give a liberal supply of bloom in Winter and Spring if they get anything like fair treatment. They are propagated by cuttings taken from soft wood in the Fall.

**HIBISCUS**—The varieties of *H. rosa-sinensis* make first-class tub plants. When thus cultivated they need liberal feeding, being robust growers; and as the flowers are produced on the young wood there has to be an abundant supply of this to have them looking at their best. With the help of liquid manure bushes will thrive in the same tubs for years. Autumn-struck cuttings, if grown on during Winter, will give 6-inch pot plants by Spring. The varieties known as *H. brilliantissimum* and *H. grandiflorus* are the best singles among the crimson varieties. There are double reds, yellows and pinks; among the latter is "Peach Blossom," which I grew for the first time last year. It has exceedingly attractive flowers; the name describes the color of the flower well. The plant blooms in a small state. All of the kinds delight in a soil having a fair proportion of leaf mould. A quantity of crushed bone may be added when the plants have to occupy the pots or tubs for any length of time. The varieties of *H. rosa-sinensis* should be given a trial out-of-doors; they grow and flower very luxuriantly. They may be kept during Winter in a structure from which frost is excluded. In a low temperature, and kept dry at the roots, they are deciduous.

**HYDRANGEAS FOR POTS**—*Hydrangea hortensis* and its varieties may be propagated either in Spring or Fall. When the work is done in Spring the cuttings must be taken from plants which are being forced in the greenhouse, the wood of which is in excellent trim for the production of strong, healthy roots. Those shoots which show no signs of blooming are the ones to be taken for propagation. The cuttings root very readily if given a syringing overhead two or three times daily. Pot in 3-inch pots and plant out from these about the middle of May. Or the plants may be potted into 5-inch pots and plunged in well-rotted stable manure. They are, however, easier looked after in the field, and there make plants every bit as good. Moreover, when lifted and potted they can be given fresh soil, which will suit them when taken in to force in the beginning of the year; whereas those in pots may not require shifting, so far as their size is concerned, and yet be benefited by fresh soil. Where Hydrangeas will stand the Winter some of each kind should be planted out permanently, so as to give an abundant supply of material for cuttings. These cuttings should be taken during the Autumn months, encouraged to fill their pots with roots, and then go to rest. When given a shift from 3-inch into 5-inch pots, and brought gradually into warmth, they develop very large heads of bloom, and toward the latter part of their development liquid manure is necessary.

**Forcing**—To have the forms of *Hydrangea hortensis* in bloom early those plants which have been kept cool will by the middle of January have lost their foliage, but if any remain cut it off to within a short distance of the stem. The plants, whether in 4, 5, or 6-inch pots, which show that an increased size may be given, will stand the operation better if the roots are disturbed as little as possible. The same size, or

those larger, which cannot be shifted and the ball preserved intact, are best reduced when the soil is somewhat dry. Put in a cool house after potting, watering only to settle the soil; and syringe in order to start into growth. After a start has been made the heat and watering may be increased, and as the growth increases, weak manure water may be given frequently.

**IMANTOPHYLLUM**—An indispensable plant for private collections; grows best in a cool greenhouse. Large plants need shifting only at long intervals, and for this reason the soil should have a good sprinkling of crushed bone and charcoal. Increased by division. *I. miniatum* and its forms are the finest.

**INGA PULCHERRIMA**—For flowering in a cool greenhouse during March and April, but only in roomy structures, there are few things to surpass this in the brilliancy of the flowers. These are arranged in heads with an enormous number of stamens, which are the principal attraction. Take cuttings in February.

**IXORAS**—This is hardly a genus for the florist to deal with, as the plants take more care than the prices obtained for them would permit. There are numerous species and varieties, all of which are attractive when well done. In the latitude of Washington, D. C., they make growth best when plunged outside, and some of them flower profusely out-of-doors. *I. Colei* is a good white; *I. Williamsii*, *I. coccinea*, *I. Chel-soni* and *I. picturata* are all very reliable species. They will thrive in the warmest house during Winter. Peat, sand, and a little loam will make a suitable soil. Cuttings should be put in during March.

**JASMINUM GRANDIFLORUM**—Although there are other meritorious species, this is the one usually grown. Plant out the young stock in May, and by the end of September they should be lifted and potted. Keep in an intermediate house. The plants will stand full sunshine.

**JUSTICIA (SCHAUERIA) CALYTRICHA**—One of the best Winter flowering species, producing yellow flowers in large heads. Cut back after blooming to encourage growth for propagation. Keep the young plants in the greenhouse during Summer, as they are not of a robust growing nature.

**J. (Jacobinia) carnea** and **J. rosea**—Cuttings of these should be put in at the end of January; they root in a few days. The young plants should then be grown on and used for Summer flowering in the greenhouse. Almost any porous soil will suit them.

**LIBONIA PENRHOSIENSIS** is a charming Winter flowering, dwarf evergreen shrub. Its culture is of the easiest description, and almost any soil will suit the plant. Put cuttings in the warm propagating bed during the latter part of February; plant out middle of May to make growth; lift middle of September and flower in a moderately warm greenhouse.

**LOPEZIA RACEMOSA** (Mosquito Plant) makes an exceedingly weedy growth outside in Summer. Cuttings put in the beginning of Septem-

ber, and the plants kept in a sunny greenhouse with a minimum temperature of 45 degrees, will give an amazing supply of bloom all Winter. This plant is desirable only for private collections.

**MAHERNIA GLABRATA**—A dense-growing, dwarf evergreen shrub, with small yellow flowers produced late in Winter. The flowers have an odor much resembling that of the violet. The cuttings should be made large, at least 6 inches in length. They should be taken before growth begins. The roots are sparingly produced. Put the rooted cuttings at the sides of the pots, so that they will take easily with the soil.

**MALVAVISCUS MOLLIS** and **M. ARBOREUS** are greenhouse plants which in Winter take up too much room as specimens, and should not be grown for that purpose, as the flowers are not freely produced. For outdoor planting they are good subjects, making a large mass of foliage dotted here and there with bright red flowers. The new **M. lanceolatus** from Mexico is the best for Winter flowering. The leaves are different in shape from those of the two first-named species, and it blooms more freely. Cuttings of all three root with the treatment given Coleus.

**MARANTA**—Of this genus **M. smaragdina** and **M. Porteana** are the best. When well grown they are among the most ornamental foliated plants in cultivation. For culture see Calathea.

**MEDINILLA**—This magnificent flowering plant must have a high temperature, and should be in every collection of stove plants. The flowers are arranged in large, drooping racemes. Cuttings root well when placed in a pot of loose moss, in a warm frame, or on a well-shaded bench of a warm house. **M. magnifica** is the species most commonly seen.

**METROSIDEROS ROBUSTA** and **M. SEMPERFLORENS** are flowered from imported plants. The treatment given for Acacias will suit them.

**MONSTERA DELICIOSA**—There are several excellent house plants which are very little known, on account of the difficulty experienced in propagating them in sufficient quantities. Among the best of this class is the Monstera, a subject almost unique in the vegetable kingdom, owing to the broad leaves having perforations all over their surfaces. It needs little pot room, but plenty of water; in fact, the pot may be placed in a saucer of water. It will continue to throw up leaf after leaf in a dwelling house just as well as if in a conservatory, the bright emerald green of the young leaves contrasting well with the deeper color of the older ones. The easiest method of propagation is to cut up the old stems to single eyes, and place in sand, in a warm house, where the cuttings sprout in a few weeks.

**MUSA COCCINEA** is sometimes grown for its brilliant red bracts. It is a dwarf species and needs stove temperature. For other species see Bedding Plants.

**MUSSÆNDÅ FRONDOSA** and **M. LUTEOLA** are handsome warm greenhouse plants, cultivated for their colored bract-like growths.

**NEPENTHES**—These are known as East India Pitcher plants. In their native habitats they grow as vines. Under cultivation they are usually seen as dwarf, pot or basket plants. Nepenthes are very suitable for suspending from the roof of a greenhouse, as then the curiously-shaped appendages, or "pitchers," at the ends of the leaves are best seen. Moreover, some of the kinds have long leaves, and when the pitchers are half filled with liquid they hang lower than the base of the pot or basket. In this case the plants must be suspended from the roof. Their cultivation, with the exception of a few species, is not difficult. There are between 30 and 40 species, found principally in the East Indian Islands. The temperature should not fall below 65 degrees at any time of the year, and from this it may rise to 90 degrees with safety. At all times I prefer growing these plants with as little ventilation as possible, as under those conditions growth will be more vigorous and a heavier crop of pitchers will be the result. Pruning is a very important matter in their cultivation. With the possible exception of *N. bicalcarata*, none of the kinds should be allowed to grow over a foot high. When a few pitchers have been formed, or are forming on a shoot, cut the end out; this will very materially help in the development of those in process of formation, and will cause new shoots to burst out on which more pitchers will be borne. The material in which to grow Nepenthes should consist of fibrous peat and sphagnum in equal parts. Charcoal, crushed bone and sand in small quantities may be added. During the growing season the plants must never be allowed to get dry at the roots. One and two-year-old specimens are the most satisfactory, although some of the kinds will keep in good condition as long as they have good material in which to make fresh roots. Shade during bright sunshine, and syringe frequently. The sexes are on different plants, and so far as I have observed all the species and varieties will intercross. Seeds are sown on a finely prepared surface of chopped moss, covered with glass. As soon as they can be handled the seedlings are pricked off in small pots. Cuttings should be taken from the half-ripened shoots about the beginning of December; they should be cut to single eyes only when a large number of plants are wanted. Terminal growths, short and stocky, make the finest plants, and in a much shorter time than single-eye cuttings. In a propagating frame, with a bottom heat of 80 degrees, plunge the cuttings in sphagnum; they may be either pushed through the hole of an inverted thumb pot or put in small pots, using a rooting medium composed of sphagnum, sand and charcoal. I much prefer the first method. Many beautifully marked hybrids have been raised in recent years; these are, as a rule, easiest grown. *N. Mastersiana* is one of the best; *N. Dominiana*, *N. Henryana*, *N. Williamsii*, *N. Outramiana*, *N. Siebrechtii* and *N. Amesiana* are all well worth growing.

**NERIUM (OLEANDER)**—Much grown as a tub plant, for which it is well suited. Old plants should be kept as dormant as possible during the Winter. Cuttings are rooted early in the season, and plunged outside when established in pots.

**OCHNA MULTIFLORA** is an interesting and beautiful cool greenhouse shrub. The flowers are yellow. The calyx, at first green, changes to a

brilliant red on the ripening of the fruit. Propagated by Fall-struck cuttings.

**ORCHIDS**—Although there is an immense number of species and forms of orchids few of them are grown solely for their cut flowers. Most of them produce flowers but sparingly, and are chiefly grown in private collections. A large number being hybrids very few of each kind are in cultivation; only those species and their varieties which are procurable in large quantities from their native haunts are grown for cutting from. Under favorable circumstances, and when their wants are understood, Orchids are as easily grown as any other class of plants. The epiphytal class has a growing and a resting period. During growth, as a rule, they need lots of water, and when resting they are kept on the dry side so as not to start shoots at the expense of the flowers. Shading is necessary as the sun gets powerful, and a stagnant atmosphere must be avoided at all times.

**Potting material**—This is mainly to supply a reservoir for moisture during the growing period, and should consist of chopped fern roots, at least six months old before using, live sphagnum, charcoal and broken pots. If grown in pots or pans these should be filled two-thirds with crocks, the plant elevated above the rim of the pot, using lumps of the fern root, pieces of charcoal and finishing off with a thin layer of live sphagnum. The best time to pot is before the plants start growth.

**Calanthe**—This is not an epiphyte, but a terrestrial Orchid growing among soil. It responds very readily to good treatment. As the demand for Orchid flowers is on the increase this must eventually become a popular genus. It is one of the few which allows of being propagated freely. Loam, peat, sphagnum and well-decayed cow manure, with a little sand added, will form a good mixture. Good drainage is necessary, as the plants, while growing, need heavy waterings. During the growing season a high temperature is necessary, lowering it and curtailing the supply of water when growth is completed. When done blooming either shake the plants from the soil and stand them in empty pots, or withhold water from the roots. They should be started in March. Careful watering is necessary at first.

**Cattleyas**—These are the most popular Orchid flowers at present, owing to their large size and delicate colorings. *C. crispa* is in flower during July and later; *C. labiata* comes in during November. *C. Trianæ* and *C. Mossiae* are the most profitable, as they bloom at a season when there is a demand for the flowers. Of both species there are numerous varieties. *C. Trianæ* is in season from November to February, *C. Mossiae* in May.

**Coelogyne cristata**—If kept in a healthy condition at the roots this is a very free bloomer. The potting material should be examined after the flowers are gone, and if decayed replace with fresh material. In large specimens this is a tedious operation. A good size for flowering may go into 10-inch pans. By the beginning of June we place our plants under the shade of trees for four months, where they develop splendid growth. Their flowering season is during February and March, and

immediately after, the shoots begin to push out. This species is easily divided. New growths sometimes push out not only from the base of last year's pseudo-bulb, but also from those of the two previous seasons.

**Cypripedium**, the "ladies' slippers," are terrestrial and mostly evergreen (our native species being herbaceous). The evergreen kinds need copious supplies of water while growing, and even during the resting season they should not be allowed to get dry. They may be grown largely in peat and sphagnum. *C. insigne*, the one most frequently met with, is best grown cool. It should be kept outdoors during Summer, and to retard the flowering period may be kept in well-aired frames until there is danger from frost. *C. Spicerianum* requires a warm temperature, flowering in early Spring.

**Dendrobium nobile** is one of the oldest and easiest grown of the dendrobias. *D. formosum giganteum* is an evergreen and requires heat. *D. Phalænopsis* is one of the finest for cutting, giving long stems without injuring the plant.

**Lælia anceps** makes its growth from April onward. It is an abundant bloomer, but on account of its resemblance to some of the Cattleyas, and having smaller flowers, it is not so popular. Flowers in November and December.

**Odontoglossum**—With the exception of *O. citrosum* the species of this noble genus have a struggle for existence in this latitude. Further North they succeed better. *O. Alexandræ* is one of the most popular.

**Oncidium varicosum** and *O. v. Rogersii*—Both bear large panicles of pale yellow flowers. Both are natives of Brazil, blooming during early Winter.

**PALMS**—This order furnishes the most important of our decorative plants. Out of the large number of known species, comparatively few are in cultivation, and of these a very limited number is grown by the florist for this special line of work. Those kinds which are raised in quantity are selected partly because they are easily and quickly grown. The seeds are obtainable in large quantities, and because the plants are exceedingly ornamental, and, as a rule, stand rough usage, to a certain extent, without showing bad effects. Palms may be divided into two sections—those with pinnate or feathered leaves and those with palmate or fan-shaped leaves. *Latania*, *Livistona*, *Chamærops*, *Rhipis*, *Corypha*, *Licuala* and *Thrinax* are familiar examples of the section having fan-shaped leaves; while the feather-leaved section is represented by *Kentia*, *Phoenix*, *Areca*, *Arenga*, *Cocos* and *Seaforthia*. The commercial kinds are grown in very large quantities by several firms, and so cheaply are they offered that it does not pay to raise the seedlings in small quantities. For collections rather lengthy lists of species are offered by several European seedsmen. The seeds should be covered to about twice their thickness in sandy soil and kept fairly moist and warm until they germinate. The drainage in the seed pan should be of such a nature that the roots can be easily removed from it, as very little is gained by potting in a very young stage. In this section of the country nearly all of the species make rapid growth out-of-doors during the Summer after

they have reached a certain stage, say in 6-inch pots. They are plunged in half-decayed stable litter and partly shaded with lath slats. Large-sized plants will bear the full sun, but not when taken directly from the greenhouse. When it is desired that plants shall occupy the same pots for any length of time, very little, if any, vegetable humus should be among the soil. Crushed bone and a little charcoal will be found beneficial.

*Areca (chrysalidocarpus) lutescens* was grown largely as a decorative palm a few years ago, but owing to its tender nature it has been superseded by the Kentias.

*Cocos Weddeliana* in a young state is exceedingly ornamental, the leaf divisions being narrow and close together. It will stand a lower temperature than is generally given. It is admirably adapted for the dwelling house.

*Kentia (Howea) Belmoreana* and *K. Forsteriana* are two of the best kinds, either for house plants or decorating. When they reach a desirable size they should be kept on the cool side, as they will then be less liable to injury when used.

*Latania borbonica* (*Livistona chinensis*) is the best known of all the fan palms. It should be grown under the same conditions all the time, otherwise some of the leaf stems will be short and others long, making an unsymmetrical specimen.

*Livistona rotundifolia* makes a very neat, little specimen plant. The foliage is of a bright green color. This palm grows best in a warm house.

*L. Jenkensii* is not much used as a decorative plant, but it is one of the most desirable for collections.

*Phœnix rupicola* has taken the place of the older species. It is the most graceful of the genus. *P. dactylifera* bears the date of commerce.

*Euterpe edulis*, *Rhapis flabelliformis*, *Ceroxylon andicola*, *Corypha australis*, *Cocos plumosa*, *Seaforthia elegans*, *Stevensonia grandifolia*, *Licuala grandis* and *Caryota sobolifera* are a few of the better known species grown in collections.

**PANDANUS VEITCHII**—There are other variegated Screw Pines, but none approaching this one as a commercial plant. No one will dispute its right to a place among the best twelve decorative plants; in fact, most people would put it in a shorter list. As a bedder it stands our warmest weather without the least shade. As a dwelling-house plant it has no superior, and as a stove plant, owing to its beautifully striped leaves, it tends to relieve the dull monotony of green. There are good and bad forms common in cultivation; those to be avoided have monocolored leaves, and leaves with dirty white variegation. The good one has almost pure white markings. In selecting stock plants take those which show lateral growths at or near the base of the plant. Large lateral growths do not make good specimens, but they should be rooted for subsequent use as stock plants. In rooting it will be found a good method to put each piece into a pot of sand and plunge in a propagat-

ing bed having a brisk bottom heat. The large, succulent and easily broken roots which the cuttings make, being confined within the pots, will be nicely preserved by shaking out the sand and replacing it with soil, or by being shifted into larger pots, as the cuttings will keep many weeks in the sand after roots are made without injury. Stock plants, which get too large and have an abundance of grassy side shoots, will be encouraged to develop those if the young leaves of the main growth be torn out. Young plants, plunged out-of-doors during the end of May, should be examined from time to time, as the roots are apt to get outside the pots; larger-sized pots should then be given and the plants replunged.

*P. utilis* is a green-leaved species, forming very handsome plants even in small pots. It stands well in a dwelling house, but, like *P. Veitchii*, must be kept on the dry side during the resting period. *P. utilis* is raised from seeds which, if fresh, germinate well. The soil for both kinds should be porous and enriched with a small quantity of bone meal.

There are several other species, none of them grown largely, being principally found in collections. *P. javanicus variegatus* is quite as handsome as *P. Veitchii*, but needs more heat in Winter, besides the hooked spines pointing two ways on each leaf is a feature very much against it. *P. Baptistii* is a handsome variegated plant, but too soft for use outside of a stove. The true *P. graminifolius* is not of much use outside of collections.

**PARIS DAISIES**—For Winter blooming the cuttings should be put in during late Spring. By the end of July they should get their last potting for the Summer, be pinched back and plunged, so as to make large heads for Winter-flowering. These Daisies can be made to pay during the dull months from the number of flowers which can be cut from them. They are not so common as they might be, and Daisies in Winter are very desirable flowers with some people. Large plants are useful about Easter time. Left-over plants in Spring can be planted out to furnish cuttings for Fall propagation, to give medium-sized plants in flower for early Spring sales.

**PAULLINIA THALICTRIFOLIA** is an elegant plant for clothing the tops of unsightly tubs in which Palms and other plants are growing, being also useful for large vases. It stands the sun well. The foliage somewhat resembles the leaves of Adiantums. Cuttings in September are placed in heat.

**PHORMIUM TENAX** and its forms are rather stiff-looking plants, especially in a young state; older plants furnished with an abundance of foliage are more attractive. To increase, plant out in very sandy soil in May and divide in September.

**PERESKIAS**—These are seldom grown for their value as decorative subjects. The flowers of several of the species are of a rather pleasing appearance, but they last only a short time and are not freely produced. Two of the species, *P. aculeata* and *P. Bleo*, are common in cultivation, and are used chiefly as stocks for the gaudy-flowered Epiphyllums, which see for treatment.

**PEPEROMIAS**—Useful little plants with peltate leaves, finely marked with bands of white between the principal veins. They grow best in a warm greenhouse with shade. *Peperomia Saundersii* is grown either for filling shallow pans, mixed with other plants, or as specimen plants for the window. *P. maculosa* and *P. marmorata* are also well worth growing. Propagation is effected at any time of the year by placing entire leaves, with a piece of stem attached, edgewise in sand.

**PHYLLAGATHIS ROTUNDIFOLIA** belongs to the same family as the better known *Sphærogyné latifolia* and *Cyanophyllum spectabile*. It somewhat resembles the former in general appearance. A few plants of it were given a test last year, outside during the Summer, in a position partly shaded from the sun. They behaved splendidly, and in a position like the above, where the surface of the soil is covered with some low-growing plant, such as *Hydrocotyle* or *Lysimachia*, to keep the sun from the roots, it may become a valuable feature for outdoor decoration. But for indoors, it may be used as a substitute for the more gaudy-leaved *Sphærogyné*, as it succeeds in an atmosphere where the majority of greenhouse plants can be grown. Propagation for small plants is by the leaf, the petiole of which is inserted in sand, the blade lying flat on the surface and the ribs severed in several places. From the cut parts nearest the petiole, numerous small growths are made; these, when an inch or so high, may be potted up. For making specimen plants quickly old subjects which have been encouraged to branch may be cut up, and the pieces inserted in pots in bottom heat. They send out roots very quickly.

**PHYLLANTHUS NIVOSUS** and **P. ATROPURPUREUS**—These are hardly suitable as florists' plants, but for public or private establishments they should always be grown, as their foliage, in a young state especially, is most beautifully colored even when grown in the open air during Summer. In this latitude we plant them out along with other bedding material; they are exceedingly effective. The old plants are cut back severely in Autumn, potted and stored in a rather warm house. In February cuttings of the medium thick wood are taken, and rooted in strong heat.

**PHYLLOTÆNIUM LINDENII**—This plant, which belongs to the Caladium family, should be employed for decorative purposes more than is the case at present; not only because the foliage differs from the small number of kinds of plants used for decorative work, but mainly for the reason that it will stand the rough treatment given to those plants more so than one would expect. It is a stove plant and one of the most ornamental. After a goodly number of leaves have been developed in a warm, moist atmosphere the plants will continue to keep up a presentable appearance with ordinary greenhouse temperature, and they may even be used as house plants. The leaves are shaped somewhat like those of the fancy-leaved Caladiums; the texture is much firmer, the color is green with white markings along the principal veins. Propagation is by division. Before repotting put the pieces in a warm sand bed to encourage fresh roots.

**THE PLUMERIAS** are a neglected class of plants somehow; we see them only in places where a general collection of stove and greenhouse plants are grown, and yet their flowers are large, showy and sweet smelling. The stems and foliage have an ornamental character of their own. They make very rapid growth in Summer, being well suited for tub culture. The plants should be kept dry during Winter. The leaves will fall off early, and the pots or tubs in which the plants grow may be laid on their sides under the bench of a greenhouse. In propagating, which may be done best during February, the cuttings may be taken from 6 inches to a foot long; stand them upright or leaning against the back part of the propagating bench, but not with the bases buried in the sand. Nor should they be allowed any water for a week or two. After the cut part is well healed over they may be potted in almost dry sand, in which they root quickly if put in a brisk heat.

**PRIMULA SINENSIS** has not by any means been left behind in the improvement of florists' flowers. The latest strains put on the market would almost be taken for new species by those who only knew the plants of 20 years ago. *P. sinensis* is a popular Winter blooming plant. The seed may be sown as early as the last of March to have plants in 5 and 6-inch pots in bloom before Christmas. Later sowings should also be made, but it should be borne in mind that the plants make their best growth during cool weather. They may be summered in a well-aired and shaded frame.

*P. Forbesii* is a wonderful species when we consider the enormous number of flowers produced on even small plants. Several plants may be potted together in shallow pans.

*P. floribunda* has a very floriferous form named *P. Isabellina*; the flowers are creamy white.

*Primula obconica* would seem to be in the process of being evolved from the rather inconspicuous flower of the type to one not unworthy to stand alongside those of the finest strains of *Primula sinensis*. One of the European seed firms, a year or two ago, offered seed under the name of *P. o. grandiflora fimbriata*, a sowing of which I made at the time. The resulting seedlings corroborated all that had been claimed for them. Some are heavily fringed, and range from pure white to deep rose. The largest individual flowers are a little short of being an inch and a half in diameter. The plants are exceedingly floriferous; some in 6-inch pots have the foliage almost hidden with bloom. To have plants in flower by the first of the year the seeds should be sown as early in the season as possible. Cover the seed very lightly with finely screened sphagnum, moistening the surface whenever it shows signs of becoming dry. As soon as large enough to handle the seedlings may be either potted off singly, or placed around the edge of a 3 or 4-inch pot previous to giving them their first pots. During the Summer the seedlings should be shaded from the sun and never allowed to get dry. They do not make much headway during the very hot months. The plants will not suffer if given their last shift just as they are coming into bloom. Keep in the coolest house.

**Fertilizing Primula Flowers**—Any extra good forms of *Primula sinensis* or *P. obconica*, desirable on account of large flowers, shape, or color, should be set aside for seed. During the Winter months, when insects are scarce, fertilization will have to be done by hand, as it is rarely the case that a flower of *Primula* is fertilized by its own pollen. For seed plants preference should be given to those having the pistil protruding from the corolla tube. It may be stated that primroses have two kinds of flowers, each kind on separate plants, one having what is called the style elongated until the stigma shows plainly from the mouth of the tube formed by the bases of the petals, while the stamens are attached near the bottom of this tube. In the other flower the positions of the organs are reversed, the style being shortened so that the stigma is more than half way down the tube; and the stamens are in full view near the mouth of the tube exactly in the position occupied by the stigma of the long-styled flower. The pollen of the Primrose is ripe before the petals are expanded, but at this stage the stigma of the same flower is not in a condition to receive it. Those flowers having elongated styles are easiest to manipulate, and if I am not mistaken, they are the best seed bearers. Pollen, from either short or long-styled flowers, may be applied to the stigmas. When it is necessary to fertilize those with short styles, it is, of course, impossible to get at the stigmas with a small brush, owing to the anthers filling the mouth of the corolla tube, but with a pair of small scissors the corolla tube may be snapped in two immediately below that part to which the stamens are attached, thus giving easy ingress to the stigma. Keep the atmosphere as dry as possible while the pollen is acting.

**REINWARDTIA (LINUM) TRIGYNUM** and **R. TETRAGYNUM** are both desirable Winter flowering plants. *R. trigynum* is the best known; the other one has light yellow flowers and is the most floriferous. They may be planted outside, middle of May, and lifted during the end of September, if large specimens are required for the greenhouse; or from cuttings rooted in April they may be grown on in pots, pinching occasionally. *R. trigynum* is the only one which seeds freely.

**ROCHEA FALCATA** or *Crassula falcata*, is the principal member of a small genus of plants indigenous to the Cape of Good Hope. The foliage is rather peculiar in that the leaves are thick, blunt and formed somewhat after the shape of a curved knife. The principal attraction lies in the flowers, which are bright scarlet, small, but produced in immense numbers in flat heads. Although in Summer it will stand an abundance of water in fully exposed situations, it should be given drier conditions in Winter. It will succeed well enough in a house suitable for Geraniums. The Rochea is a slow-growing plant, consequently getting up a stock is a tedious process. The tips of the shoots make the finest plants, and the pieces of the stem next the place where the tip has been taken off, can be utilized for as much of its length as will be safe to enable it to break out again. For leaf cuttings the leaves must be cut off cleanly and put in sand, much in the same way as Echeverias, only a little more heat should be given during the rooting process. Encourage old plants to send out small growths along the old stems by taking out

the tips and keeping the plants perfectly dry for a time. As soon as they begin to break, water may be gradually supplied.

**RUELLIA MACRANTHA**—For a greenhouse plant for amateurs this is one of the best. Its cultivation is very simple. Cuttings rooted in September will furnish fair-sized flowering plants by the end of January. These may be planted out, end of May, in the open ground; by the end of September they will have made considerable growth; and if large specimens are wanted they may be lifted and potted. The flowers are very large, tubular-shaped, and magenta in color.

**RUSSELIAS**—*Russelia juncea* is an old plant but too seldom seen; it is probably the most useful of all our basket or vase plants. It sends out long arching branches of rush-like growths with flowers of an intense scarlet. Planted singly in vases there are few things to equal it in appearance. To propagate it take a handful of shoots at a time and cut them into lengths of from 4 to 6 inches. In this way 200 cuttings may be made with two strokes of the knife, and every one will root. *R. Lemoinei* and *R. elegantissima* are both good. The flowers are smaller than those of *R. juncea*, but more of them are produced. The two latter are better Winter flowering plants than *R. juncea*.

**SARRACENIAS**—Natives of the Eastern States. There are six species and a large number of hybrids; much prized in Europe owing to their curiously-shaped, and in some cases highly-colored leaves. *S. Drummondii*, a native of Florida, is the finest of all the kinds, none of the hybrids approaching it in the gorgeous markings of the foliage. *Sarracenia*s are best grown in a cool, sunny house. The potting material should be the same as recommended for *Nepenthes*.

**SALVIA SPLENDENS**—When it is desired to raise this fine late Summer-blooming plant from cuttings, old plants may be lifted, the flowers cut off and the plants set in a cool house. Under these conditions the growths made are softer and root very quickly, a single plant giving a large number of cuttings. Fall propagating is sometimes done in a hurry, owing to the sudden arrival of a cold spell, and this *Salvia* may be lifted and stored in safety without the loss of much time.

**Salvia Splendens "Bonfire"** is an improvement on the old kind, being of a deeper color and more compact in growth.

There is a very large number of species, but only a few in general cultivation. *S. leucantha* is very late in coming into bloom, making enormous growth during the Summer. It is well worth growing even for the short season of bloom. *S. patens* is one of the handsomest blue-flowered plants in cultivation. Store the roots under a bench and start early to get cuttings; or it may be raised from seed.

**SAINTPAULIA IONANTHA** is a very pretty dwarf, blue-flowered plant, the leaves resembling those of a *Gloxinia* but smaller. With little trouble it may be had in bloom at almost any season. The end of March is a good time to propagate. Cut off the ripened leaves with about an inch of stalk attached and insert in the sand bed, covering only a small part of the leaf blade. The sand should not be kept too wet during the

process of rooting. Otherwise, the treatment may be similar to that of the *Gloxinia*. The plants may be flowered all the year round, or given a period of rest by partly withholding water.

**SPH $\sigma$ EROGYNE LATIFOLIA**—This stove plant bears the distinction of being one of the finest foliage plants in cultivation. Together with *Cyanophyllum magnificum*, another noble leaved plant, it belongs to the same order as our common Meadow Beauty (*Rhexia*). Both of these plants look as if they would be very difficult to propagate, but, on the contrary, they are exceedingly easy subjects, so easy that if the conditions are all right, there is no excuse for losing a cutting. Mossing the tops is a rather slow and unsatisfactory method, and, I think, single eye cuttings can be just as rapidly grown into specimens as successfully rooted tops. During January the plants are in less active growth than at any other period, consequently this is the best season for putting in the cuttings. Split the stems, making single eye cuttings; shorten back the leaves to within about 2 inches of the leaf stalk, leave about  $2\frac{1}{2}$  inches of stem (less than this will root poorly); put firmly in sand of warm propagating bed, taking care that the under part of the piece of leaf lies flat on the sand; cover with glass. Rooting will be indicated by the buds elongating. Pot in thumb pots and keep close for a time.

**STEPHANOTIS FLORIBUNDA**—A great deal of roof space may be successfully utilized in the growing of this plant, the flowers of which can be profitably disposed of at all times. The plants may be put out in benches in the greenhouse and trained up the rafters, but the bench must be one which will not need repairing every now and then. The best plan is to have a rather deep box of soil specially prepared. Fibrous loam, enriched with manure; some charcoal and crushed bone will keep the soil open. It is not necessary to have a high temperature in Winter, as most of the growth will be made during the Summer months. Start with cuttings, as they flower much more abundantly than plants grown from seed.

**STEVIAS**—Cuttings are struck in late Spring. Put in  $2\frac{1}{2}$ -inch pots; from these they are shifted into 4-inch pots. About the beginning of August they are transferred into 6-inch pots. To prevent the plants getting wiry constant pinching should be resorted to. Pot-grown plants are preferable to field-grown subjects for late flowering, as the plants in pots can be stored in a place from which the frost is just kept out, so as to fill space vacated by Chrysanthemums. Field-grown plants may get their last pinching during September, and in the benches should be planted quite close together.

**STREPTOCARPUS HYBRIDS**—These have now attained such a high degree of perfection that they should be included in every general collection of greenhouse decorative plants. They are better window flowering plants than is generally supposed, not requiring a very high temperature at any time. Seed, to produce flowering plants in the Fall, should be sown during March. As the seed is very small, extra care should be taken in the sowing and subsequent treatment until the plants are large enough. In connection with the germination there is a peculiarity not

noticeable in other plants. Two tiny seed leaves are produced shortly after sowing the seed, and after a while one of these seed leaves dies the other continuing to elongate. In some of the species, notably one name *S. Wendlandi*, this seed leaf, which at first was about the size of a pin head, expands till it gets about 18 inches long and a foot broad.

**STROBILANTHES ANISOPHYLLUS** and ***S. ISOPHYLLUS*** are very neat and useful Winter blooming plants for the warm greenhouse. Flowers are light purple. Cuttings should be taken in early Spring. Plant out for the Summer, lifting and potting end of September.

**SYNADENIUM GRANTII** is a very compact-growing euphorbiaceous plant, with bright green foliage, bearing no flowers in a small state; and those which come on mature plants do not have much to recommend them. This is one of the easiest plants to root. By merely sticking pieces about 8 inches in length in the soil about the end of May, they take root quickly, making a good display for the balance of the season.

**STEPHANOPHYSUM (RUELLIA) LONGIFLORUM**—For conservatory decoration this is a most useful plant during the dull months, small-sized subjects being covered with bright red flowers. The ease with which flowering plants may be had by the end of the year is remarkable. Cuttings are put in the usual time that soft-wooded bedding plants are propagated; they root in a few days, after which they are put in 3-inch pots. Three of the plants may then be put in a 6-inch pot, and by keeping them in a growing temperature they may be had in full flower two months after the cuttings are taken. It is not only useful as a Winter blooming plant but it comes in well for planting out in Spring, blooming satisfactorily during the Summer.

**TINNEA ÆTHIOPICA**—A shrubby greenhouse plant sometimes called the Tree Violet, owing to its flowers having the same fragrance as the violet. It is propagated from good-sized cuttings of the dormant wood.

**TOXICOPHLÆA SPECTABILIS**—A Spring blooming stove shrub. Flowers are pure white, borne in dense clusters. Should be treated similarly to the Ixoras.

## Bedding Plants.

**ACALYPHAS**—There are about eight species and varieties of *Acalypha* grown as bedding plants. With the exception of *A. hispida* (Sanderi) they are ornamental foliage plants, having bronze-colored leaves of varying shades. *A. Godseffiana* and *A. Hamiltoniana* are marked with creamy white margins. *A. Wilkesiana* has several variations, the best known of which are *A. Macafeeana* and *A. musaica*. *A. hispida* has very ornamental pendant spikes of red flowers, produced in the axils of the leaves. Cuttings may be taken in the Fall before the cold weather injures the plants, but to save space the old plants should be lifted, cut back, and boxed or potted, starting them into growth in early Spring, when they push out from every bud giving abundant material for propagating.

**AGERATUM MEXICANUM**—This is one of the most tender bedding plants, although it does not require much heat during the Winter. Lift old plants and keep in a greenhouse; they will give an abundance of growths for cuttings during the months of February and March.

**ALTERNANTHERA**—The dwarf and slow-growing *Alternantheras*, such as *A. brilliantissima* and *A. paronychioides* are unsatisfactory from cuttings, unless taken in late Summer and kept growing. When taken later they are apt to continue in a weak condition all through the Winter. But in either case they take up too much room in the greenhouse for nearly eight months. A much better method is to lift the old plants before the frost blackens them, cut over to within three or four inches from the roots; put the cut-over plants as thickly as they will go in boxes; give water once and place under the benches of a warm house, where they will get some light. About the beginning of March bring the boxes up to the light, sprinkle about an inch of sand among the plants, and give water. Two weeks later divide the plants and pot them, when it will be found the pieces are much superior to plants from cuttings and make a better and quicker display in their Summer quarters.

**ALYSSUM MARITIMUM (Koeniga)**—The plant known as Sweet Alyssum is one of the last to succumb to cold weather. In this locality it is frequently in bloom up to the middle of December. It is used for window boxes, vases and baskets. A few plants may be lifted, cut back and planted in the front part of a rose or carnation bench, where they will furnish abundant material for cuttings in the Spring.

**AMARANTHUS** will germinate out-of-doors and make fair-sized plants, but to have them at their best the seed should be sown in the beginning of March, in a warm house, and near the glass, as the seedlings get very weak unless given all the light possible. As soon as large enough they are pricked off into boxes, and, when they reach the proper size, potted singly into 3-inch pots planting them out from this size. Their value

lies in the highly colored foliage, no other class of plants surpassing them in this respect. In the hottest parts of the country they do not last long after attaining their full size, and may be successfully used among Canna plants, which have been set out in a semi-dormant state.

**ANNUAL PLANTS** are those which germinate, come into flower and ripen their seed within a year. Plants of this nature usually die soon after ripening their seeds. Familiar examples are as follows: *Phlox Drummondii*, *Chinese Aster*, *Browallia elata* and *Silene muscipula*. But these and many other plants known as annuals under favorable circumstances will germinate in the Fall and flower the following Summer. In this locality *Phlox Drummondii* and *Silene muscipula* germinate freely in the Autumn months out-of-doors, and flower the following year; so that it will be seen that the term cannot be strictly applied similarly in varying latitudes.

**ASCLEPIAS CURUSSAVICA**—A greenhouse plant in European gardens. Seeds sown first half of February, and the plants put out from 3-inch pots in May, will grow 5 feet high and 3 feet through, bearing myriads of yellow and red flowers. Seeds ripen freely on outdoor plants.

**ASTERS, CHINESE (*Callistephus chinensis*)**—A few years ago Chinese Asters started early (about the beginning of February) and flowered indoors proved remunerative; but so easily are they grown that the market soon became overstocked. Their habit of growing to a great height in the greenhouse can be guarded against by selecting the varieties, planting wide enough apart and giving the maximum amount of light and air. They should take the place of exhausted Carnations or Mignonette. The outdoor crop need not come in bloom all at the same time; the first lot may be safely planted out during the middle of April in most places, the seeds being sown in very shallow hotbeds about the end of February.

**BANANAS (*Musa*)**—The ordinary fruiting Bananas for sub-tropical bedding will do well in almost any part of the country. With a plant or two to start with no trouble need be experienced in getting up a stock, as they sucker freely from the bases of the old stems. If there is difficulty in disposing of them, which is not likely to be the case, as in every community there are some people who like things which are uncommon, then use them for the decoration of the home grounds with such plants as Cannas, Eulalias and dark-leaved Ricinus. This combination will make a display that will be hard to equal. There are few things easier to keep over Winter. On the approach of frost the leaves should be shortened back by two-thirds of their length, the plants lifted, roots shortened back considerably, and stowed as thickly together as they will go in a box and placed in some out-of-the-way corner, where frost will not get at them. They will pull through the Winter all right, in a pretty low temperature. When planting-out time comes they are rather uncanny-looking objects for the center of a bed; but they are not long in developing a crop of leaves.

The hardest species of the genus, and one splendidly adapted to our Summers, is known as the Abyssinian Banana, *M. Ensete*. It does

not sucker like the ordinary edible fruited varieties, but is easily raised from seeds. Sow them the latter part of January in the sand bed of a warm propagating house, and pot off the seedlings when they have developed three or four leaves. They may be potted earlier if kept in bottom heat. In one season they will, under favorable conditions, grow 6 feet high, and if lifted, kept over Winter and planted the second season, they will develop into very large specimens. They delight in rich soil.

**M. superba**—A species somewhat resembling *M. Ensete*, is of a slower growth. The foliage is slightly covered with a farinaceous looking substance. In Winter the leaves die down, the bases of which form a resting bulb-like formation. It should be started into growth before planting out. These plants are raised from seed.

**BALSAMS (*Impatiens Balsamina*)**—Many florists depend to a great extent upon the white camellia-flowered Balsams for supplying material for designs during Summer. Although there are other things more satisfactory the Balsam will continue to be used, as it can be depended upon to grow with a minimum amount of care. The crop is sometimes disappointing, owing to a large percentage of the seedlings bearing semi-double flowers. Those plants with very double flowers do not set seed very freely, of course, and the temptation is evidently great, in gathering a seed crop, to collect the capsules from the very abundant crops on the single-flowered plants to the exclusion of those on the doubles and semi-doubles. A few plants of the best types carefully lifted from the field during dull weather and put indoors, will seed more freely than when left at the mercy of wind and rain, or panes of glass may be fixed over extra choice plants in the field. For each plant get two pieces of wood, making a cut of about an inch deep with a wide-set saw near the top; have the sticks driven into the ground on opposite sides of the plant, with the cuts facing each other; into these cuts slide the panes. This looks like a lot of trouble, but it is better to do it than to be without the flowers. For late crops these seeds may be sown out-of-doors and transplanted. To have them in bloom early sow in shallow hotbeds and transplant about the middle of May, earlier or later, according to locality.

The Zanzibar Balsam, *Impatiens Sultanii*, makes a very showy border plant, and needs very little care after being planted out. Sow the seeds in heat about the 1st of March; keep growing to prevent flowering in a young state.

**BEGONIAS**—Seeds of the bedding varieties should be sown by the beginning of January, to have the plants in good shape for Spring sales. Cuttings are often used, but they do not make anything like as good plants as those from seed. The seed should be sown in boxes or pans. Sterilize the soil used on the surface, firm well, water, then sow thinly without covering the seed, or with only a very small quantity of fine sand, covering the box or pan with a pane of glass until the seeds vegetate. Some of the varieties used for bedding, and which do grandly in most localities, are *Bruantii*, *Erfordiae*, *Vernon*, *Vulcan* and *Zulu King*. Out-of-doors all of them will ripen seed by September. Seed of some of

each should be saved, keeping it until wanted for sowing, without bursting the seed vessels.

**Begonia corallina** is undoubtedly the best of all the shrubby Begonias for outdoor use. The larger the specimens when put out the finer the display. Small plants in 3-inch pots must necessarily make fresh growths from the root, in order to attain one or two feet in height, and in doing this the best part of the Summer is spent; but large, healthy specimens will break freely into growth from the old wood and produce myriads of bright red flowers. An abundant supply of propagating material can be secured from out-door plants just before freezing weather. Old plants will hibernate in boxes under the bench of a moderately warm house.

**BELLIS PERENNIS**—The best kinds of double daisies are perpetuated by dividing the plants after blooming, but in many parts of the country these plants do not survive hot weather. Seeds should be sown during September, and the plants Wintered in a frame.

**BROWALLIA ELATA**—A blue-flowered annual species, may be sown where it is to bloom. In this locality the numerous varieties are hardy annuals.

**B. speciosa** may either be raised from cuttings or seeds. When grown cool both are good Winter blooming plants for the conservatory.

**CANNAS**—The first lot of rhizomes intended for bedding purposes should be started during the first part of February. These should be the finest kinds and those which it is desired to increase, because even the smallest pieces having one dormant point, started early, will make plants large enough to occupy 5-inch pots by the time for planting out. Leave as much of the rhizome to each point as possible, as it will send out new growths from the dormant buds between the scales. In the formation of the rhizomes scales are first formed entirely encircling the rhizome, which, as it reaches the light, gradually elongate until true leaves are formed. The main crop may be gone over during the first half of March. Cut up the rhizomes into pieces small enough, so that when the time comes for potting, each piece will fill a 5-inch pot. Before potting they should be put in material which will encourage the formation of roots, and the best for this purpose is sphagnum, sand and rotted cow manure in equal parts. When the rhizomes are potted without roots they always turn out unsatisfactory. Some start immediately but the majority remain dormant, and take up valuable space for too long a time. Use boxes to start the rhizomes; place a couple of inches of the material in the bottom, put the pieces on this and cover with at least one inch of the rooting medium. Water only sparingly at first; as the growths push up give full exposure to the light.

**Varieties**—It is only a very few years since the principal feature of the Canna was its foliage, the blooms being small and comparatively insignificant. Within the last decade the development of the flower has been very marked. The beginning was made in Europe, and from the first of the improved forms numerous fine varieties have been raised in America, so that now anyone can take a few good flowered sorts, pol-

linate the flowers, and among the resulting progeny will be found some as good, if not better, than the parents. A new race has recently sprung up known as the orchid-flowered Cannas; these have been secured by crossing the Crozy section with the large yellow flowered *C. flaccida*. The flowers are very large and showy, but the direct cross between the two is not very suitable as a bedder, owing to the soft nature of the segments. There are at present indications of the orchid-flowered section being considerably improved in the substance of the flower, so that in a few years they will be more largely grown.

**Varieties with Ornamental Foliage**—Some of the varieties are grown for the foliage alone; these are either slightly variegated or with the leaves dark red. Black Beauty has for several years been by far the best of this class, and likely to remain so. It should never be planted out in a dormant state.

**Raising from Seed**—The seed covering is very hard and resists the influence of heat and moisture for a long time under ordinary conditions. Germination may be hastened by soaking the seeds in warm water, and also by removing a very small piece of the seed covering. In any case sow early and in a bottom heat of from 75 to 80 degrees.

**Storing**—Cannas should be lifted from their Summer quarters just as soon as the foliage is blackened by the first frosts. Before this occurs they should be gone over and labeled correctly, noting the color, size and comparative value of seedlings. Use hanging labels, tying them on firmly as near the ground as possible. Cut off the flowering stem about 6 inches from the ground. Put the kinds together. If there be greenhouse accommodation a position under the benches, where they won't get much drip, will suit them exactly. If greenhouse accommodation is not available they should be closely packed together in boxes, using dry sand, and stowed away where frost will not affect the rhizomes.

**CHÆNOSTOMA HISPIDA**—This charming dwarf shrub is not so well known among florists as its merits deserve. It is useful in a number of ways, but principally as a plant for filling boxes or baskets. For rock work, cemeteries or even as a bedding plant it is prettier than a number of the things commonly used for such purposes. It has a prostrate or decumbent habit, according to the position in which it finds itself, and has the great merit of being continually decked with a host of neat little pinkish white star-shaped flowers. It is remarkably quick in making a bushy growth from the seedling or cutting stage. For propagation lift old plants in the Fall; keep in the greenhouse and take cuttings from the young growths early in the Spring.

**CINERARIA MARITIMA** and **C. CANDIDISSIMA** are much used on account of their foliage, which is densely covered with very fine white hairs, so much so that the leaves have a whitish appearance. The most reliable method of propagation is from seed, which should be sown in Autumn. Cuttings may also be taken, avoiding those which are very robust. Give them treatment similar to that recommended for Gazanias.

**CODIÆUM (Croton)**—It is only within recent years that these plants have been used to any extent in the open ground. They succeed well,

putting on colors much superior to what we usually see indoors. Some of the higher colored varieties are unsuited for this work, as they need a high temperature at night as well as during the day. The following are the kinds which I have found reliable: *C. Lady Zetland*, *C. pictum*, *C. aucubaeifolium*, *C. chrysophyllum* (one of the most satisfactory), *C. multicolor*, *C. interruptum*, *C. Veitchii* and *C. Weismanni*. As these may be grown successfully from 10 to 15 degrees cooler than *C. Reidi*, *C. Challenger* and others of that section, they should be given a trial even in the Northern States. The principal batch of cuttings for bedding plants is taken beginning of September. If there is no bottom heat by that time they will root splendidly in a close propagating frame. With bottom heat they root in the open bed, and the cuttings may be quite large. Allow quite a quantity of roots to form before potting. A minimum temperature of 60 degrees will be found sufficient during Winter for the above varieties. Before putting them in the ground they must be very gradually hardened off otherwise they are apt to lose the lower leaves. Old plants should be given a top-dressing of bone meal and plunged out, to furnish cuttings.

**COLEUS**—Owing to the easy way in which young plants are got up their rapid growth and very ornamental foliage, when planted out, the very numerous kinds will continue to be popular bedding plants. In Winter young plants should not be subjected to a lower temperature than 55 degrees. From a few plants grown from cuttings, put in during the beginning of September, a large quantity of young plants may be raised in Spring. In this latitude we have little use for hotbeds. In other localities, where the nights are colder during April and the first half of May, the hotbed is an indispensable adjunct to the greenhouse for developing plants such as Coleus from late rooted cuttings.

**COSMOS BIPINNATUS**—To have the plants complete their growth early the seed should be sown indoors, or on a hotbed by the middle of March. Give the seedlings enough light to avoid weak growth. Plant out in rather sandy soil, and not too heavily manured. *C. sulphureus* has yellow flowers; late blooming plants of it may be lifted and put in large pots, or planted out in a bench where there is abundant head room. When grown on stiff soil the plants lift easily. Some of the more robust shoots may be removed, owing to the loss of some of the roots in removing. In this way they will give a large quantity of bloom up till the middle of December.

**Supports for the Plants**—We frequently see a very promising crop of Cosmos laid flat on the ground by a moderate wind storm, which not only breaks half, or more, of the branches, but the flowers on those which are left are at least a week later than usual in making their appearance and have crooked stems into the bargain. Drive in a fence post at each end of the row, stout in proportion to the length of row, with smaller posts at intervals between; knock in some small wire staples at convenient heights in the post; let one man unwind wire or strong string at one end of the row, and another take the end of the wire or string and put through the staples, securing firmly to the strong posts at each end. Two or three stretches to each row will suffice, and

if tied afterward with string will help to secure the plants in an upright position against storms.

**COTYLEDON** (*Echeveria*)—Frequently used for carpet bedding. Some of the best for this purpose are *C. atropurpurea*, *C. californica*, *C. clavifolia*, *C. fascicularis*, *C. gibbiflora* var. *metallica*, *C. secunda* var. *glaucia*, *C. imbricata*, *C. Pachyphytum*, *C. mirabilis*, *C. globosa* var. *extensa*, and *C. eximia*. The narrow-leaved kinds are raised in quantity from leaves; others from seed, offsets and from cuttings. November and December are the best months for propagation. Pull the leaves from the plants, taking care during the operation that the bud in the axil of the leaf is preserved. Make a depression, say 2 inches deep and 4 or 5 inches wide, across the sand bed of a warm house; lay two rows of leaves in this with their bases touching; keep dry until the little growths start. When large enough they should be pricked off close together in boxes. Old plants should be lifted in Autumn and placed as thickly as they will go in boxes, without adding much soil and keeping them without water in a cool house.

**CUPHEA PLATYCENTRA** and **C. LLAVÆ**—A few plants Wintered over in a moderately warm house will give cuttings in March. *C. Llavæ* has large and handsome flowers, but they are not freely produced until the plants have made considerable growth.

**DAHLIAS**—The Dahlia delights in a cool and humid atmosphere, but immediately the mercury gets anywhere near the freezing point that is the end of the plant's usefulness for the season. Old plants are cut back to within 6 inches of the soil, dug up, and the soil removed from the fleshy tuber-like roots; they are then stored for the Winter in a dry and frost-proof structure.

**Propagation**—Although the kinds are perpetuated by division, grafting and cuttings, the latter method is the one best suited for raising large quantities of young plants. The roots are brought into heat about the 1st of March, covered over with some light soil, and encouraged to make growth by frequent syringing. As soon as the shoots are 3 or 4 inches long, separate from the parent, taking them with a heel. They can then either be put singly in small pots and kept close and warm until rooted, or put in an ordinary propagating bed with a bottom heat of 75 degrees. The sand need not be kept very moist, but the atmosphere should contain enough moisture to prevent wilting. As soon as weather permits the plants should be put out in a frame to harden.

**Varieties**—The large and perfectly symmetrical flowers are rather stiff and artificial looking for cutting purposes. The cactus-flowered section do not have this fault; nearly all of them are well worth growing. The Pompons, especially those with white flowers, can be utilized for various purposes. The single-flowered varieties can all be used for cutting; this section seeds freely, and some of the strains offered by European seedsmen come remarkably true, but good kinds should be perpetuated from cuttings.

**Soil**—This should be very rich and light, and if the plants are put in positions where it is inconvenient to water them during dry weather they should get a mulching of half-decayed stable bedding.

**ERYTHRINA**—The varieties of *E. Crista-Galli* are seldom without flowers during the hottest months when planted out. During Winter they should be kept dry, under a bench, and may even be put out in that state, although quicker results may be had by starting them into growth before planting. They are best propagated by giving the old plants heat and moisture, to produce growths about the 1st of March. When a few inches long take off with a heel, pot in sandy soil and stand them in a warm propagating frame.

**FICUS ELASTICA** may be associated with such plants as Variegated Screw Pines, Crotons, Variegated *Panax* and *Dracæna Sanderiana* in the formation of tropical groups of plants. They make very rapid progress when plunged in 5-inch pots shortly after being potted from 3-inch pots. All of these may be arranged where the full sun will strike them. The Ficus must be examined from time to time, to prevent the roots from establishing themselves outside of the pots.

**GAZANIAS**—Decumbent composite plants from South Africa, of a somewhat succulent growth, and succeeding well in partially shaded positions. In the Northern States they thrive in full sun. The flowers are large, deep orange. Owing to the succulent character of the plants the cuttings are liable to decay when placed in wet sand. Put them in boxes, using sandy loam. Make the soil quite firm; give one good watering, then put in the cuttings and keep in a cold but close frame until rooted. This may be done about the end of September; on the approach of severe weather bring the boxes into a cool greenhouse and pot off in early Spring.

**GERANIUM**—See *Pelargonium*.

**HELIOTROPE** (*Heliotropium peruvianum*)—Grown principally on account of the sweet-scented flowers. There are dark and light lilac varieties, also a few with whitish flowers. A few years ago a very large-flowered kind was sent out, but it had no perfume, and its first season was its last. The kinds will succeed best in full sun. Old plants should be wintered, planted out on a bench. A minimum temperature of 40 degrees will suit. From these plants abundant material for propagation may be had in early Spring.

**HUNNEMANNIA FUMARIÆFOLIA**, for late Summer and Fall cutting, beats all other members of the Poppy family. Seeds of the earliest flowers will have ripened by the end of September. They should be gathered and laid away in a cool, dry place for sowing in early Spring, taking care not to burst the seed vessels. The only difficulty attending the cultivation of this Poppy is in the seedling stage. The young plants are difficult to transfer from the seed pan to small pots, but this can be avoided if the seeds are sown in small pots, with the soil firmly pressed before sowing and shifted on as the plants require it. The flowers resemble those of some of the *Eschscholtzias*, to which genus it is closely allied; but there is much more substance to the flowers of the Hunne-

mannia and also to the flower stems. They can be cut and kept in excellent condition for several days. It thrives well in sandy soil, and needs but little attention in the way of watering after planting out. It sometimes stands the Winters in the District of Columbia, but oftener it gets killed outright.

**ISOTOMA LONGIFLORA**—This plant is figured in Curtis' Botanical Magazine under the name of *Lobelia longiflora*. It belongs to the order Campanulaceæ. In Europe it is grown as a greenhouse subject. In America it is one of our most showy white flowering biennials for the open border. The plants before coming in bloom are anything but attractive, as they closely resemble some of our common coarse-growing weeds. The flowers, on large plants, are anything but sparingly produced; they are pure white, an inch or so across the petals. Sow the seed in a cool greenhouse in the Autumn, or in a warm house early in Spring. Each plant will ripen an immense quantity of seed.

**IRESINE (Achyranthes)**—As a bedding plant, treat much the same as Coleus. They will stand a lower temperature. Cuttings put in during September can be used as stock plants in the Spring.

**LANTANA**—Low-growing greenhouse shrubs with yellow, white, red and purple flowers in small, close heads. They are perfectly at home in the open border, growing most luxuriantly in heavy, well-manured soil. The leaves and flowers have an undesirable odor, which is against their ever becoming very popular. Take cuttings early, and from plants thus raised they may be further propagated during February. A minimum temperature of 50 degrees will suit all of the kinds.

**LOBELIA ERINUS**—A very popular bedding plant in Europe, but short-lived here, owing principally to the high temperature during mid-summer. A few old plants kept on a bench along with such things as Heliotrope and Ageratum will give fine cuttings, which are rooted beginning of March and transferred to a hotbed, to make growth.

**MESEMBRYANTHEMUM**—The pretty little variegated Ice plant, known under the name of *Mesembryanthemum cordifolium variegatum*, has a habit of damping off in the propagating bed when treated like the majority of bedding plants. A way to circumvent this is to prepare shallow boxes of sand and leaf-soil. Give one good watering previous to putting in the cutting. Let the "oxes stand for a few hours, put in the cuttings quite close together and stand them on a bench over the heating pipes. Give no more water till rooted; that is, if the soil does not become too dry; in this case the cuttings should not be watered with a rose. This variety is one of the prettiest of dwarf bedding plants, and should be more commonly grown. *M. crystallium*, *M. tricolor*, with pink and white flowers, and *M. amœna*, the latter an evergreen species, are all used for outdoor planting. The annual kinds should be sown indoors beginning of March. Cuttings of the perennial kinds should be rooted in Autumn.

**MIGNONETTE, (Reseda)**—For pot culture sow beginning of September in 3-inch pots; leave three of the strongest seedlings in each pot, and long before the plants are pot-bound shift into 5-inch pots. Keep in the

coolest house, where they can be given abundant ventilation and full sun at all times. About two quarts of soot to a barrel of water makes a good liquid manure. For blooming out-of-doors sow thinly as soon as weather permits.

For early flowering seed may be sown during the first half of August. The method of sowing the seed on the benches is the one there is the least difficulty with, and that calling for the least amount of intelligent care, as a number of seeds can be sown at each station where they are intended to flower, and the strongest plants left. This system is not always convenient, however. Other methods consist of sowing in pots and planting from them, or in boxes or pans, and pricked out from these into small pots, shifting if necessary, and planting out when the proper time arrives. Mignonette seedlings, when they get beyond a certain size, are exceedingly difficult to prick off successfully; but when taken as soon as they can be handled there is little danger of failure if ordinary precautions are taken against damping off, suffering from too much or too little water, or from the direct rays of the sun until the seedlings are established. Mignonette likes cool treatment, so that attempts to coddle it by giving a high, close atmosphere will not produce flowers worth the cutting, if they ever reach the flowering stage. The soil to grow it in should be well enriched with cow manure, and well firmed before either sowing or planting. There are several kinds on the market to select from; but there is not so much in the variety as in the way it is grown.

**MIMULUS MOSCHATUS**—An old-fashioned plant with a musky odor. It will keep in a frame during the Winter, and may be brought indoors early in the season, divided into small pieces and potted. It grows best in a shaded cool house, or it may be planted out in a moist shady spot.

**MIRABILIS JALAPA**—This species (the Marvel of Peru or Four o'Clock) has tuberous roots, and in Winter may be stored in the same way as the roots of the Dahlia, or raised annually from seeds sown indoors. The flowers are very showy, of various colors, principally yellow, crimson, red and white.

**NIEREMBERGIA FRUTESCENS** and **N. GRACILIS**—Seeds of these should be sown in September and plants wintered in a frame. The following Summer they will make much better subjects than from Spring-sown seed. They are principally used in large vases, but they make exceedingly showy plants for the rock garden and border.

**NIGELLA DAMASCENA**—As soon as the weather permits seeds may be sown rather thinly where the plants are intended to bloom in the open border.

**OXALIS**—For outdoor blooming during September and October knock out a few plants from their flowering pots and start some of the largest bulbs about the middle of July in 3-inch pots. Use light soil. Some of the plants will be in flower inside of a month. They can be used as bedders, to take the places of plants which die off as the result of warm weather; for instance, Ten-Week Stocks, Lobelias and Pansies. *Oxalis Bowiei*, *O. hirta*, *O. rosacea*, and one which goes under the name

of *O. crydentalles*, are all very suitable for this kind of work. Plants which were in bloom during the Winter and Spring may be started for this purpose after a few weeks rest.

**PANDANUS**—For bedding purposes the best plant in this genus is *P. Veitchii*. It will thrive in almost any position, but it makes better leaves in full sun than it does in shade. As young plants increase in value up to a certain size, they should be put out in their pots, and once or twice during Summer should be examined at the roots and larger pots given if necessary. The roots are large and soft, and when they grow over the sides of the plunged pot and into the surrounding soil they are difficult to manage afterward.

**PANSIES (Viola)**—To have pansy plants ready to put out in the Fall the seed should be sown about the middle of August, and even earlier, where the weather will permit. In the very warm weather the principal danger is in the damping off of the seedling plants shortly after they have germinated. Sow thinly and cover lightly with screened moss, or old manure, giving only enough water to keep the surface slightly moist. In the warmer parts of the country it will require good judgment in selecting a suitable place for the seed boxes during germination. One can be secured by raising some shaded sash above them, in a place where the air is not apt to get stagnant. As soon as the seedlings are large enough to handle, they should be pricked out in boxes of moderately moist soil, and for some time only given gentle sprinklings through a fine rose to prevent wilting. They are put in their Winter quarters by the beginning of October and given a mulching of rotted manure shortly afterward. In this way they can be grown in the same beds with low growing bulbous plants, such as *Crocus*, *Galanthus* or *Scillas*, these bulbs going out of flower just as the Pansies are coming in, securing a season of bloom from the time when the snow disappears until very warm weather, or, in Northern latitudes, all Summer long. In some parts the plants make sufficient progress before the advent of cool weather, not only to bloom, but to send up numerous shoots from the base of the plant. This is a good opportunity to select cuttings of the finest forms to raise seed from. Take those cuttings having a small piece of solid stem; put in sand, treating them as cool as possible. As soon as rooted place in boxes of light soil and Winter in frames, planting out as soon as weather will permit. It should be borne in mind that plants put out in the Fall always give the best results in Spring.

**Pansies to Flower in Frames**—If sown early enough and potted off the seedlings will show the colors before planting and thus enable the grower to select those which are best for selling. These should be planted in a frame facing south so that they will catch all of the sunshine available during the Winter months. If pinched back frequently it will induce the plants to make bushy growth before freezing weather; then mulch with leaf soil or old manure, giving air whenever the weather will allow of it. They will throw up an amazing quantity of bloom early in the season, which will pay to cut with the foliage attached so that good long stems can be secured. Pansy seed should be sown in very shallow boxes. The plants delight in a low temperature and a

soil which is open enough to enable the small succulent roots to ramify freely through it. It is not necessary to have the soil largely of vegetable humus; one that answers well may be made up as follows: Screen some soil through a No. 8 sieve; the rough material which does not go through the meshes put through a No. 3 sieve. This, mixed with leaf soil, to one-third of its bulk, will insure a good germination. The idea is to keep the roots in a healthy growing state with abundance of air around the seed leaves to prevent damping off. Pansies do better outside during Winter than most people suppose. Planted early with a little mulching, and if the weather gets very severe, some old stable bedding thrown over them, will give all the protection necessary. For plants for Spring sales the seed may be sown late and Wintered in cold frames, or it may be sown early in the Spring; but the most satisfactory plants are obtained from early sowing.

**Tufted Pansies**—These are what the Scotch florists up to within a few years ago used to call bedding Violas; but as Pansies, tufted Pansies and Violets are all members of the genus *Viola*, the use of the generic name for any one section of the genus has generally been discarded. The tufted varieties are hybrids from *V. cornuta*, *V. lutea* and *V. tricolor*. They spread at the root much more than the ordinary Pansies do, making a great mass of flowers, especially in cool climates, for the greater part of the Summer. After Pansies having become so popular in this country I am afraid the tufted Pansy would have a struggle for existence in the estimation of the ordinary flower lover. Although in the tufted Pansies there is a greater diversity of color, more graceful flowers, and the plants are very floriferous, the flowers are much smaller than in the ordinary Pansy, and it is a question if they would become popular.

**PELARGONIUM**—(This genus includes the bedding Geranium). Cuttings are rooted during the end of September or first half of October, according to locality. Plants that are well developed without being "drawn" are best for supplying wood. The usual method is to put each cutting in a thumb pot and stand these close together for the time being in a frame or cool house. Leaf mould, sand and loam in equal parts will answer as a soil. Give one watering, enough to moisten the soil; subsequent waterings will be necessary only when it gets dry. Take the cutting immediately under a joint and shorten back the large leaf blades one half. By the end of the year they should be shifted into 3-inch pots, using stronger soil, and a month or six weeks later the plants will give a batch of cuttings which may be potted like the first lot. A hot, stagnant atmosphere must be avoided at all times. A saving of time and space may be accomplished, together with providing equally fine plants, if the old method of propagation be adhered to. This consists in putting the cuttings, made with the leaf blades shortened somewhat, into boxes pretty thickly together, standing the boxes outside, partly shaded from the sun until they root. Little water is given during the operation, and heavy rains are to be guarded against by having sash ready to cover the plants. The soil used should be such as to enable the rooted cuttings to thrive in it until January when they

are potted up. If kept on the dry side they will bear considerable cold, and will be prevented from making a too rapid growth. By this method there should be no necessity for putting in a second batch of cuttings from the tops of the first lot. Give this method a trial on a small scale, until familiar with its working.

**Ivy-leaved Section**—The stems of these are not so succulent as those of the Zonales, and should be rooted in the sand bed. Old plants potted up after being cut back will give abundant material for propagation.

**Fancy Pelargoniums** are of no service for bedding, as they have only a short flowering period. In this latitude they are never seen at their best, and it hardly pays to grow them. In the Northern States they do better. Cuttings should be put in early, and kept in a growing condition from the start. Large plants are secured by reducing the balls of one or two-year old plants and repotting.

**PENTAS CARNEA**—More familiar as a stove plant than for bedding purposes. In the warmer parts of the country, however, it will give three months of rather showy bloom. Treat the cuttings similarly to those of Lantana.

**PERISTROPHE ANGUSTIFOLIA**—A rather loose growing, but dwarf and finely variegated plant, useful for vases and baskets. Propagate in Spring from lifted plants.

**PETUNIAS**—It is always advisable to sow the best strains of the double Petunia seed, as the majority of the seedlings will furnish all the single flowered plants necessary for ordinary use. The doubles can easily be picked out from the singles before the flowering period. They are known by their stocky appearance, the singles having a decidedly "annual" look shortly after the seedling stage has been passed. In order to prevent washing of the soil after the seed is sown, use boxes, say 3 inches deep; put a shallow layer of sphagnum in the bottom, make the soil firm, give a watering sufficient to wet the soil through; then when the surface will admit of the operation roughen it with the ends of the fingers. Sow the seed thinly and smooth the surface with the end of a cigar box without covering with soil. A pane of glass or a piece of damp cloth placed over the box will prevent a too rapid evaporation of the moisture till the seeds have germinated. They may be sown during the first part of February.

**PHLOX DRUMMONDII**—The numerous varieties of this popular flower should be sown by the middle of February. The single whites and reds are most in demand. In sowing cover the seeds with sphagnum rubbed through a No. 4 sieve. In a moderate temperature they will germinate inside of a week. After the seedlings are large enough they should be pricked off into boxes from which they should be transferred to pots later in the season. When put in pots during the seedling stage they are apt to throw up flowering stems, and become hard before sufficient growth has been formed. For late flowering plants a batch of seed may be sown beginning of May; these will be of most service if white varieties are selected.

**PLUMBAGO CAPENSIS** is usually treated as a greenhouse plant. It blooms after midsummer on the current year's growth. Our warm Summers are very favorable to its growth out-of-doors, and it certainly ought to be largely grown for this purpose, as there is no other plant which can supply the color (light blue) so abundantly. Plants from Fall struck cuttings will be large enough by planting out time to fill 4-inch pots, and they ought to be planted out from this size for early blooming, as younger plants are too apt to make growth instead of flower. The best flowering plants are those which have been Wintered over in a dormant state, the larger the better; by midsummer they are a solid mass of bloom. There is a white flowered form which goes well with the blue one, but this should not be confounded with *P. zeylanica* —a worthless species.

**RICINUS (Castor Bean)**—This grows, according to variety, from 5 to 15 feet in height. *R. zanzibarensis*, a green-leaved form, continues growing all Summer and does not even ripen its seeds in this locality. R. Gibsoni has blood-red foliage. The seeds should be sown beginning of April in small pots, as they form a large mass of roots quickly after germinating.

**SALVIA SPLENDENS**, the scarlet Sage, is the most used of this extensive genus for bedding purposes. Young plants are raised early in Spring from cuttings taken from lifted and headed back plants. *S. marmorata*, *S. Wm. Bedman*, *S. alba* and *S. Mrs. Stevens* are all well-known kinds.

**SANCHEZIA NOBILIS** puts on a very rampant growth when placed out-of-doors in rich soil. Although a bed of Cannas may look best by themselves, a border is often wanted of some other plant; this species will answer well for such a purpose. Good-sized cuttings root very freely. They may be Wintered in 3-inch pots in a moderately warm house.

**SANTOLINA INCANA**—Although a perfectly hardy, dwarf shrub, it is frequently used for Summer effects in carpet bedding. It can be rooted any time before frost, in boxes of sand kept in a cool, close frame, or from old plants wintered in a frame. Cuttings may be secured in Spring.

**SWAINSONA**—Not only is this plant useful for Winter blooming, but early struck cuttings grown in well-drained soil will flower well in Summer. Old cut back plants which have flowered during the previous Winter will also supply an abundance of bloom when planted out.

**STROBILANTHES DYERIANUS**—This species, especially in a young state, has foliage suggestive of some of the highly-colored Bertolonias. Its treatment should be similar to that afforded the Coleus, so far as Wintering and propagating are concerned. When planted out in the full sun, the leaves are apt to have a washed-out appearance, especially on old plants. A situation having partial shade is best.

**TAGETES**—Some of the Mexican species are useful for late blooming. In the open border they are among the last plants in flower. The im-

proved kinds may be sown in a gentle hotbed and transplanted to where they are to bloom.

**VERBENAS**—The varieties of these used to be kept true to name, the plants lifted in the Fall and cuttings taken in early Spring. Seeds can now be depended upon to furnish the finest flowering plants. They should be sown in February and the seedlings potted as soon as large enough. Pinching should be done early to make the plants branch and have them in bloom by planting-out time.

**V. venosa**, an herbaceous species, with heads of purple flowers, is hardy in the Middle States. It may be raised from seed sown at the same period as the garden varieties, or from division of the roots in the early part of April.

**TORENIA FOURNIERI** is none too common yet as a half-hardy annual. Although it will germinate outside it takes too long a time in blooming. Owing to the color of the flowers (different shades of violet) it is desirable, as bedding plants of that color are not plentiful. Sow indoors middle of March and allow the seedlings to gain a considerable headway before potting. *T. asiatica* and *T. Bailloni* are well suited for basket or vase work, as they are of a procumbent habit. *T. Fournieri* is of erect growth.

**TROPÆOLUM.(Indian Cress)**—With the exception of the double-flowered forms, which are perpetuated by cuttings, those varieties commonly grown are raised annually from seeds. The seed must not be sown too early, because they make rapid progress, and are apt to produce spindly growth in small pots. *T. majus* and dwarf forms and *T. Lobbianum* are well known and useful as climbers, or for planting in beds. All of them are quite tender, and should be put out rather late.

**VINCA ROSEA**—The Madagascar Periwinkle should be sown about the beginning of January, to have fair-sized plants by the beginning of May. Sow the seed thinly, and when large enough prick off into boxes. From these the seedlings may be shifted into 3-inch pots, from which they are transferred to the open ground. There are three kinds which come true from seed, one with rose-colored flowers, one pure white, and the third has white flowers with pink center. They are among the most satisfactory of bedding plants.

**ZINNIAS**—Very gaudy flowering annuals of the Daisy family. The tall-growing kinds have given way to the dwarf and much more showy varieties. Sow seed about the end of March and prick off into boxes of rather rich soil. Harden them off in a frame before planting out.

## Vase and Basket Plants.

When vases have to be filled with only one kind of plant, hardly anything will be found more appropriate than the Russeliae. The branches are erect in a young state, eventually becoming drooping. If the plants are put in a light, rich soil, with abundance of water during the growing period, they will be in bloom most of the time. Only one-year-old plants should be used for large vases; that is, plants in 6 or 7-inch pots, as when of that size they soon become furnished with good-sized branches. The old and well-known *Russelia juncea* is the best for the purpose, although *R. sarmentosa* and *R. Lemoinei* are both good, giving a greater number of flowers, which, however, are smaller than those of *R. juncea*. Among those plants needed for the center of vases, *Pandanus Veitchii* and the numerous varieties of the grassy-leaved species of *Cordyline*, such as *C. australis* and *C. indivisa*, are among the best. Last year's seedlings of the *Cordylines*, if they have been liberally treated, will be large enough by the beginning of the season for all ordinary purposes. They stand the hot sun well. *Pandanus Veitchii* colors well under full sunshine, but needs more water than the *Cordylines*. *P. Baptistii*, of which much was expected as an outdoor Summer plant, is rather disappointing, as its foliage is too tender for exposed places. Other good things for vases and baskets, in the shape of flowering and trailing plants, are the three species of *Torenia*, two purple and one yellow, besides the so-called white variety, and *Maurandya Barclayana*, all of which may be got under way from seed in a short time; *Mesembryanthemum cordifolium*, Germany Ivy; all the trailing *Vincas* and *Abutilon vexillarium* are indispensable. The variegated ground Ivy will stand the sun well in exposed situations; it is dwarf growing and comes in handy for planting around the edges of vases and baskets, where its long hanging growths can be seen to advantage. Stock of it, kept in boxes under the cover of sash, should be cut up during the early Spring, and small pieces with roots attached placed in sandy soil in boxes, and either returned to the frame or brought into a cool house, to be started into growth previous to potting.

*Saxifraga sarmentosa* ("Aaron's Beard") is a very hardy species with ornamental flowers and foliage. It thrives out-of-doors all the year round in positions partly shaded from the sun. By the first of March fair-sized plants may be put in 3-inch pots. It is suitable for baskets, vases and boxes, which do not get much sun. There is a variegated form with striking foliage.

*Senecio scandens* ("German Ivy")—A few plants struck from cuttings in the Fall will give growth for a large number of cuttings after the first of the year.

**Othonna crassifolia** ("Little Pickles")—This plant will stand full sunshine with very little water. It is of procumbent growth with small yellow flowers. Lift a few old plants before frost, and merely lay them on the front of a sunny bench. A dozen or two nice little tufts may be potted up from a single plant.

**Lysimachia nummularia**, the Money Wort, will thrive in shade or sun. There is a pretty variety with yellowish leaves.

**Ipomæa Tubiculata**—With small star-shaped leaves, throws out quantities of hanging growths. Every bit of stem with a leaf attached will root either in Fall or Spring.

**Vinca major var. elegantissima** comes in very serviceable, not only for vases and baskets, but for indoor decoration. Specimens for this purpose should be in 5-inch pots, or even larger. Plants rooted early in the Fall and kept growing will, in course of time, make very long growths. A good place for them in this condition of growth is on the front of a sunny bench, where the growths are allowed to hang over the side. This plant does not show the effects of neglect as quickly as most other things.

**For Indoor Boxes for Windows** or other places where there is not much light the following plants will be found useful, as they are almost hardy, and, with ordinary care, they will last a long time in a presentable condition: Rohdea japonica and the variegated form will stand in the coldest places. These plants, by the way, are perfectly hardy here, the foliage being but slightly browned during the coldest weather. Aspidistra elatior and A. e. variegata, together with the spotted leaved species called A. punctata, while not so hardy as the Rohdea, yet they will stand a good deal of cold. Of course, the plants will have to be small, in 5 or 6-inch pots. Old plants broken up for this purpose and immediately used are not to be depended upon, as the principal roots are apt to get severed in the operation. Many of the New Zealand Cordylines, with narrow green leaves, can be utilized for drafty places; they will stand considerable frost without hurt if they have been grown cool. Farfugium grande, a broad-leaved composite with yellow spots, is another well-known plant which comes through zero weather all right. Niphobolus lingua corymbifera, a tough-leaved crested Fern, can be got up in quantity for use by division of the stems which grow near the surface of the soil. Lastrea prolifica, a dwarf dark green leaved species; Lastrea opaca, Pteris serrulata, and Adiantum Capillus-Veneris are all pretty hardy, as well as ornamental species of Ferns good for the purpose.

## Vines, Hardy and Tender.

**ADENOCALYMINA COMOSUM**—This is one of the best tender vines where it can be given enough head room. If planted out and otherwise treated according to its requirements, it will make growths 70 feet in length. It is closely related to the Bignonias. Flowers are bright yellow, being borne in large racemes. It blooms in midwinter. Propagated by cuttings of the ripe wood in late Summer.

**AKEBIA QUINATA**—Although a climbing plant, and a very handsome one, it is frequently grown to answer the same purpose as bush plants of *Jasminum nudiflorum*. For this purpose it should be allowed to ramble over low supports. For trellis work it is well adapted. Although a common plant we seldom see it in fruit, which is probably accounted for by the fact that the pistillate flowers come into bloom before the staminate ones, thus preventing fertilization; besides, they flower at a period when fertilization out-of-doors is a somewhat precarious operation with vines brought from other countries. Its propagation is brought about from cuttings of the current year's growth, choosing wood not too thick nor yet the weakest branches. Make the cuttings with two or more leaves on them, and place together in a cool bed; root them in time to be put in a cool frame for the Winter.

**AMPELOPSIS VEITCHII** and **A. ROYLEI** differ from each other only in that the former is the smaller of the two in leaf and fruit. **A. Roylei** is, perhaps, the more rapid grower of the two. They are both ideal vines for covering walls, not only for ornamental appearance, but what is of more importance, in warding off the rain from the walls. It may be noticed that the foliage is imbricated; that is, the lowest leaves, the blades of which hang almost perpendicularly, are covered for nearly half of their length from the base by the ends of the leaves above; thus the water drips from one to the other instead of being absorbed by the substance against which the vine grows. Another good reason why it should be planted much more freely is, that it keeps the sun from the walls, making quite an appreciable difference in the temperature of the interior of the dwelling. The fruit may be gathered about the beginning of November, the seeds washed clear of the pulp, and sown in a frame having a southern exposure. Do not sow thickly as the cotyledons are large, and damping off may result before the seedlings are transplanted. By the middle of May the seedlings are ready for handling. They may either be put in small pots, singly, or three in a 3-inch pot, plunged in ashes in a frame, the sash put on and shaded for a few days until the young plants have taken with the soil. The Ampelopsis, owing to the nature of the roots, are best transplanted out of pots. **A. Engelmanni**, **A. diversifolia** and **A. aconitifolia**, all good kinds in their

way, are treated similarly to the first-named kinds as regards propagating.

**ANTIGNON LEPTOPUS**—In the Southern States this is one of the most satisfactory vines; even in Washington it blooms for about two months out of doors; that is, when put out as small plants. When large specimens are planted out the period of blooming is much longer. The flowers are bright pink, in very large clusters. It should be propagated from cuttings taken in September; make the cuttings with a single leaf attached, and cut below a joint. The large roots are tuberous looking, enabling the old plants to be easily wintered over in a cool house.

**ARAUJA (Schubertia) GRANDIFLORA**—It is seldom that we see this noble vine grown well in greenhouses, the plants being usually sickly and infested with mealy bug. As a Summer vine out of doors it makes very vigorous growth, and after midsummer it bears a profusion of bloom. The flowers are not unlike those of *Stephanotis floribunda*, but are larger and quite as sweetly scented. Cuttings make the best flowering vines. These may be taken from the ripe wood before the advent of cool weather. Seeds are freely produced in large egg-shaped fruits; they germinate freely shortly after being sown.

**ARISTOLOCHIA STURTEVANTII** and **A. ELEGANS** are easy to grow, and are almost certain to produce an abundant crop of their exceedingly curious flowers. *A. Sturtevantii* has soft growth, more so than any other species, and roots very readily from cuttings. *A. elegans* gets hard soon after developing, and is a trifle difficult to root; but seeds are produced abundantly, and the seedlings are every bit as floriferous as plants raised from cuttings. Both of these kinds may be planted out in Summer to cover trellis work. An intermediate house will suit them in Winter. *A. elegans* ripens seeds in the open at Washington. Further North the seasons are too short, unless large plants are taken to start with.

**A. siphon** is a native species, but far behind the tropical ones in the beauty of its flowers. Sometimes we need a vine for covering unsightly structures under the shade of trees; this is the best to be had, as it luxuriates under those conditions. It is most easily raised from seeds.

**ASPARAGUS PLUMOSUS NANUS**—Plants in beds requiring dividing and replanting should be attended to about the middle of July, so as to make sufficient root growth to enable the plants to send up strong shoots. Keep dry for a short time before dividing. This will have a tendency to render any young roots which may be on the plant less succulent, and after planting they will push out all right again. Solid beds, with the idea of having them in good condition for several seasons, should be carefully prepared. The ground soil should, if retentive, be thrown out to a considerable depth, drainage, such as broken brick or stones, put in the bottom, and the soil put back with a little manure or leaf soil mixed with it. This is merely for the sub-soil. Over this prepared soil 8 inches or a foot deep should be placed, boxing the sides to a height of 6 inches or so. With the crowns raised above the

ground level of the house there is little danger of over-watering. After planting, for a week or so allow the atmosphere to get humid, but not enough to force the plants into undue activity. This Asparagus, which is probably entitled to specific rank, instead of being a variety of *A. plumosus*, sends out some of its stems from the horizontal root-stock traversing a considerable distance under the surface before making their appearance above ground. If the terminal part of an underground stem is injured before making its appearance above ground, the dormant buds develop eventually into small crowns, sending out both shoots and long succulent roots. The same conditions happen sometimes after the developed shoot is severed, but in this case infrequently, as the break is more apt to be above ground. The kind known as *A. plumosus* does not have this peculiarity, the shoots growing straight from the crowns.

**A. Plumosus Nanus as a Pot Plant**—In this capacity the plants must be in a starved state, that is, without strong shoots; but with numerous small ones 6 inches to a foot high. When once they get into a starved state it takes quite a while to get them out of it, and this is quickest accomplished by splitting the plant up into very small pieces. This should only be done when it is desirable to make plants for strings. The root stocks are very close together, crowding each other and sending out tiny growths. When grown in pots they seldom make tall climbing shoots, and when they do show such a tendency, all that is necessary to keep plants within bounds is to nip off the ends of the shoots a few inches above the pot. In getting up a stock for pot plants plant them out on benches, using only 3 or 4 inches of soil, planting out quite closely together; keep pinching, splitting up and replanting or potting as required.

**A Plumosus Nanus for Short Sprays**—The cutting of short growths of this plant to supply green for Summer flowers, beyond the safe limit, is an evil to be guarded against. The idea should be kept in mind all the time that this Asparagus, especially after the strings are cut and the short bushy sprays remain, needs so much live material to keep it healthy. If the quantity of branches is out of proportion to the roots and kept for any length of time in that condition, the roots must suffer; the branches subsequently thrown up put on that undesirable yellow color which is worse than no Asparagus at all. Keep old plants pinched down until the time when it is desired to start strings, so that the bottom part will break and supply short material, which in Summer pays best with those growing for local trade. The plants should, if anything, be kept on the dry side, but not dry enough to suffer, and be given an abundance of ventilation.

**Raising from Seed**—Seed of *Asparagus plumosus nanus*, or that which is offered under the name of *A. p. nanus*, is not always to be depended upon, unless the seed is procured from a reliable source or home grown, and known to be true to name. The reason for this is that *A. plumosus* is the kind which fruits most freely, and some not knowing the difference between the two sorts and others knowing, but also appreciating the fact that *A. p. nanus* is the better of the two, and that seed going under the name of the latter is sure to command the best prices.

Germination is very irregular with seed sown in some soils. The best medium I have found is rough grained sand that does not pack. Cover to the depth of half an inch.

**A. tenuissimus** is of a lighter green than **A. plumosus** and **A. p. nanus**. If cuttings of the ripe branches are put in bottom heat they will root freely. In small pots the plants are very ornamental and useful for associating with ferns and other plants in filling pans. This Asparagus used to be trained on strings, but has been superseded for this purpose by **A. p. nanus**.

**BIGNONIA VENUSTA** is one of the most reliable of our warm greenhouse climbers. It should be planted out in a box built of bricks, such box being large enough to hold several bushels of soil. The ideal way to train is to a single main stem along the rafters of the greenhouse. From this stem the growths on which the flowers appear are allowed to hang downward to their full length. By judicious trimming of these growths, and short resting periods before starting into growth, two crops of bloom may be had each year. The flowers are reddish orange in color, and are produced in great profusion. Propagation is by cuttings of the ripe growths in March. The plant will bear full sunshine all the year round.

**BOUGAINVILLEA SPECTABILIS** and **B. LATERITIA** which is said to be a variety of the former, are sometimes shy in blooming; but the cause will be found in unsuitable root conditions. Planted in well drained soil and fed with liquid manure while making the flowering wood, they are equally as attractive as the better known **B. glabra**. Like the Bignonias they should be trained to long single stems, and flowered from lateral growths, pruning these severely before starting into growth. Propagated freely from cuttings of the ripe wood.

**BOUSSINGAUTIA BASELLOIDES** (*Madeira Vine*)—In well drained sunny situations, such as may be found at the south side of a wall, this plant frequently stands out all the year round in Washington, D. C. It is a favorite vine with a great many people. It is very readily increased by taking the little tubercles which form on the vine and sowing them in rows in the open, without supports. The tubers, which form underground, may also be taken, cut up into small pieces and treated in the same way. After the vines are blackened by frost, dig up and store with Dahlia roots.

**BRYONIA LACINIOSA**—A slender cut-leaved vine, with rather handsome red fruit the size of a cherry, beautifully marked with white. Raised from seeds, which may be sown out-of-doors end of April.

**CHILDSIA (Hidalgoa) WERCKLEI**—A native of the mountain regions of Costa Rica and only recently introduced, so that but little is known of its cultural requirements. It is a vine of soft growth with compound leaves. The flowers are not unlike those of a single Zinnia; the color is intense scarlet. Like other greenhouse vines of this family (*Compositæ*) such as the Mutisias, the weak growths will not produce flowers, consequently the plants should be encouraged to make robust growth, espe-

cially during the late Winter months, to flower in April and May. When planted out in Summer the vines make very rapid headway, but the flower display is meagre. For the Southern States and California it may turn out to be a very desirable vine. With us it seems to thrive best in a rather cool house.

**CISSUS DISCOLOR**—No other vine approaches this species in so far as the beauty of its foliage is concerned. The leaves are reddish on the lower surface; on the upper surface the color is bright velvety green mottled with silver; stem red. It is usually grown in a warm house, where its growth is very rapid. Cuttings of the ripened wood will root at almost any period of the year. *C. antarctica* is a well-known window plant, for which purpose it is admirably suited. It is not particular as to treatment.

**CLEMATIS PANICULATA** is a hardy white flowering vine, blooming during August and September. It has jumped quickly into popular favor, being one of the best hardy vines in cultivation. Seeds ripen in November. Raising from seed is the best and easiest method of propagation. If sown when ripe the seed will germinate early in Spring and make fair-sized plants by the following Fall; but if kept till Spring, and sown then, they will not germinate till the Fall; even then they have to be carried over in boxes in frames, and are not much in advance of the seedlings which germinate the following Spring. From this it will be seen that a year's growth is gained by Fall sowing. Like most other Clematises it does best in deep, heavy loam well enriched with manure.

**Grafting Large-Flowered Varieties**—*Clematis* of the Jackmanni and Lanuginosa types, that is, those having the large blue, purple, lavender or white flowers, some of them, the singles, being about 8 inches across and some double, are all worth attention, as they give an elegant display of flowers from June all through the Summer; that is, if properly attended to in the way of soil, mulching and watering. They all dislike limited root space and show it in poor-sized flowers and few of them. The varieties may be propagated from the beginning of January till the beginning of April. Lift a few roots of such species as *C. ligustrifolia*, *C. paniculata* or *C. viticella* for tying on pieces of any of the sorts desired to be increased. Whip grafting will answer best. Tie the stock and cion together with raffia and place in a box of chopped moss, standing the box in a propagating frame with a temperature of from 65 to 70 degrees. Afterward they are gradually given air, potted on, and hardened off as they require it. Encourage them to make all the growth possible before cool weather. They should be started early in the season in a cool house not too much heated. With one or two flowers on they are ready selling plants, and all that are sold will be advertisements for next season's supply. Another method of propagation is to take cuttings of the young wood about the middle of June, and root indoors. This is the method mostly employed in this country; but grafted stock make the strongest plants in a given space of time, owing to the stronger root action.

The beautiful *C. coccinea* is a variety of our native *C. Vorna*. It is

well adapted for wire trellis work. There are other good forms, such as Countess of York, Countess of Onslow and Duchess of Albany.

**CLERODENDRON THOMSONÆ**—A wonderfully floriferous vine, which can be flowered successfully in 6 and 8-inch pots. Old plants may be allowed to get in a dormant state in Autumn reduced and repotted in February, but as much as possible of the old wood saved, as from this they produce flowers on short growths. Each plant will require the support of three or four stocks. Cuttings may be struck in Spring and planted out during the hot months to make growth. The flower is bright crimson, the calyx being large and pure white.

**C. speciosum**—In growth this resembles the above. The flowers are scarlet, and the calyx tinged with red.

**CLITORIA TERNATEA**—A half-hardy annual vine, and one of the very best, making an exceedingly pleasing display when in rich soil and given supports about 4 feet high. The flowers are dark blue, in shape and size resembling those of the Sweet Pea. The seed should be started indoors early. The seedlings, no matter how carefully they are tended, look as if they had a hard struggle for existence, but under the influence of full sunshine they will make good plants by the middle of May, when they may be planted out for the Summer. This vine is sometimes grown as a creeper, but the very attractive flowers are better seen when it is allowed to climb. It is an ideal plant for growing on iron railings. There are pink, white, and double-flowered forms.

**COBÆA SCANDENS**—When grown indoors as a perennial this vine will attain a length of 30 feet. In this country it is principally grown as an annual for outdoor use in Summer. As the seeds germinate quickly and need pricking off shortly, or almost immediately after germinating, owing to their large cotyledons, it will save time to put each seed in a 2-inch pot; fill the pots and merely press the seed in edgewise. No covering is necessary if the seed be pressed in deeply so that only the upper edge is seen when the soil is settled by watering. *C. s. variegata* is a pretty form for the greenhouse. Increased by cuttings.

**HEDERA HELIX** (*English Ivy*)—The varieties of this species are numerous; some have very small leaves like *H. Doneraeliensis*, others are very large leaved, as, for instance, *H. dentata*. Others again are beautifully variegated. Nearly all of the Ivis make good pot plants, and some of the varieties will develop more leaves and stems to a given size of pot than any other plant in cultivation. If the cuttings are taken from outdoor plants propagation should be done in Autumn, as then the foliage is at its best, and it keeps splendidly during the Winter months on good-sized cuttings rooted in frames. The variegated kinds should be given the protection of a frame, especially for stock purposes; and cuttings of these kinds are rooted in March. They will not root so freely from large-sized cuttings as from more moderate-sized ones. The less sun the plants get in Winter the harder they will be, as rapid thawing and freezing is injurious to the foliage. Where a supply of leaves is wanted during the Winter the vines may be planted on a position slop-

ing to the north. In cold localities a light covering of fine branches will be beneficial.

**HOYA CARNOSA** is the most popular of the genus. It has large umbels of flesh-colored flowers. It is a popular house plant with many. There is a beautifully variegated form. For cuttings take good sized pieces, pot and plunge in brisk bottom heat. The young plants should, if started early, be given a rather high temperature. In Summer they may be plunged in the full sun out-of-doors. An intermediate house and only a moderate supply of water will suit them in Winter.

**HUMULUS JAPONICUS VARIEGATUS**—In the warmer parts of the country, at least, this vine is a hardy annual, and one of the most handsome of those having variegated leaves. To have an early growth, the seeds should be sown about the beginning of March and the seedlings potted off singly when large enough. Green leaves preponderate on the seedlings, gradually becoming better colored as the plants increase in height.

**IPOMŒA**—The Japanese Morning Glories vary much in the color of the flowers, and while some of them are undoubtedly pretty there are numerous shades which will never become popular. A year or two ago out of a package of seed I had 25 distinct shades of colors. None of them approach in beauty the well-known *I. Learii* or the kind known as *I. rubro-cœrulea*. The first named is evidently a perennial without tubers, and it is propagated from cuttings; the last named, from seed. The tuberous-rooted kinds need only to be treated like Cannas or Dahlias during the Winter. In Summer few climbers can equal them in perpetual masses of bloom. *Ipomea paniculata* is probably the best of the lot. Other good ones are *I. scabra*, *I. Hardingii*, *I. Horsfalliae* and *I. insignis*. The two last named are nearly alike, but *I. insignis* is the best Summer bloomer. *I. Michauxii*, a native of the Southern States, makes an excellent outdoor vine if started early in the greenhouse. Under cultivation the large flowering variety of the native *I. pandurata* makes a display of bloom never seen in a wild state. As to their propagation *I. Horsfalliae* and *I. insignis* are either rooted from cuttings taken during September, or grafted on seedling stocks of *I. pandurata*. The other tuberous-rooted kinds are best raised from seed, which should be preserved in the capsules until the beginning of February and sown in boxes of chopped sphagnum, in which they germinate much sooner than in soil. Keep in a growing atmosphere, as the seedlings are prone to develop tubers and go to rest shortly after the seed leaves are formed.

**Ipomœa Briggsii** is one of the best flowering vines of moderate growth for the decoration of the greenhouse during the Winter months. Most of the other Ipomeas bloom during the Summer, but this one makes a liberal supply of shoots during the Summer from which it blooms during the dull months of the year. The color of the flowers is very deep crimson. The old plants should be repotted in early Summer, using light, rich soil and giving them pots large enough to flower in. As the shoots develop they should be tied around stakes, and later on, if wanted

to cover pillars or rafters, these shoots can easily be untied and fastened in the positions in which they are wanted to bloom.

*Ipomoea grandiflora* (The Moonflower)—Plants from Autumnstruck cuttings which were shifted on after the first potting, will, by the beginning of February, be throwing out a quantity of shoots which are intended to be utilized for cuttings. When these shoots get a foot or more in length nip the ends out, as by doing so the remaining part will ripen more quickly and provide better material for single eye cuttings. The plants from these will be large enough by planting-out time. Large flowering plants of the common Moonflower will often ripen considerable quantities of seed; these, when gathered, are very large and rather soft, but when kept for some time they diminish in size and get very hard, so much so that they refuse to germinate under ordinary conditions. Put them into a flat of water and stand the vessel on a warm bench for a day or two, when the seeds will soften. This condition will be indicated by their swelling to two or three times their normal size; they should then be sown singly in small pots, keeping the soil only slightly moist to prevent rotting. The Moonflower is comparatively seldom seen. One of the probable reasons is, that at the planting-out season the vines are unattractive-looking, and as most people want plants in bloom when they buy, the Moonflower is overlooked. Plants should be in 4-inch pots before planting out, as those out of smaller sized pots take too long a time to develop.

**KADSURA JAPONICA**—A rather-attractive looking vine allied to the Magnolias, with small yellowish white pendant flowers. It is propagated from the ripe wood in August.

**LAPAGERIA ROSEA** and **L. ALBA**—Our hot Summers are not favorable for the growth of this plant under ordinary circumstances. Where a cool shaded spot can be devoted to it success may follow. To flower well the Lapageria should be planted out. Propagation is best effected by layering the stems. This subject is one of the choicest of cool greenhouse climbers.

**LITHYRUS LATIFOLIUS ALBUS** is among the finest of Summer flowering herbaceous plants. The flowers are pure white and come in very useful for making up designs. It is a comparatively scarce plant and the seeds offered by dealers are not always to be depended upon, as the pollen from the pink flowered one, usually to be found in gardens, seems to act quicker on the stigmas of the white variety than its own pollen. In seeding they should be kept apart so that there will be no danger of their mixing. Sow the seeds indoors, in boxes or flats, and keep in growth all Winter. In a temperate house the plants will only be in 3-inch pots by planting-out time in the Spring. To support the vines run some stout branches in the ground around the plants, bend and tie together at the top.

**Sweet Peas** are sown at different seasons in different localities, to be in bloom at or about the same time. In the vicinity of Washington the crop put in the ground during the latter half of September is usually 3 or 4 inches high by the beginning of December. The crop put in from

four to six weeks later is usually in bloom about the same time as the plants raised from seeds sown during the end of February or beginning of March; but the early sown crop is in bloom from two to three weeks ahead of the others. Aside from early flowering nothing is gained, for it cannot be said that the plants are stronger or better able to withstand warm and dry weather. In this vicinity it is impossible for the plants to continue in health during the very warm weather. In more Northern latitudes the season is much longer. To have the plants in a flowering state for as long a time as possible they should be mulched and watered, choosing the most airy stretch of ground for their cultivation. Plants for blooming indoors should be sown just as soon as the weather gets a little cool. They may either be sown in their permanent positions, or in pots, and planted out where they are to bloom. There is a very large number of varieties grown for the retail seed trade; but six varieties at the very most are quite enough for the production of cut blooms.

**Supports for Sweet Peas**—Sweet Pea vines should never be allowed to tumble to one side from their own weight through lack of a suitable support. The most natural supports are branches of trees, about 4 or 5 feet long, stuck in on each side of the row. The plants are provided with tendrils which cling to the small twigs of the branches. A quicker method, the results of which are not quite so satisfactory, is to have strong sticks driven in at intervals of a few feet along the rows, with twine or wire fastened to them. Wire netting of a pretty wide mesh, when properly adjusted, makes the best support. It is the most expensive at first, but in the long run the cheapest, as it can be taken care of to last for years. Perhaps the best method of using the wire netting is to stretch it fastened to iron supports between two rows of peas, thinly sown, each row about 12 or 18 inches apart.

**LONICERA SEMPERVIRENS** (*Woodbine*) is a most beautiful native species; the flowers are dark red and yellow. There are several varieties; one has pale yellow flowers. *L. caprifolium*, flowers yellowish, large. *L. Periclymenum* is the common English Honeysuckle. It is a very strong growing vine and exceedingly fragrant. *L. japonica* produces flowers dull red and white; very fragrant; a most profuse bloomer. *L. Halleana*, the flowers of this species open pure white, changing to a dull yellow; when the plants get sufficient moisture they continue blooming all Summer. *L. brachypoda aureo-reticulata* is a weak grower if not planted in good soil. It is grown for its beautifully marked foliage, which is netted with yellow. *L. Heckrotii*, a species with glaucous foliage and very handsome reddish pink flowers, blooms continuously from near midsummer. All the kinds root freely from ripe wood after midsummer.

**MANETTIA CORDIFOLIA**—One of the handsomest of the low-growing flowering vines, growing about 4 feet in a season, and covered from midsummer on with bright red tubular flowers. It is almost hardy in the District of Columbia, surviving ordinary Winters with the protection of some litter thrown over the crowns. Green cuttings are not very easily rooted, nor does the plant give an abundance of material for this

purpose. But by root cuttings a one-year-old specimen may be made the parent of a hundred or more plants. To give large and healthy roots for this purpose, the plants should be planted out early. By the middle of October the tops are cut off, the roots lifted and put in boxes of sand for a few weeks. In preparing for the root cuttings take a box, in the bottom of which put some rough screenings, then 2 inches of fine soil made very firm; put the pieces of roots (about three-quarters of an inch in length,) on the surface, then cover with three-quarters of an inch of coarse grained sand and put in a warm house. When the growths have made two pairs of leaves put each growth in a 2-inch pot, shifting into 3-inch pots as they require it.

*M. bicolor* is apt to run too much to weedy growth during Summer, especially in the warmer parts of the country. Cuttings of the green wood root quickly. Those propagated early in September make nice flowering plants in 4-inch pots for Winter blooming in the cool conservatory.

**PÆDERIA FOETIDA**—Usually grown as a stove and greenhouse climber, but it is hardier than is generally supposed. We have old plants which have stood out in the open border for over ten years. It is rather an attractive-looking, but not a free-blooming vine. The leaves, or any part of the plant, when bruised, emit a most offensive odor. Cuttings should be put in any time after the growths are matured.

**PASSIFLORA INCARNATA** is said to be hardy around Philadelphia. It is one of the most rapid growing species; has large whitish flowers and bears seeds abundantly.

*P. coerulea* is apt to get killed to the ground in Winter north of Washington. *P. Constance Elliott* is a white flowered variety, seemingly hardy and more floriferous than the type. *P. Imperatrice Eugenie*, *P. Innesii*, *P. Lawsoniana* and *P. Munroi* are good hybrids. Stock plants will Winter if planted in a frame, the back of which is formed by the wall of a warm house. These may be propagated from cuttings of ripe growths any time in late Summer. *P. alata* and *P. quadrangularis* are stove climbers with large, handsome flowers. *P. aucubæfolia*, a variety of the last named, has the foliage handsomely marked with yellowish blotches.

**PETREA VOLUBILIS**—A greenhouse climber of very irregular growth, bearing in March and April long racemes of very showy purple flowers. The calyces are only a few shades lighter in color than the corollas. This plant should be in every greenhouse collection. It is very suitable for training up rafters. Cuttings of the dormant wood will root in heat; the best time to do the work is just before the plants start into growth.

**PUERARIA THUNBERGIANA** has for several years been distributed throughout the country under the name of *Dolichos japonicus*. It is a hardy, trifoliate-leaved vine, having inconspicuous purplish pea-shaped flowers, which are seldom produced except on the old wood of well-established plants. The flowers amount to but little, however; in fact, no one would grow the vine on account of the flower display. It is the

rapidity with which the vine will cover space which has made it a favorite with those who have given it a trial. It is, without doubt, the most rapid growing hardy vine in cultivation, and is useful either for covering the ground, for trellis work, and especially for hiding unsightly structures. Propagation is brought about by cuttings. They should be put in by the end of August, to enable the plants to make a little headway so as to stand over Winter safely. The leaves, being large and soft, should be laid flat on the sand without being shortened back in any way, and allowing only about 3 inches of stem with each leaf. Roots are produced from the under part of the stem a short distance from where the leaf joins. It seldom happens that cuttings root in the ordinary way, that is, from the cut part of the stem, so that they are ready for potting in a few days after being put in the sand. Good plants may be had in a short time by layering at this period, keeping the ground moist during the operation.

**SENECIO SCANDENS** (*German Ivy*)—A useful soft growing vine with leaves the shape of the English Ivy (*Hedera*). Propagate a few plants in the Autumn, and from these a great number of cuttings may be taken off early in Spring. The plants are principally used for growing over the sides of baskets, vases, and also for twining to supports.

**SMILAX** (*Myrsiphyllum asparagoides*)—Old beds of Smilax grown year after year are rather unsatisfactory, the growths being either too irregular or weak. The plan which insures a regular growth and allows the bed in which it is grown to be used for other purposes during a portion of the year, is to raise the plants annually from seed. This should be sown during February, in a warm house. Put the seedlings in thumb pots when large enough, shift to 3-inch pots and plant out from this size after midsummer. The plants will be benefited by a warm atmosphere from the seedling stage until ready for cutting.

**SOLANUM WENDLANDII**—In the Southern States this should prove a desirable garden vine. The flowers are arranged in cymes from 6 to 10 inches across (bright lilac blue) on the ends of the hanging branches. In this latitude the seasons are too short for small plants to make much of a floral display in the open. As a greenhouse climber, however, it ought to have a place where sufficient room can be devoted to it. Cuttings should be made from the short lateral growths, taken about the end of September.

**STIGMAPHYLLON CILIATUM** (*Butterfly Vine*)—The flowers of this plant are not unlike those of some species of *Oncidiums*, both in form and color. It is one of our best medium-sized vines for trellis work. For pot culture it is of little service, and only thrives in the greenhouse when planted out. September is the best month for propagation. On outdoor plants much of the wood is useless for this purpose, being thin and soft. Choose the growths which were made early in the season; a heel or a joint is not necessary. Root them in bottom heat, potting in 2-inch pots, and afterward in 3-inch pots, in which they will pass the Winter.

**TECOMA GRANDIFLORA** differs from our native *T. radicans* in having very much larger flowers. It makes a very showy vine when in bloom

late in Summer. A good plan to show off this vine to advantage is to grow it against a stout support, made of iron or wood, several feet high, and when it gets to the top encourage it to become bushy by frequent pinching. Propagation is sometimes attempted from portions of the roots cut into small pieces, but unless certain that the plant is on its own roots this is a dangerous practice and has resulted in much disappointment, as the resulting plants may turn out to be nothing but the native *T. radicans*, on which *T. grandiflora* is frequently grafted. After these root cuttings make considerable growth it is quite a difficult matter to tell whether they are *T. grandiflora* or the native species, so closely does the foliage of the two species resemble each other. Those on roots of *T. radicans* make plants quicker than from root-cuttings, or from cuttings of the green or dormant wood. Cuttings of the branches are a trifle difficult to manage at any time, but the ripened growths of young plants will give the best results, as then the wood is not nearly so thick and pithy as in old specimens.

**THUNBERGIA**—This genus includes some very desirable greenhouse climbers, and at least one species, with several varieties, useful for vases, baskets, and as a vine of moderate growth for the mixed border. This is *T. alata*. Seeds will germinate outside, but to produce early effects they may be sown indoors early in the season and hardened off with other soft wooded plants. The best greenhouse species are: *T. laurifolia*, white and blue flowered; *T. fragrans*, pure white, and *T. mysorensis*, purple and yellow. The perennial species may be raised from seeds, but plants obtained in this way are apt to have a weedy growth and turn out to be shy in blooming. Cuttings put in about February will furnish the finest flowering plants.

**VITIS HETEROPHYLLA VARIEGATA** is a vine of straggling growth, with very handsome colored foliage. It may be planted with English or Boston Ivies to break the monotony of a large expanse of green. The variegated form comes true from seed; it should be treated in the same manner as seeds of *Ampelopsis*. The fruit of *Vitis heterophylla* is remarkable in being green, creamy white and violet blue at different stages of growth.

**WISTARIA CHINENSIS** flowers before the leaves are fully expanded. Old and floriferous plants have a gorgeous appearance when in full bloom. It may be grown as a standard trained to a stout post sunk in the ground, or as a vine for arbors, etc. There are several varieties of this species: *W. c. flore-pleno* having double flowers, *W. c. macrobotrys*, a variety with very long and light-colored racemes. *W. frutescens* is a native species, flowering later than the Chinese plant. Propagation is effected in various ways. The plants, as a rule, set seed freely, but the seedlings are apt to turn out shy bloomers. Seedlings of *W. frutescens* may be used as stocks on which to graft *W. chinensis* and its forms. The operation should be performed while the plants are dormant in March or April. The long growths may also be layered in mid-summer, allowing them to remain till well established.

## Bulbous Plants.

**ACHIMENES**—The usual method of cultivation is to start the tubercles from the end of February till the end of April, to give a succession of bloom. When the plants have made 2 inches of growth they are placed one by one in a wide shallow pan about 2 inches apart each way, each growth being staked before plants show bloom. This method means a great amount of labor. I prefer starting the tubercles in their last season's flowering pans; after making a little headway divide into three or more equal parts and put into their flowering pans without supports. The specimens are not so symmetrical as those which are staked, but they give a satisfactory quantity of bloom and are most useful for the conservatory during the Summer months.

For growing in suspended baskets in the greenhouse the older kinds are well suited. Use wire baskets, and with started plants build them in from the bottom upwards so that the sides will be clothed with them. The Achimenes do not need a very warm place for storage. During their resting season clip off the stems to within an inch or two of the pot instead of wrenching them out, as the tubercles are easily torn out with them. Stand the receptacles on their sides in a dry part of a cold house. No water will be required till Spring.

**AMARYLLIS (Hippeastrum)**—These beautiful plants are not as much grown as their merits deserve; this is partly because the finer kinds are somewhat expensive, especially when flowering bulbs are purchased. With a few good sorts to start with they may be increased, and even new varieties raised much more rapidly in America than in Europe, as our Summers are very favorable to their rapid growth and increase by offsets. Seeds are produced quite freely, and from this method of propagation flowering plants are raised with little trouble. Most of the very numerous hybrids now in cultivation are the progeny of *A. vittata* and *A. Ackermannii*. There are two methods of culture—growing in pots all the year round, and growing them during Summer planted out in the open, lifting and potting in the Fall. I much prefer the first method for the production of the largest sized blooms. Few flowers are more attractive than those of the Amaryllis; they are borne in umbels on stout scapes well above the foliage. The colors are principally crimson, blood red and white, some of the varieties being beautifully striped and mottled. Their season of blooming is generally from January to May. About the beginning of the year the pot-grown bulbs which are dormant should be removed from the pots and repotted in good, rich compost; at first water only to settle the soil, gradually increasing the supply. Some bulbs will show flowers early; these, if wanted in bloom quickly, will be forced along with a minimum temperature of 60 degrees. By giving too high a temperature the foliage is

weakened, and it must be borne in mind that the plants make their principal growth for the season after the flowers are past, so that too early forcing is apt to endanger the health of the bulb. After blooming, the pot plants should be kept in an open frame till the end of September, with some loose material, such as stable litter, between the pots to prevent a too rapid evaporation of moisture; feed them frequently with liquid manure. A deep frame heated so as to exclude frost will be found the best place for the pot plants during the resting season. By the end of May bulbs may be planted out-of-doors. A border sloping to the south should be chosen. Immediately after planting give a heavy mulching of manure, and to insure continuous growth keep them well watered during dry spells, otherwise, when the time comes for lifting the plants, some will be at rest, others in full vigor of growth. In the latter case the transfer to the flower pot cannot be effected without detriment to the bulbs; the roots are large, preventing a suitable quantity of soil being given while using a pot within a reasonable size.

**Raising Plants from Seeds**—The seed will mature on pot-grown plants about the end of July. Sow as soon as gathered. The seeds do not require much covering, and ought to be kept in a warm atmosphere, not only while germinating, but until the plants are at least a year old, during which time they should be kept in a growing state.

**Propagation by Offsets**—These may be separated from the pot plants during the operation of potting, or taken from the old bulbs when lifting in the open border in Autumn. In the latter case they may be stored for the Winter in boxes of sandy soil, and either potted off in Spring or planted out with the larger bulb.

**AMORPHOPHALLUS**—Useful for sub-tropical bedding, owing to their very handsome leaves; those of *A. Rivieri*, the species commonly met with in cultivation, being between 4 and 5 feet across. The petioles are necessarily stout and beautifully marbled with creamy white. The leaves are very much divided. In early Spring the flowers are produced before the leaves; they have such an offensive odor that unless seeds are wanted they should be cut off before developing. Propagation is from offsets and seeds. The large tubers are wintered in a manner similar to those of the fancy-leaved Caladiums.

**ANEMONE**—The tuberous rooted species known as *A. coronaria*, *A. fulgens*, and *A. hortensis* are all natives of Southern Europe. When planted permanently the soil should be open and well drained, and if it is apt to bake in Spring give a top-dressing of leaf soil or stable manure thoroughly rotted. This will keep the surface soft and enable the growths to break through easily. The above species are sometimes grown in pots; they may be planted in September or October, kept in a cold frame and flowered in Spring. *A. fulgens* is the most useful for this purpose. The many varieties are sold cheaply by dealers in bulbs.

**BULBOUS PLANTS**—This term is generally applied indiscriminately to plants having thickened subterranean stems, such as *Crocus* and *Gladiolus*, including true bulbs, such as those of *Lilium*, *Hyacinth* and *Allium*. A true bulb is simply a resting bud composed of leaf scales, as

in *Lilium*, or partly formed by the bases of the leaves of the previous season's growth, as in the *Hyacinth* and *Onion*. A Corm differs from a bulb in having the interior part solid; examples, *Crocus* and *Gladiolus*. A tuber is a swollen underground stem provided with latent buds, as in the *Potato*. The thickened tuber-like roots of the *Dahlia* are simply reservoirs of nutriment, and are known as tubercles. Terrestrial Orchids supply numerous other examples.

**CALADIUM, FANCY-LEAVED**—There are several species and a great many forms of these gaudy foliage plants. They are principally used to fill the benches of the conservatory during the Summer months, when most of the usual greenhouse plants are occupying their Summer quarters out of doors. They are also used in bedding, and if the higher colored forms are avoided, choosing those in which green and red predominate in the leaves, they will succeed well even in the full sun. A goodly quantity of bone meal worked into the soil before planting will make strong and well-colored leaves.

**Starting Tubers**—The first lot of tubers should be started about the middle of February for conservatory decoration. They should first be gone over carefully, and any that show signs of rotting at the bottoms should have the decayed part cut or scraped off and dusted with powdered charcoal. The under part of a Caladium tuber, after it has reached a certain size, is more or less in a state of decay, but sometimes, through being kept too wet, too dry, or in a too cold place, this natural decay is hastened by rot, which, if not checked, will kill the tuber in a short time. The white succulent roots start from the top part or neck of the tuber, near the base of the leaf-bud, so this part must be covered and kept in an evenly moist state to start them into growth. I find the best conditions under which to start growth to be as follows: Take a box 3 inches deep, put half an inch of moss in the bottom; put in the bulbs close enough together so that at least half the space will be occupied, then cover with moss to the top of the box. Have the moss chopped so that the particles will fall easily from the roots previous to potting. This operation may best be done when the roots are from one to two inches long. A good soil should consist largely of leaf mould. As the tubers send out their roots shortly after putting in the moss they should be transferred to pots before the roots get too long, else they will be injured in the operation. Pots should not be used of a size larger than will hold the tubers and roots comfortably, without danger of being bruised. The subsequent shifts should have a greater quantity of loam with rooted cow manure added. For specimen plants do not cut up the tubers, plant them whole. At the end of the season, as a rule, they will have made quite as many easily detached tubers as if they had been cut up in the Spring.

**C. argyrites**—The small-leaved kind called *C. argyrites* will be all the more useful if it be not started too early, as it is most needed late in the year. It keeps well among sawdust in paper bags. The tubers are so small that several hundred can be put in a small bag. The tubers can be increased at almost any time, even when the plants are in full growth,

but preferably about the starting time, either before or after. They are cut up into pieces, each one with a bud or growth to it.

**Preparations for Lifting Tubers**—By the beginning of October, and earlier in some localities, fancy-leaved Caladiums will soon begin to lose their bright colors, owing to the low temperature. Before this occurs go over them and renew the names, using fresh labels. If they are without names go over them all the same, jotting down the colors of the leaves, and whether certain kinds should be used again and so forth. All this is very necessary with the Caladium, as it is a coming bedding plant. I have not yet come to the conclusion whether it is best to plant them in the dormant state like Gladioli, or to start indoors before planting. I used to favor the latter method, mainly because there was something to look at as soon as planted. Some beds which I saw lately, owing to the splendid growth made from dormant tubers at planting time, spoke volumes in favor of this method. It certainly saves the time given to the starting and potting indoors. But again, more money can be got out of a plant, with its beautiful leaves, started in a 5-inch pot than can be got for a mere tuber that has no more beauty to it than a potato.

**Storing the Tubers**—Outdoor plants as they lose their leaves should be dug up and laid under the bench of a house where the sun won't get at them. Give water occasionally to both roots and foliage until the latter gradually decays. After the leaves are cut off and the tubers are dry, put as many as will go into a fair-sized pot, then run in dry sand and stand the pots in the warmest part of the house, where they will be free from drip. They should be kept in a temperature not lower than 60 degrees during the Winter. Plants in pots will soon begin to look "seedy" unless they be kept in a warm, close house. To rest them, withhold water gradually, and when the leaves are nearly gone, remove the pots to the driest and warmest part of the house, placing the pots on their sides. If room cannot be spared the plants may be knocked out of the pots and stored like the outdoor collection.

**Propagation**—Many of the kinds form small tubers on the sides of the large ones; these are easily detached and grown on. Again, many sorts, especially some of the finer and recently introduced varieties, do not make these small tubers, or not in large enough numbers to be of much service; but it will usually be found that the large tubers have one or more eyes generally at the sides. These, if taken off with a piece of the tuber attached, either before or after starting, will make small plants the same season. In separating from the parent tuber dust the cut surfaces with powdered charcoal, to prevent decay. If taken off before the tubers are started, put the pieces in warm sand to hasten the formation of roots.

**Caladium odoratum** or *Colocasia odorata* is used much in the same manner for outdoor decoration in Summer as the well-known *Colocasia esculenta*. They are known from each other by *C. odorata* having thick fleshy stems above ground and the leaves pointing upward, or at least growing with the leaf blade horizontal, while *C. esculenta* has drooping leaf blades, and has no stem above ground. They are both

wintered in the same way, that is, in a dormant condition, in a warm place, although *C. odorata* can easily be kept over Winter with the roots of the previous Summer preserved and the foliage green by storing the stems thickly together in boxes, keeping on the youngest leaves when lifted and storing plants in a fairly warm house, giving water occasionally. Well furnished plants can be had quicker from the stems of this than from those of *C. esculenta*. The propagation of *C. odorata* should be attended to during February. Cut up the long stems into pieces with a dormant eye to each piece, dust them over with powdered charcoal to prevent decay, and lay them in the sun to dry for a day or so; afterward put in moss, not too wet, in a warm frame, where they will sprout much in the same manner as stove Alocasias. Pot as soon as the roots are sufficient in number.

**CONVALLARIA MAJALIS**—Lily of the Valley pips used in this country for forcing purposes are obtained from abroad. There is, however, no reason why they should not be produced as good in the United States. Lily of the Valley thrives in some parts very luxuriantly, when grown in the shade of small trees with an annual top-dressing of decayed leaves or old manure. The pips are received during the early part of November, and the florist who can raise bloom successfully from these before Christmas does not need to be told anything of the plant's culture. At that time, however, good roots are obtainable from the previous year's supply, kept in cold storage. Or home-grown material may, in time, be used, as then preparation could be made earlier with greater certainty of success in early blooming. Lily of the Valley is a decidedly artificial-looking flower when unaccompanied by its foliage. A stock of small pips should be put in the forcing house and given plenty time to develop the foliage for occasions when wanted. The material in which to place the pips may be pure sand, as no new roots are made during the forcing period. When taken from a temperature near the freezing point, increase it very gradually until a bottom heat of from 80 to 85 degrees is given for the actual work of forcing. The pips may be kept almost in the dark at first, gradually giving light as they develop; but keep them shaded from the sun. In storing pips for the Winter keep them in a frame, with a northern exposure, so that rapid thawing and freezing may be obviated. There are double flowered and variegated-leaved forms; all of them are desirable for half-shaded places in the open border.

**CRINUM**—The tender species are not much grown indoors, but there are several which are useful for the hardy border. One which gives much satisfaction in Washington, and which is perfectly hardy, is named *C. longifolium*. The flowers are tinged with rose. There is a white-flowered form. Nearly every flower will set seeds which are very large and irregular in shape. They should be sown as soon as ripe, as after falling to the ground a little moisture will cause them to germinate in a few days. Sow the seeds 2 inches apart in a seed pan; keep in a frame, and plant out without potting off in Spring.

**C. Powellii** is a hybrid between *C. longifolium* and *C. Moorei*. It thrives in Washington with slight protection in Winter. *C. Moorei* is also hardy when planted in warm soils and slightly protected. In large

conservatories *C. giganteum* should be grown if only for the foliage. The leaves are several feet in length, fully 6 inches broad in adult specimens, and of a bright green color. The flowers are pure white and sweet smelling, produced at irregular intervals.

**EUCHARIS AMAZONICA**—The Amazon Lilies have long been popular stove bulbous plants, their large, pure white flowers making them favorites wherever grown. To the florist who does a general trade this is a paying plant when properly grown in moderately large quantities. Their culture seems a trifle difficult to many, but this idea has arisen through trying to grow them under adverse conditions. They are plants which delight in a warm, moist atmosphere, shaded from strong sunshine. The temperature should never fall below 60 degrees, and it should only be allowed to get in the neighborhood of that figure during cold weather. The plants cannot be properly grown after the manner of most bulbous subjects which florists handle, such as *Liliums*, *Richardias*, *Gladioli*, *Tulips*, etc.; that is, potting them up at a certain time to have them in bloom at a given date. Their culture has not been brought down to such a fine point because their nature does not permit of it. They can be grown either with or without a short period of rest in the Fall months. I prefer to keep them growing all the time; but to do this successfully the roots must have close attention. From the nature of the compost in which they grow it will become sodden if extra precautions are not taken in the way of providing good drainage, also in mixing with the soil a goodly quantity of broken charcoal to keep the mass porous. The principal ingredients should consist of loam two parts, leaf mould one, a fourth to consist of rough sand and well-rotted cow manure. There are three kinds in general cultivation—*E. grandiflora*, *E. candida* and *E. Sanderiana*. The first is the best known of the three, and the most profitable to grow, as the individual flowers are larger and more of them are produced on a stalk. They are grown in pots, tubs, or on benches. I prefer the first two methods, as the plants can be more easily handled than when on benches. A good-sized clump can be kept in a 10 or 12-inch pot for a good many years by periodical examinations of the drainage, the decomposed soil removed from around the ball with the aid of the hose, and a mixture of loam and bone meal dusted over it. Put back in the pot and give a good top-dressing. Clumps treated in this way have flowered with me three and four times in a year regularly for 12 years.

**FORCING BULBS**, such as *Tulips*, *Hyacinths* (Roman) and *Narcissus*, are put in shallow boxes for forcing. The bulbs are inserted quite close together, if of the poorer grades; but if they are the largest sizes a little more room should be allowed for the development of the flowers. The soil used is generally old material from benches in which *Roses* or *Carnations* have been growing. In preparing bulbs for forcing the principal point to be borne in mind is that they must make roots before being put in heat. A place should be set apart for the boxes, where they may be covered with about 8 inches of sifted ashes. On the approach of freezing weather the ashes may be kept in a condition so that the boxes may be removed when wanted, by covering with rough stable litter; or,

when grown in large quantities, a bulb house should be provided. In this structure light should be excluded and the roof thick enough to keep out frost. In a well-regulated house the bulbs remain in fine condition. They may be kept almost dormant for several weeks and be forced into bloom in less time than those from the open ground. Paper White Narcissus and Roman Hyacinths may easily be had in bloom in November, and Due Van Thol Tulips by Christmas; but to insure these results early rooting must be looked after.

**ROMAN HYACINTHS IN PANS**—Roman Hyacinths are usually grown in boxes, and when about to flower, or even when in bloom, they are taken out of the box and placed in shallow pans or pots, new soil added and perhaps covered with fern moss before being exposed for sale. This method does not turn out satisfactorily to the buyer, the flowers lasting but for a short period. By employing the shallow flats in common use for Ferns, Roman Hyacinths may be grown to even greater perfection in sphagnum moss than where soil is used. A little well-rotted manure among the moss does good. Fill up to near the brim with moss, place the bulbs on this as thick as they will go, if the receptacle is small; give more room, if large; fill in intervening spaces with moss, saturate the moss, and to make roots, keep in a dark, cool place. As soon as a sufficient quantity of roots are made bulbs are forced into flower in a few days and come in very handily about Christmas, when other flowering plants are scarce. While making roots they should occupy a cool frame, and be covered with damp leaves.

**Outdoor Bulbs**—Hyacinth and Tulip bulbs flowered out-of-doors may be made to last more than one season if the bulbs are given a little care. By the end of May, when the bulbs have to be lifted to make room for Summer plants, the foliage will indicate maturity by turning yellow. After lifting the bulbs should not be allowed to lie around with the old leaves rotting over them, sometimes wet, at other times dry, according to the weather. Spread them out on boards in an airy shed, so that they may have a chance to get plump and dry; after which they should be cleaned, stored, and when the time arrives replanted for outdoor ornamentation. Low-growing hardy Spring bulbs, such as Galanthus (Snowdrop), Crocus, *Scilla praecox*, *Tecophilæa cyaneo-crocea*, *Triteleia uniflora*, *Puschkinia* and *Chionodoxa*, should be planted as soon as they are procured from the dealers. If put in late they bloom late and their foliage does not get time to ripen before the advent of real warm weather, and the bulb for the following season is next to useless. None of the latter is much used by florists for pot culture. In planting out they should, if possible, be given permanent positions. Sometimes Fall and Winter weather is favorable to premature growth of the tops, and because of this they should be protected from rapid thawing and freezing by a covering of an inch or two of half-decayed leaves or manure put on after freezing weather arrives.

**FREESIAS** which are wanted to bloom by the end of the year should be potted or boxed as soon as they can be procured from the dealers. Plunge the pots in ashes, in a frame, where strong sunshine won't keep the surface of the soil too warm and dry. They must not be covered

over as other bulbs are after potting, as the leaves are thin and tender and must develop to a considerable extent before the flower stems make their appearance.

**GLADIOLUS**—Bulbs of these used to be imported; they are now grown in great quantities in this country. Most of the kinds grown are of hybrid origin, and not a few of them have originated in America. With florists the plants are cultivated for the sake of the flowers. The first crop is usually grown indoors by planting the bulbs during January or February. They are usually planted among Carnations, the long narrow leaves of the Gladiolus giving but little shade. For outdoor crops they may be planted in batches from April onward. To have the bulbs in good condition for use the following year the ground should be well mulched as soon as the growths are well above ground. Cultivating is then not necessary and the weeds likely to smother the plants may be removed by hand.

**GLORIOSA SUPERBA** and **G. PLANTII** are ornamental flowered liliaceous plants, very suitable for our hot Summers. The plants have a vine-like growth and must be supported by sticks. They are serviceable for the embellishment of greenhouses during Summer. In the District of Columbia they do well out-of-doors. To raise bulbs sow a few seeds in a 6-inch pot and allow them to remain in their seed pots for the Summer, gradually drying off as the foliage turns yellow. Store with Gloxinias during the Winter. Each plant may be potted off singly the following Spring.

**HÆMANTHUS**—A genus principally of South African bulbous plants; they are all of easy culture. Those which annually lose their foliage produce their beautiful flowers before the new leaves make their appearance. To develop the foliage the plants may be treated much in the same way as Amaryllis; that is, planted out in a sunny border, mulched with half-rotted manure and given water during dry weather. They are good plants, but only useful for general collections.

**RIS**—Some of the tuberous rooted species are very early in blooming, and only need a short term in the greenhouse to bring them into flower after the end of January. *I. filifolia* and *I. Histrio* are two of the best. The tubers should be procured as early as possible, and put in shallow boxes to root. The surfaces should be covered while in the frame with a thin layer of sphagnum moss. *I. reticulata*, a species which blooms in the open border, very often before the snow is gone, is valuable for forcing in 5-inch pots. The flowers are dwarf and not very large; the foliage is of a grassy nature. From four to six tubers should be put in each pot. The flowers of this species, which are deep purple, have a fragrance much resembling that of the common Violet. There is a lighter colored form called *I. r. Krelagei*; this, however, has no fragrance.

**LACHENALIAS**—By the 1st of August Lachenalia bulbs should be knocked out of the pots, the sizes sorted and the largest put, say four together, in a 5-inch pot, and plunged for the time being among ashes in a frame. The smaller bulbs should be potted or boxed for growing on.

These bulbs are not common and should be more grown, not for cutting, as the flowers are not suitable for this purpose, but for pot plants. The leaves, even by themselves, are very attractive, being broad, rich green, and spotted with brown. The flowers are greenish red and yellow, arranged in spikes. Small bulbs should always be saved and grown on, as they increase in size quickly under cultivation.

**LILIUM**—Many species and varieties of Lilies are grown for the ornamentation of the border in Summer and Autumn. As a rule, they prefer light and well-manured soil, and a position partially shaded from the sun. To lessen the necessity of frequent watering the plants should be well mulched after the growths are a few inches high. The species used so much for forcing in pots is known as *L. longiflorum*, a native of China and Japan. There are at least two kinds; the best known and quickest in blooming being *L. Harrisii*, said to have come originally from Japan, but largely grown in Bermuda, whence the bulbs are obtained. The bulbs should be potted as soon as procurable, and plunged in a frame with a bottom of sifted cinders; the plunging material should be cocoanut fiber, leaf soil, or thoroughly-rotted hotbed material. This precaution works well in maintaining an equal state of moisture in the pots without the necessity of frequent waterings. To prevent the sun drying the surface of the soil enough covering of loose stable litter should be given. Remove the plants indoors on the approach of severe weather. For early forcing the pots may be placed directly on the bench of a cool greenhouse, and precautions taken to keep the soil in an equably moist state, avoiding either extreme. These bulbs should also be covered with some light material to prevent baking. The pots used should be small enough, so as to provide for a shift into 6 and 7-inch sizes as the plants require it. Much better results are thus obtained, because roots are formed on the stem of the Lily above the bulb, and often above the soil, when they are planted directly into their flowering pots, and especially when they are planted with the tops of the bulbs level with the surface of the soil. So it will be seen that a shift given after the plants have made considerable headway will work advantageously in supplying new rooting material, not only for the roots already formed in the soil, but for those forming on the stem above it. In potting put one large piece of broken pot, concave side down, over the hole in the bottom, and over this some half-decayed leaves, not moss, as the latter retains too much moisture at the bottom of the pot; ram the soil moderately firm. The soil should have good, fibry loam, enriched to about one-fifth of its bulk with well-rotted stable manure; this, with the addition of some broken-up charcoal, is as much for the purpose of keeping the soil open as for feeding. The *Aphis* is one of the worst enemies of the Lily when grown indoors, and the conditions favorable to its increase should be guarded against—keeping the plants in perfect health is the best preventive measure. Some of the things to be obviated are sudden changes in temperature, chilly drafts, soil too wet or too dry. Fumigating or vaporizing with tobacco must frequently be resorted to whenever the *Aphis* makes its appearance.

**Preparing Bulbs for Potting**—If, as is frequently the case, the bulbs on arrival are a trifle shrivelled, do not pot them immediately, as they are apt to get a set-back by so doing. The treatment they get should be directed to restore the bulb as soon as possible to that condition in which it was when taken from the soil. This can be done in the following manner much more quickly and with better results than when potted immediately into soil. A cool, moist propagating house is an ideal place for the operation. Place the bulbs as close together as they will go in the moderately wet sand. They may be either covered with sand for a day or two, without wetting, or covered with papers during the driest and hottest part of the day, until they get plump and fresh-looking, taking care that they be potted just before the roots break through, for if potting be done after the roots make their appearance more harm than good will result. Soil should be used which contains enough moisture, so that on first watering it will not be necessary to give a very large dose. The pots used should be large enough to accommodate the bulb and no more. A later shifting should be given as the plants require it. A mass of roots will be developed just above the pot when considerable growth has been made; these when covered with soil in the second potting will be found to be valuable feeding roots.

**L. Speciosum**—At the season when Roses and Carnations are scarce, both in and out of the greenhouse, a grand substitute may be found in the Japanese lily, *Lilium speciosum*. It is one of the best, if not the very best, so far as graceful structure of flower is concerned, being far ahead of the popular variety of *L. longiflorum* in this respect. *L. speciosum* was introduced from Japan over 60 years ago; it was then erroneously called *Lilium lancifolium*, a name which still sticks to it in many places. It may be stated for guidance in the cultivation of this Lily that it is perfectly hardy here in well-drained light soil, that is, on raised rock-work; but unless the bulbs are lifted at intervals of two years and immediately replanted in freshly worked soil, with manure added, they get smaller and smaller, ultimately dying from starvation. For pot cultivation and to bloom early in Summer *Lilium speciosum* it is one of the easiest to manage, but less trouble will be experienced by planting out in raised beds, giving the necessary protection from severe and late frosts in localities where those conditions exist. The species is extremely variable in form and color of flower, color of stems, foliage, buds, and even in the anthers. Among the whites, *L. s. Kratzeri*, imported direct from Japan, is one of the finest. This variety has greenish stripes down each of the six divisions of the flower; the anthers are brown. *L. s. album-novum* has larger flowers, with bright yellow anthers. *L. s. album*, grown in Europe, gradually becomes tinged with pink. *L. s. punctatum* has white flowers dotted with pink. The principal pink or carmine forms are *L. roseum rubrum*; others are *Liliums Schrymakersi*, *cruentum*, *purpureum*, *purpuratum*, *magnificum* and *superbum*. The natural period for blooming outside, according to locality, is from the end of July till September. A variety called *L. Melpomene*, which sometimes gets to be 6 feet high, was raised by the late Mr. Hovey, of Boston, many years ago. It was

said to be a hybrid between *Liliums speciosum* and *auratum*; it has larger flowers than any of the varieties of *L. speciosum*, but, with us, it is very unreliable when left outside, going off suddenly without any apparent cause, while both *Liliums speciosum* and *auratum* alongside do well. *L. longiflorum* is perfectly hardy, and with *L. candidum* should be grown for Summer flowers. *L. auratum* is often unsatisfactory, failing to start well from imported bulbs. It is of little service as a cut flower, but probably the finest species of the genus for the open border. As many as 50 large flowers are frequently produced in a season from a single bulb.

**NARCISSUS POETICUS** is the most useful of the late blooming species for outdoor cutting. It should be given a permanent place in the open ground, as it usually does not deteriorate, but in suitable soil rather the reverse. The bulbs are procurable in large quantities at low rates, and it ought to be taken into consideration that they flower yearly in the open field and increase to such an extent under fairly good treatment, that the bulbs which fill a given space this year will in four years fill six times the space. *N. p. recurvus* is the best of the single forms, but other kinds are sometimes sold for it. The double form is a large and handsome flower, of which we see too little. They should be lifted every second or third year, as soon as the bulbs are ripe (where cultivated on a large scale they are lifted every season,) the sizes sorted and immediately replanted, the ground having been well enriched with manure. Their usual period of flowering here is from May 10th to the 20th. In well-sheltered, sunny positions they flower much earlier. In order to utilize space, if the rows are wide enough, stock plants of various things can be planted between them.

**OXALIS**—The main batch of Oxalis for Winter flowering should be potted up by the middle of October. Put a single bulb in each pot, using 3-inch pots to start with, and shifting on the plants as they need it until they are in 5 or 6-inch pots, in which they bloom. When several bulbs are potted together in a large pot, at first they are certain to produce foliage in abundance and but few flowers. By the middle of June the bulbs will be dried off; this is accomplished by withholding water and turning the pots on their sides. Be careful to place them so that the soil is exposed to view, as mice are exceedingly fond of the bulbs. All of the kinds grown for their flowers in Winter are very prolific in the production of new bulbs, that is, if sufficient root room has been afforded for their perfect development during the growing period. Home-grown bulbs are very superior to those imported. Some of the best kinds are *O. cernua*, yellow; *O. Bowiei*, *O. gigantea* and *O. hirta-rosacea*, pink; *O. versicolor* and *O. lactiflora*, white. *O. rubricaulis* is desirable not so much for the flowers as for the highly colored red stems. *O. Bowiei* and *O. versicolor* are well suited for baskets, for hanging in conservatories. The last named requires very little heat.

**POLIANTHES TUBEROSA** (*Tuberose*)—These are grown largely for supplying white flowers during Summer and Fall months. They may

be put in the ground after danger from frost is past, and at later intervals to give a succession of flowers. The finest bulbs are supplied so cheaply by American growers, that it does not pay to propagate in small quantities.

**RICHARDIA AETHIOPICA** (*Calla*) which are out of service should have the water gradually withheld from them, and as the foliage dies down turn the pots on their sides and leave them in this position until the time arrives for starting into growth in Autumn. The pots should not be put in a place where the sun will have full play on them. Jadoo potted tubers may as well have another season without disturbance, as this material does not seem to decompose rapidly; liquid manure would then, of course, have to be applied regularly. For increasing the stock of the yellow varieties they should be grown all Summer; plant them outside in rich, well-drained situations where they can be watered abundantly when occasion requires it. In Winter they need a minimum temperature of 60 degrees. By the middle of September the largest sizes of *R. aethiopica* should be in 6 and 7-inch pots and placed in an open frame. Have the sash handy so that they may be protected during wet weather. With a good watering at first they won't need much moisture till good roots are formed. At least one-third of rotted cow manure should be in the soil.

**TRILLIUM**—About a dozen species of these beautiful and interesting native plants are in cultivation. *T. grandiflorum* is the one most commonly grown, owing to its very large white flowers. Its culture is of the simplest description, requiring a half-shaded position with abundance of vegetable humus in the soil. It is sometimes grown in pots for early forcing, for which purpose it is well adapted. The rhizomes should be potted as soon as the plants are at rest, late in Summer, and plunged in a cool frame until wanted. With very little heat they will flower several weeks in advance of their usual time.

**VALLOTA PURPUREA**—A very useful plant, either for the greenhouse or the window garden, but not of much service to the florist, as it flowers at a period when the demand for cut flowers is not very great. As the bulbs will last in the same pots for several years, the drainage should be carefully arranged, and the soil mixed with crushed bone. During growth occasional waterings with manure should be given. The flowers are reddish scarlet, several in an umbel; in appearance somewhat like those of an Amaryllis. The foliage is evergreen, but during the resting season the supply of water should be curtailed.

**Propagation**—The *Vallota* has a very curious method of making young plants which I do not remember to have seen described anywhere. These young plants are produced to such an extent that the process tends to curtail the flowering propensities of the larger bulbs if attention be not given in the matter of removing them. In course of time they form two colonies, one on each side of the parent bulb. The bases of the leaves forming the bulb have each a small bud-like growth

a considerable distance from the base or disc, but attached to the disc by a root-like formation which continues active, after the swollen base of the leaf is dead, in supplying nutriment to the young bulb until it sends out roots. When this little root-like process is of no further use it gradually shrivels up. Afterward the young bulbs grow apace and rob the soil of the nourishment intended for the parent bulb. This provision evidently shows that the *Vallota* naturally grows deep in the soil and is intended to raise the bulblets near to the surface before taking root. These bulblets, unless intended for increasing the stock, should be removed as soon as they make their appearance above the soil.

## Ornamental Grasses.

**ANDROPOGON SCHÆNANTHUS** (*Lemon Grass*)—The leaves of this plant when bruised emit a fragrance much resembling that of the Lemon Verbena. It is a tender evergreen. When planted out in Summer the growth is very rapid even in dry soils. As a pot plant it has a very ornamental appearance, and stands well in a dwelling house. It is propagated by division at any time of the year. The pieces should be placed in wet sand for a few days previous to potting to encourage new roots to form.

**ARUNDO DONAX**—The tallest of our herbaceous grasses, growing under favorable conditions to a height of 25 feet; flowers late in Summer. A very ornamental plant for the centers of large beds, or for isolated groups on wide borders or lawns. As it increases very rapidly at the root the rhizome-like growth may be divided just as the new shoots make their appearance above the soil; these, when heeled in, may be transplanted at any time.

**A. D. variegata** grows only about half the height of the green one—an exceedingly desirable plant for the hardy border. To propagate, take the ripe stems and lay them in damp moss or sand; from each joint one or more buds will start into growth and ultimately take root. These young plants, when of sufficient size, may be detached from the parent stem and put in small pots.

**BAMBUSA** (*Bamboo*)—There are one or two species grown in greenhouses and several hardy ones. *B. arundinacea* will grow 60 feet high in a single season. It is useful for roomy structures where quick effects are wanted. *B. aurea* is perfectly hardy in Washington, D. C. The growths will reach a height of 15 feet. *B. striata* is grown indoors in Winter. The plants will thrive a long time with limited root accommodation. *B. viminalis*, *B. chrysanthia*, *B. punctata*, *B. mitis* and *B. Marliacea* sometimes stand the Winter in the open border without losing their foliage. *B. Fortunei variegata* should never be placed where it will crowd other plants, as it spreads rapidly and is difficult to eradicate. Propagation is best effected by division. The pieces should be started into growth among sand, in a close cool frame, potting off the rarer kinds when a few new roots have been made.

**CYPERUS ALTERNIFOLIUS** is useful either as a house plant or for planting out in Summer. Its propagation is much quicker accomplished by leaves than from seed in the following manner: Get a piece of zinc, or as many pieces as may be wanted, of a size say, 2 feet square; turn up the sides 3 inches; beat the sides forming the corners together and bend them

to one side so as to hold water, fill with sand and saturate with water. Get some mature growths, cut off the stalk and shorten the leaves; insert in the sand and keep thoroughly wet. In a warm house they will send up numerous rooted growths in a short time, which, as they require it, should be potted and grown on. Young plants such as these can very easily be divided. I haven't had much success with the variegated form propagated in this way; it is apt to come green. Division suits it better.

**DACTYLIS GOLMERATA VARIEGATA**—The species grows in waste places in the Eastern States. The green-leaved plants are weedy in growth, very floriferous and are never grown in gardens. The variegated form seldom produces many flowers, and these, when they appear, should be removed. It is one of our best low-growing variegated grasses, much used in some places for bedding. It is readily propagated by division.

**ELYMUS GLAUCUS**—A very ornamental species with bluish green leaves finely striated on the upper surfaces. It reaches a height of about 2 feet. The habit is inclined to be spreading. In early Spring the growth is about a foot high when most other ornamental grasses are just showing. Propagated by division.

**ERIANTHUS RAVENNÆ**—This species comes next in size to the Arundo, frequently growing 10 feet high. The growths are stout, ending with very ornamental flowers, which, if taken in a young state and dried in the sun, are quite as showy as those of the Pampas plumes. The plants produce seeds freely; they should be sown in Autumn and wintered in a cool house. The plant is thoroughly hardy in the District of Columbia.

**EULALIA (Miscanthus)**—The variegated forms of *E. japonica* are more frequently used than any other ornamental grasses. As isolated specimens they grow into very symmetrical subjects, the outer leaves of the clump drooping and almost reaching the ground. There are three kinds usually cultivated—*Eulalia japonica foliis-striatus*, *E. j. zebrina* and *E. univittata*. The last named is much more dwarf than the others, the leaves narrow with a whitish stripe down the middle. They are natives of Japan. Propagation is effected by division of the crowns, and should be done just as the plants are starting into growth. Old clumps will have to be broken up with the aid of a mattock or axe. They may be divided into pieces small enough to go in a 3-inch pot and plunged in a frame among ashes, or they may be heeled among sand in a frame for a couple of weeks or more before potting. They should in any case be kept close for a few days after being divided, in order to start fresh roots.

**FESTUCA GLAUCA** grows only a few inches high, the foliage is of a bluish green color. It may be divided and replanted during March or April.

**GYNERIUM ARGENTEUM (The Pampas Grass)**—During the exceptionally severe Winter of 1898-1899 we did not lose a single plant of any of the forms of the Pampas Grasses. None of the plants was protected

by the usual method of boxes or barrels with the ends knocked out, placed over the plants and filled with leaves or straw. Propagation from seed is the usual method, but division of the old plants will be found more satisfactory. Dig up a large clump in the Fall; chop it up into pieces small enough to go easily into 6-inch pots. Use stiff loam and pot firmly, standing the plants under benches; water occasionally until the beginning of February, when the plants should be removed from the pots and divided up into the smallest pieces, saving the new roots as much as possible. Shorten the leaves back to half their length and put in the sand bed for a couple of weeks to start fresh roots; then place in 3 or 4-inch pots, and they will form well-furnished plants in a short time.

**PANICUM VARIEGATUM**—A useful little warm house plant, having leaves striped with white and pink. It will grow in shade or sun, and is used chiefly for hanging over the sides of baskets, vases and boxes. Propagated from cuttings in March. The correct name is *Oplismenus Burmanni variegatus*.

**PAPYRUS ANTIQUORUM**—The Papyrus, after being lifted from its Summer quarters, where the growths made are usually very strong, frequently gets into a half sickly state during the Winter months, from which it takes it some time to recuperate after being replanted outside. In Winter the growths are grassy and spindling. By the way, I doubt very much if the true *Cyperus Papyrus* is in common cultivation, the one generally grown under that name being an entirely different species. However, that is a small matter, as the one commonly grown under the name of *Cyperus Papyrus* answers the purpose for which it is used, quite as well, if not better, than the true species. If the old plants are taken in hand some time in January, and split up into the smallest pieces and put in the sand bed of a warm house, they will in a few days push out fine, healthy roots, and when potted in a mixture of equal parts of moss, sand and manure, will grow very vigorously and will be in splendid trim for the planting out season. If it is desired to increase the stock the young plants, after being in the pots for a few weeks, can be re-divided and the operation of rooting gone through as at first. In the absence of a propagating bench a box of sand placed on the hot water pipes answers the same purpose.

**PENNISETUM LONGISTYLOM**—Perhaps the finest of our dwarf grasses, which are grown principally on account of the very ornamental character of the flowers. It is usually treated as a half-hardy annual, owing to its liability to get Winter-killed. It sometimes survives the Winters in the District of Columbia, but should always be treated as a tender subject. Plants raised annually from seeds are satisfactory, if sown early; but old plants, divided up will give larger pieces, start into bloom earlier and do not take so much attention as seedlings. The old plants are wintered anywhere out of the reach of frost. About the beginning of February cut off the old leaves to within 6 inches of the crowns; divide into small pieces, trim the roots so that they will ultimately go into 3 or 4-inch pots; place the pieces thickly together in

boxes of sandy soil and keep in greenhouse. Pot as soon as the new roots have started. They may be removed to a cool frame long before the soft bedding material demands all the indoor space. There are several other annual and perennial species grown; none, however, is as desirable as the above.

**SACCHARUM OFFICINARUM VIOLACEUM**—A variety of the sugar cane with violet or plum colored leaves and stems; useful for sub-tropical bedding. It is easily increased by cutting the stems into pieces, with two joints to each piece, and placing them on the sand bed of a warm house at almost any time. Numerous shoots are produced at the joints, and they make plants rapidly.

**STIPA PENNATA** (*Feather Grass*)—An old favorite in gardens. The leaves are long and narrow. The flowers are arranged in long, arching spikes, presenting a very delicate appearance. Propagated in Spring by division, and from seed. There are over a hundred species, only a few of which are in cultivation.

**UNIOLA LATIFOLIA** is a native species which makes an attractive border plant, growing usually from 2 to 3 feet high. The leaves are broad and arching, about an inch wide; the spikelets are drooping on long pedicels. This grass starts early into growth and is one of the easiest to propagate by division.

## Water Plants.

**LIMNOCHARIS HUMBOLDTII**—Useful for planting where the water is only a few inches deep. The flowers are yellow, about 2 inches in diameter. The plants must be wintered indoors. When grown in shallow water during Summer it is not necessary to keep them under water during Winter. All that is required is to prepare a box of moist loam; put the plants in this, in rows, close together; give a good watering and stand the box under the bench of a warm house where it will get a fair amount of light. They will make a new set of short-stalked leaves ere long, and remain in good condition for planting out in the Spring.

**NELUMBIUM**—There are at least two species, *N. speciosum* and *N. luteum*, besides several forms of the first named, differing from it principally in the colors of the flowers. *N. speciosum* and its forms are the best for growing in ponds and fountain basins. During Summer they make very long underground stems, and, on the approach of cold weather, form thick resting tubers at the ends of which are one or more dormant buds. *Nelumbiums* need an abundance of rich soil for their perfect development. When grown in a cramped space comparatively few flowers are produced. The flowers are from 8 inches to a foot across—pink, white, and yellow, in color. They are borne on long, rigid stems well out of the water. The leaves have an exceedingly ornamental appearance, being peltate and standing a considerable distance out of the water. The first few leaves float on the surface, but as the shoots gain strength they rise 2 and 3 feet above the surface.

**Raising Plants from Seed**—This is a very certain method of increasing the supply of plants, not only for planting out the same season, but as a convenient form in which to keep plants for sale. The seeds have a very hard covering, and before putting them in water this covering should be pierced either with the point of a knife or by the aid of a file. A very small opening will suffice in causing them to germinate in a few days. About the end of March sow fairly thick in a shallow seed pan, sinking it about 6 inches beneath the surface in a warm tank. After the seedlings have made the first leaf put each in a 3-inch pot. They can be planted out of these; or, if necessary, shift into 6-inch pots; in these they will pass the Summer and in the Fall form one or more small tubers.

**Starting Dormant Tubers**—Attempts to start the dormant tubers of *Nelumbiums* after removal often result in disappointment. The operation of digging them up and replanting has an effect upon them sufficient to prevent their breaking into growth with the same certainty that would have followed had they been left undisturbed. Especially is it a risky performance to plant out the tubers early in the season. I find it

a very certain method to let the tubers float on the surface of an indoor tank, or tub, on which the sun has full play; they soon begin to form roots quite freely, and when put out by the middle of May or beginning of June, according to locality, they continue to grow very luxuriantly, making even greater progress than those which have succeeded in starting outside.

**Insect Enemies** are not numerous; there is one, however, which causes great trouble, especially in the vicinity of long-established colonies of the American species, *N. luteum*. This insect deposits its eggs on the leaves, and on hatching the caterpillars attack the outer edges principally, rolling the leaves inward as they develop. Another favorite point of attack is the stem of the leaf. Beginning at the top the caterpillar will eat out the interior part for several inches. In large collections it is a serious matter to attempt to combat this pest, but where there are only a few plants hand picking will prevent them doing much injury.

**NYMPHÆA**—When anything like fair treatment is given most of the species and varieties of *Nymphaeas* grow very rapidly and flower abundantly. There are only one or two kinds which are backward in this respect, and unfortunately they are the most handsome ones of the genus. *N. gigantea*, a light blue-flowered species from Australia, and the rose colored variety of *N. alba*, are the principal offenders. The former can be managed but not with the same treatment as is given the other blue-flowered species. With *N. alba* rosea the trouble seems to be caused by our hot Summers. However, there are numerous other species and many hybrid forms which require much less attention than the majority of other classes of plants to bring them to perfection. There are in the neighborhood of 40 kinds to choose from. Of these about half are tender; the others will stand the Winters successfully if the crowns are low enough in the water to be out of the reach of frost. Or if they be grown in places from which the water has to be drawn in Winter, the plants may be covered with some protecting material. But the question of just how much cold the various kinds will stand has not been ascertained. I have had tubs of several kinds frozen solid for six weeks at a time without injuring the plants in the least.

The tender kinds are divided into two well defined sections—day blooming and night blooming. In the day blooming section we have *N. gracilis*, white; *N. scutifolia*, *N. stellata*, with numerous forms ranging from colors almost blue to deep rose; *N. pulcherrima* produces flowers exactly similar to those from plants raised from seed of *N. gracilis*, which have evidently been fertilized by pollen from forms of *N. stellata*; *N. elegans*, a Mexican species, has purplish flowers; *N. gigantea*, a light blue-flowered species from Australia, has the largest blooms of all, sometimes attaining a diameter of 16 inches.

The Night-blooming section is represented by about ten kinds, the best known of which are: *N. Lotus*, *N. rubra*, *N. devoniensis*, *N. dentata* and *N. Sturtevantii*. Most of the other sorts are cross-bred forms between *N. Lotus* and *N. Sturtevantii*. All of the tender kinds have thick

swollen root-stocks, while the hardy species, with one or two exceptions, have thick, fleshy rhizomes.

**Among the hardy sorts** *N. odorata* is the one most commonly grown for its flowers. A form of this is known as the Cape Cod Water Lily; *N. odorata rosea* has bright rose-colored flowers; *N. o. sulphurea*, *N. Marliacea chromatella* and *N. tuberosa flavescens* have yellow flowers; *N. Marliacea albida* and *N. alba* are pure white. A new hybrid race of which *N. Laydekeri rosea* is the best known, has several named kinds with rather odd colors, but they are less desirable than some of the better known varieties. They are, however, well suited for growing in tubs half filled with soil, and the remaining space with water.

**Soil**—All of the species and varieties will thrive in loam two parts and one part half-rotted cow manure. Another good medium is formed by adding a 5-inch potful of bone meal to a bushel of loam.

**Starting Tubers Into Growth**—The tubers of the tender *Nymphaeas* should be started not later than the beginning of April. Each tuber should be put in a 5-inch pot, using pure loam. The tuber may be covered with about an inch of soil and a further layer of half an inch of sand, and put in a tank of water at a temperature of from 65 to 70 degrees. After a few leaves have been made the growth should be separated from the tuber and repotted, as this prevents numerous shoots developing when planted out and secures a strong single growth. This applies to all of the tender sorts. The tubers may be pushed back in the 5-inch pots, where they will continue sending up fresh shoots; these, or as many as wanted, may be potted in 4-inch pots and allowed to go to rest in them. Tubers thus formed should be kept for stock purposes, instead of old plants.

**Summer Quarters**—In this latitude it is safe to put out the tenderest kinds after the 10th of May. Each plant, whether grown in sunken tubs, boxes, or planted in the bottom of the pond, should have at least three bushels of prepared soil to grow them well. One foot beneath the surface is a safe distance; but they will thrive much deeper.

**Starting Hardy *Nymphaeas***—By the beginning of April any of the hardy *Nymphaeas*, which it is necessary to increase or replant, should get attention before they make too much headway. In dividing up such kinds as *N. helvola* and the pink varieties of *N. odorata* with small rhizomes, such as *N. odorata rosea* and *N. o. exquisita*, or the small pieces of *N. Marliacea chromatella*, it is safest to start the pieces in pots so that they will make a few leaves before being transferred to their permanent quarters. Such kinds as *N. alba*, *N. a. candidissima*, *N. Marliacea albida*, *N. M. rosea*, *N. M. carnea* have very large rhizomes, and there is little danger but that they will give a good account of themselves after being divided and planted out.

**Wintering Tender Water Lilies**—From the 15th to the end of October the tender Water Lilies should be taken indoors for the Winter. Where there are small plants or tubers of the tender day blooming species and varieties, such as *N. zanzibarensis*, its varieties as *azurea* and *rosea*, the Australian *N. gigantea*, *N. cœrulea* and *N. scutifolia*, let the old ones

go, as they are difficult to keep over the Winter, except in a large green-house tank. Small, dormant tubers of any of the above can be started in the Spring, and by careful manipulation they will give several plants each, which will afford as much, if not more, satisfaction than would the older plants. Another matter which should be kept in mind concerning the above kinds is that they do not form small tubers at the sides of the large ones made during the growing season. The reverse is the case with such species and forms as *N. dentata*, *N. devoniensis*, *N. rubra*, *N. Sturtevantii*, *N. O'Marana*, *N. Columbiana*, *N. Deaniana*, *N. delicatissima* and *N. Smithiana*. These are all tender night-blooming kinds and form tubers around the sides of the parent tuber or root-stock; they are very irregular in shape, not at all resembling the pear-shaped tuber of a young starved plant. After the display of flower is over for the season, cut off the leaves close to the crown, and with a spade cut off the roots about 6 inches from the crown; lift the clump and put beneath the stage of a warm house. The central part will decay in a short time, and before this actually happens the tubers may be gathered and stored for the Winter. *N. gracilis* and *N. pulcherrima*, white and blue respectively, will keep easily, if the old root-stocks are saved, as they do not decay so easily as the other tender day bloomers. When it is necessary to keep old plants of the above-named day bloomers other than *N. gracilis* and *N. pulcherrima*, lift the smallest of the plants, save as many roots and leaves as possible, pot them and sink in a tank, the water of which does not fall below 50 degrees F. There are several methods of keeping the small tubers of the tender *Nymphaeas* over Winter. Those from the night bloomers should not be removed in a hurry, as the wound made by separating is apt to be slow in healing, and the riper the tubers when the work is done the greater the success. They keep well in damp moss, on the floor of a warm house. If they are starved tubers, that is, of the pear-shaped form, there is little fear of decay setting in, for then there are no wounds to heal as in the case of detached tubers. They may be then kept dry, but warm. Probably the safest plan, and the one which I adopt, is to put each kind in a pot of sand and sink in a warm tank.

**Raising Hardy Kinds from Seeds**—*N. pygmæa* seeds very freely, in fact, every flower may be depended upon to ripen a capsule; but if there is an overflow to the pond the seeds are very apt to get lost, as they float on the surface after being liberated from the capsule. If gathered before this takes place, and the pulpy material removed from around them, they may be thrown in a part of the pond where they are likely to germinate. *N. carolinensis*, *N. tuberosa*, *N. odorata* and one or two of its varieties set seeds freely, but as they increase so easily from rhizomes there is little need of raising seedlings. Marliac's hybrids are evidently sterile, although the pollen in those I have tested is good. Some of these hybrids do not permit of division of the root-stocks, and the probable reason why they cannot be propagated in this country is, one of the parents of the hybrids being so difficult to grow here it is unavailable for the purpose of pollination. *N. lutea* and *N. mexicana* seed somewhat sparingly, but both kinds have two methods of resting during Winter, so that raising plants from seed need not be resorted to.

**Victoria Regia**—Of this there are two forms—V. R. Randii and V. R. Trickeri. The Victorias are grown as annuals, the seeds being sown about the beginning of January, and kept in water at a temperature of at least 80 degrees. The first leaves are grass-like, gradually assuming the peltate form. The young plants should be encouraged to make all the growth possible before being put out of doors. In this latitude we plant them out about May 20, and treat them in every respect like tender Nymphaeas. Each plant should get at least a couple of cartloads of prepared soil, to have the plants at their best. V. Regia has leaves over 6 feet in diameter. The leaf of V. R. Randii is much less in diameter, but more turned up at the margins; that of V. R. Trickeri, in size, is intermediate between the two.

**Labels for Water Plants**—Labels for pots under the surface of the water, if of the ordinary wooden kind, only remain in good condition for a short time, and then the writing becomes obliterated. With the constantly increasing number of Nymphaeas and Nelumbiums, one must be well acquainted with the names of the species and varieties to tell them by their leaves, but when in a dormant state it is impossible to tell some of the kinds from others. A simple method of getting around this difficulty is to have labels made of strips of sheet copper, with a number stamped across the top, the number to correspond with a numbered list of the species and varieties kept in a book. The numbers and names should also be written on a piece of board and nailed up where it may be conveniently referred to. These labels last for years, and may be used as often as necessary. In Water Lily ponds, whether the plants are labeled above water or not, those intended to be removed to their Winter quarters should have the name secured by nailing a strip of the copper along the top of a stout wooden label, with the number belonging to the kind punched on the copper. With copper and punches conveniently at hand no more time will be used than in writing an ordinary label. This method is a safe one also, where a permanent label is desired for preserving the names of outdoor vines, shrubs and trees.

**OUVIRANDRA FENESTRALIS**—The lattice leaf plant of Madagascar. This unique subject thrives best when the leaves are near the surface of the water. The pots should be submerged from 4 to 6 inches. The temperature of the water should never be below 65 degrees, but it should be kept at least 10 degrees higher most of the time. A wide tub and one about 14 inches deep, will suffice for the plant's needs. The tub should be placed in the warmest part of the stove, and shaded from the sun at all seasons. It is not particular as to soil, growing in any ordinary potting mixture. Loam, sand and a little half-rotted manure, topped off with fine grand, produce good results. When in an evidently dormant state the plant will, no matter at what season, begin to send up new leaves when given a shift, or the ball reduced and fresh soil afforded. Its greatest enemy is the confervoid growths which cling to the leaves. To check these, keep the plant in total darkness for a few days. Propagation is by division, and from seeds.

## Ferns and Lycopods.

**ADIANTUM** (*Maidenhair*) is one of the most important genera of ferns, as it contains several of our most popular decorative plants. There are nearly a hundred known species; many of these are in cultivation, besides numerous varieties and forms. There is great diversity of form in the fronds of different species. *A. reniforme* is simple and kidney shaped. Among others *A. macrophyllum* and *A. peruvianum* have the fronds simply pinnate. In the greater number of species the fronds are much branched. Where large collections of ferns are grown it would be a difficult task to select the most beautiful and interesting kinds, as this genus above all others does not possess a simple species but what is worthy of a place in the fernery. For decorative purposes *A. cuneatum* is more extensively grown than any other species. There are several well marked forms. *A. c. gracillimum* has the segments much smaller than in those of the type. *A. c. mundulum* is a dwarf garden form, well suited for using in fern dishes. *A. c. variegatum* has the pinnules faintly marked with creamy white. *A. hispidulum* (*pubescens*) is a species much used in a young state, as it can be got up in quantity very readily. Plants in 2 and 3-inch pots raised from spores have a very different appearance from those which have reached the adult stage. *A. caudatum* and *A. lunulatum* are well suited for planting in hanging baskets. Young plants are produced at the ends of the fronds, and when planted out among rocks in a greenhouse they soon cover a large space. *A. Capillus-Veneris* is one of the hardiest of the genus, but it has a very wide geographical distribution. It is the most useful of all ferns for growing on damp greenhouse walls. There are numerous varieties, *A. C.-V. imbricatum* has very large pinnules; it is shy in producing spores, but is easily increased by division of the rhizomes in the latter part of March. *A. tenerum* makes beautiful specimens in 5-inch pots, but is a little tender for decorative work. *Adiantum* fronds will keep a much longer time after they are cut, if they be submerged in water for a few hours, than if used direct from the plant. Among the tall growing species *A. trapeziforme* is one of the most ornamental. It may frequently be met with in collections, and has fronds 3 to 4 feet long. *A. t. pentadactylon* is a well marked variety and should always be included in large collections; it stands well as a decorative plant. *A. t. Sanctæ Catherinæ* is a dwarf variety, with the segments deeply cut. This species and its varieties are best increased by division of the crowns before starting into growth.

**Adiantum Farleyense**—Success in growing this important commercial fern depends to a great extent on making a proper start with the small plants. It is labor lost in trying to make a healthy plant out of an unhealthy one, or from one which has got a set-back from some

cause, unless they be knocked out of the pots and split up into small pieces—the smaller the better, provided there are a few small fronds attached to each piece and a probability of their making new roots. *A. Farleyense* does not produce spores as most kinds of ferns do. The reason is because it is not a species, but merely an unfertile variety of a species said to be the well known *A. tenerum*; consequently the only method of propagation lies in dividing the old plants. Some growers split the crowns and pot the growing points in thumb pots, placing them in a frame or close shaded house. This method is not always satisfactory, for unless the points have fairly good live roots to start with, or show signs of immediately making fresh ones, their struggle for existence is apt to be a pretty tough one. The first batch may be started about the end of January or first half of February. Old plants from which the fronds were cut earlier in the season, and which show little colonies of small fronds, are the best for the purpose. Wash every particle of soil from the roots, when it will be found there is a considerable quantity of dead but hard, wiry rhizomes just beneath the surface of the soil. This material, if potted up with the pieces, hinders their growth and should be removed. Select only the rhizomes which have life in them and which have a frond, however small, or a piece of frond attached. The work of separation should be done with the aid of a sharp-pointed pair of scissors. Next put the pieces in a mixture of sand and moss, the latter rubbed through a No. 8 sieve; have the materials in equal parts. Water should be given very sparingly. To start the pieces into growth under the most favorable conditions they ought to be covered with glass until new roots and fronds push out. They may then be potted into 2-inch pots.

**Adiantums from Spores**—*A. cuneatum*, *A. pubescens* and many other species vegetate very quickly from spores. The principal points to be observed are to have the soil free from the lower forms of plant life, such as mosses and liverworts. Sow the spores very thinly. Keep the pans in which they are sown shaded from the sun, and the pans covered with glass until the first fronds appear. During the process of germination the soil should not be watered from above, but by sinking the pans up to the rims in a pail of water. The spores will germinate in almost any kind of soil, but it should be somewhat porous and well drained. Sow in early Spring.

**Propagation by Division**—*A. cuneatum* and *A. Roenbeckii* are the two Maidenhair ferns most largely grown. These and their allied forms, which have become unsightly through cutting the fronds, on being repeatedly used in decorations during the Winter season, should, while in a dormant state, have all the fronds cut off and be placed in the coolest house, where they should be allowed to rest as long as possible. The appearance of the young fronds will serve as an indication as to how the plants should be split up previous to repotting. Put the pieces in 5-inch pots. In potting use a loam which is apt to get hard after watering; this, with a little sand and leaf soil, will give good results. In starting the plants they will not suffer by having the house almost without shade.

**ASPIDIUM CAPENSE**—Where a good, hardy, ornamental Fern is wanted for decorative purposes, one that is cheaply got up and not easily spoiled, *A. capense* will answer. From a well filled 6 or 8-inch pot several dozen plants may be raised within a few months. It is a greenhouse species requiring but little heat in Winter.

**ASPLENIUM**—A very large genus. Only a very few of the species are extensively grown, but none of them is on the short list of the best decorative Ferns for florists. *A. nidus*, the Bird's-nest Fern, a native of Australia, is a striking species with very large simple leaves. It must have perfect drainage, rather rough and fibry soil, and a stove temperature.

**CIBOTIUM (Dicksonia) SCHIEDEI**—A low-growing Tree-Fern, native of Mexico. The fronds are of a light shade of green and very much divided, those of young plants arching gracefully. It stands well in a dry atmosphere. Young plants come readily from spores. Old plants sometimes make numerous growths at the base of the stem. If these are taken off with a few roots attached and put in the sand bed for a few weeks they make specimen plants very quickly.

**CYRTOMIUM (Aspidium) FALCATUM**, together with *C. Fortunei* and *A. caryotideum*, are among the hardiest of the Ferns used for decorating, for which purpose they are much grown. The coolest house will do for the plants after they are of the requisite size. The fronds are simply pinnate, the pinnules resembling, to a certain extent, the leaf divisions of the fish-tail Palm, *Caryota urens*. Young plants are raised from spores.

**DAVALLIA**—A genus of Ferns having scaly rhizomes which usually creep along the surface of the soil and send out roots from their under surfaces. Of the few species grown *D. fijiensis plumosa* is one of the most ornamental, having very finely divided fronds. It must be grown in a warm house. As it is not a deep rooting plant pans or baskets should be used according to the purpose for which the plants are wanted. It is propagated by division of the rhizomes while dormant. *D. bullata*, *D. pentaphylla*, *D. Tyermannii*, and *D. dissecta* are well adapted for baskets. Those made of wire should be selected, so that the rhizomes, as they lengthen, may be pegged against the side. *D. alpina* and *D. parvula* are exceedingly pretty dwarf-growing species for a warm greenhouse. *D. stricta* is grown as a pot plant; this species is easily raised from spores.

**D. Mariesii** is the species used in making up "Fern Balls." It is deciduous and should be kept moist enough in Winter to prevent the rhizomes from shrivelling.

**D. Mooreana** is a desirable plant for house decoration, but is not grown in quantity, owing to the difficulty of getting up a large stock within a reasonable time. Those in a starved condition make the best stock plants.

**DICKSONIA PAROMETZ** is a very useful, medium-sized decorative species. It is freely increased by division.

**D. antarctica**—The stems of this noble Tree-Fern are sometimes imported in a dormant state. When placed in a cool, moist house in pots only large enough to accommodate them, they usually start into growth. Young plants are raised from spores sown in a cool, shaded greenhouse. They sometimes germinate freely sown on the stems of the old plants. The fronds are of a leathery texture, and the plants stand much rough treatment.

**LOMARIA GIBBA** is a miniature Tree-Fern forming very graceful rosettes of simply divided leaves. It is useful even in a very small state, as the foliage is different from that of most other Ferns grown in quantity for decorative purposes. Old plants produce fertile fronds in abundance, and if the spores are harvested and sown at the proper time, they vegetate very quickly. By this method of increase, plants in 5-inch pots may be produced in 12 months from sowing. Of this species there are one or two handsome forms. *L. g. Belli* has the points of the pinnae beautifully tasselled. *L. g. robusta* is of a robust growing nature. A species closely allied to *L. gibba*, known as *L. ciliata*, has shorter and stouter fronds. The plant is quite as useful and as easily raised from spores as *L. gibba*.

**MICROLEPIA (Davallia) HIRTA CRISTATA** is one of the handsomest of crested Ferns, capable of being grown into very large, symmetrical specimens. To have it at its best it needs a warm temperature. Water should be kept from the fronds, as they are quite hairy and are apt to turn brown when kept wet. Increased by division.

**NEPHROLEPIS**—The species and forms are for the most part plants with tough, leathery fronds, enabling them to be used with little injury for decorating or house plants. Several varieties are largely grown. The most popular are forms of *N. exaltata*. *N. e. bostoniensis* is an old and deservedly popular plant which has within the last few years been very extensively employed as a decorative plant. Large specimens are well adapted for placing on pedestals, or hanging from the roof of a large conservatory. It is increased by division, planting the pieces in shallow soil, on benches, and potting up the young plants, which are formed from runners. The plant known as *N. davallioides furcans* is a crested form, evidently not of *N. davallioides* but of some other species, probably one allied to *N. acuta*. When planted out on benches it gives off plants from runners in the same manner as the Boston Fern, but not so plentifully. Old specimens may be divided and the pieces put thickly together on a bench, in leaf mould and sand, to make a little growth before potting.

*N. e. cristata* is a form closely resembling the last named; it needs more heat to develop it perfectly.

*N. washingtoniensis* and *N. w. pendula* are both good kinds for decorative purposes. The fronds after being cut will last for a long time under what would seem adverse conditions.

*N. cordifolia*, when well grown, is an elegant decorative subject. The typical form is much smaller than any of the above-mentioned species

and varieties. The fronds are narrow and the leaf divisions close together, but, like some of the others, it varies much. One of the varieties produces tubers; the fronds in this case are large and may be mistaken for those of *N. exaltata*.

*N. c. pectinata* is a well known variety, having the fronds narrow and drooping. When matured it is usually grown in baskets suspended from the roof of a greenhouse. Useful specimens may also be grown in 5-inch pots. Increased by divisions, which may be quite small.

*N. acuta* is a stout growing and distinct species; the fronds are sometimes 16 inches broad and from 2 to 4 feet long. It makes but few fronds when compared with some of the others. It must have abundant root room. Increased by stolons.

*N. davalliodoides* is somewhat coarse in growth. It needs careful handling while the fertile fronds are developing. Moderate-sized specimens do not show this plant at its best, as it is the very long fertile fronds on plants several feet across which make it attractive. Increased by division.

**ONYCHIUM**—Of this genus two species are commonly grown for decorative purposes; the fronds are very much divided. *O. auratum* is the largest, but *O. japonicum* is the handsomest. Both are easily increased from spores; or the old plants may be divided, but only to make large specimens.

**PLATYCYERIUM (Stag Horn Fern)**—From their wonderful resemblance to the antlers of a stag well grown plants of the Platyceriums never fail to attract attention. The species called *P. grande* is the most striking of the number. A native of the northern part of Australia it needs more heat than most of the others. While they succeed pretty well in pots they do better and look more natural when grown on blocks of wood. Some forked limbs of trees should be cut up on which to fasten the plants. The pieces should be in the neighborhood of 18 inches in length. Drive in a few nails here and there; place some rough peat and moss against the wood; put the plant in position and wire it firmly, packing in portions of the peat and moss wherever possible.

*P. grande* can only be propagated in quantity from the spores, which are found in a large mass underneath the primary division of the frond. Raising young plants in this way is not a difficult operation, but one that requires lots of patience. A pan should be prepared containing fibry peat, chopped fine; add a liberal quantity of finely-broken brick, charcoal, and coarse sand. The pan should be placed in a flat of water so that the mixture may derive moisture from beneath. Water should never be given overhead, as germination depends, to a great extent, on the spores remaining in the same spot until the prothallus begins to form.

*P. alcicorne* and its var. *majus* may be grown in a cool greenhouse. These kinds, together with *P. Hillii* and *P. aethiopica*, increase rapidly from the roots, many bud-like processes forming on the surfaces and

sending up tiny leaves. These young plants may be removed when an inch or two high, and potted singly in small pots.

**POLYPODIUM**—This is the largest genus of the order, and includes many plants which have long been known under other generic names. These names are in common use, and it is likely that they will continue to be employed for a long time. Some of the better known are *Campyloneuron*, *Cryptosorus*, *Drynaria*, *Goniophlebium*, *Goniopteris*, *Lepicystis*, *Niphobolus*, *Phegopteris*, *Phlebodium* and *Pleopeltis*. There is a great number of exceedingly beautiful plants among the species. The varieties, especially those of the common Polypody, *P. vulgare*, are among the handsomest of hardy Ferns, but they are not so much grown in America as in Europe, where they do grandly in outdoor ferneries.

**P. (Goniophlebium) sub-auriculatum** makes one of the finest basket plants for a warm greenhouse. The fronds are several feet in length, and drooping. This Fern is not difficult to grow, provided it be given a fibrous soil and an abundant supply of water during the period of growth. It is helped along wonderfully by adding to the soil some finely crushed bone with the minute particles washed out, only saving the rougher material in the process of washing. This substance, by the way, is of great service as permanent food for many of the Ferns, but the deleterious matter must be removed by washing.

**P. (Niphobolus) lingua**, from Northern India and Japan, is almost hardy and one of the best for house culture. There are three forms: one variegated, another crested, the third having the largest fronds. The fronds are undivided, very leathery in texture and remain in good condition for more than a year. All of them are very readily increased by division.

**P. Heracleum** and **P. conjugatum** are suitable for a warm conservatory. When well grown they are odd and attractive. The very thick rhizomes grow on the surface of the soil and accommodate themselves in a wonderful way to a limited rooting area by growing in coils.

**P. (Phlebodium) aureum** should be more grown for decorative purposes, as it will stand a dry atmosphere, is very graceful, and the spores on a small frond will raise thousands of plants. They should be sown on very finely chopped Fern roots mixed with screened moss. The fronds are from 2 to 4 feet in length, and from 9 to 18 inches broad, simply divided. It grows most luxuriantly among Fern root, peat and moss. There is a form called *P. a. sporadocarpum* with fronds very glaucous, almost blue, usually growing from 12 to 18 inches high—a handsome plant, showing up well under gaslight. Increased by rhizomes. It needs more heat than the type.

**P. rigidulum**—A species too seldom seen. It has two kinds of fronds very different from each other; the barren ones are about 9 inches in length, divided half way to the mid-rib, forming blunt lobes. The fertile ones reach a height of from 2 to 4 feet, and are 12 to 18 inches broad. A very handsome plant for collections.

**P. Phymatodes** is a rhizomatous species of very rapid growth, with exceedingly graceful leaves. The fronds are deeply pinnatifid, the fertile

ones narrowest. One of the uses to which this Fern may be put is in training against damp walls or on the dead stems of Tree Ferns. It is easiest propagated by taking pieces of the rhizomes with fronds attached and pegging down in 4 or 5-inch pots of sandy soil.

**PTERIS**—There are many good decorative plants in this genus, all of which are easy to propagate. Most of them may be grown in ordinary greenhouse temperature. Of *P. serrulata*, much used in a small state, there are numerous forms, some of which have beautifully crested fronds and others variegated.

*P. cretica albo-lineata* is one of the finest of all variegated Ferns. The barren fronds are nearest the base of the plant; they are shorter and broader than the fertile ones. A broad band of creamy white occupies the middle of each leaf division. This Fern comes true from the spores, which vegetate in a very short time after sowing.

*P. quadriaurita*, a variable species. The most useful form is known as *P. q. argyraea*, having a white mark down the center of each frond—a very useful variety in a small state. It is raised from spores.

*Pteris tremula* is best for using in pots not under 5-inch. It is one of the quickest raised from spores. There are crested forms. The one named *P. t. Smithiana* has been in the trade for several years.

*P. Wallichii* and *P. inequalifolia* (the latter evidently related to *P. semipinnata*) are coarse growing and easily multiplied by division. *P. hastata* and *P. macrophylla* have very dark green fronds. Both are very liable to insect attacks, unless grown cool. They are both useful in 2 and 3-inch pots.

**SELAGINELLA**—Although not related to Ferns, some of the species have a striking resemblance to these plants. Their cultural requirements are almost similar. They do best in shade, and with a few exceptions they need a rather warm atmosphere, especially while making their new growth. They may be propagated from spores, division of the crowns, or from cuttings. Propagation by spores is seldom attempted, as dividing the plants and rooting from cuttings will give an abundant supply.

*S. Emmeliana*, one of the best for supplying small plants for mixing with Ferns, is increased by breaking up the mature fronds into small pieces, and scattering these on the surface of a box or bed of sandy soil, which should be kept moist and shaded from the sun. Every small piece will make a plant.

*S. Kraussiana* is a dense growing moss-like species, much used for covering the soil in pots in which other plants are growing, in Fern dishes, and for the borders of conservatory beds. *S. K. aurea* has yellow foliage. *S. K. variegata* is green and white. In propagating this species and its forms it should not be broken up into little tufts and potted, as is usually the case. Take single growths and put, say three of them, in a 3-inch pot; in a short time they will develop enough growth to cover the soil.

*S. erythropus* is a useful species with reddish stems reaching a height of about 9 inches.

*S. Martensii*, a Mexican species, is one of those most frequently grown. It is exceedingly easy to propagate, as long aerial roots are made from the stems. Cuttings, say about 4 inches in length, will root well if put in small pots and kept close; or to fill large pans, and have them present a well-furnished appearance in a short time, root the pieces in sand, afterward putting directly in the pans.

*S. lepidophylla* is the well-known "Resurrection Plant," which, when dry, curls up into a ball, and which uncurls when placed in water.

*S. viticulosa* grows about 8 inches high, is always bright green. An easily divided plant and useful in a small state.

*S. cæsia arborea* is a climbing species very suitable for rambling over rustic work in a moist conservatory. Where its aerial roots are allowed to fasten themselves to suitable material it grows into a dense, irregular mass of lovely bluish-green foliage.

**Soil**—This should be of a porous nature, through which water will pass freely. Small plants from spores will need about two parts leaf soil and one each of loam and sand. Loam, whenever used, should be fibrous, well broken up and not sifted. For plants in pots larger than 4-inch, leaf soil, loam and sand, in equal parts, will be a safe compound. Some Ferns, notably *A. Farleyense*, are benefited by having some rotted cow manure mixed with the soil. Large plants, and those which have to remain in the same pots for any length of time without shifting, should have less leaf soil and more loam. But most of the species thrive in a variety of soils. The usual time for potting large plants is before starting into growth; but rapid-growing, small plants should be shifted into larger pots as they need them.

**Summer Quarters for Cool House Ferns**—Many Ferns used during Winter as decorative plants will be found to put on a vigorous growth in frames during the warm months. Select those frames with a northern exposure, with the sashes tilted to give an abundance of air. The pots may be plunged or placed on some material capable of giving off considerable moisture. The plants may be kept in this structure till cool weather. Among the kinds which may be thus treated are *Pteris Victoriae*, *P. cretica albo-lineata*, *P. Mayii*, *P. serrulata* and its many forms, *P. tremula*, *P. hastata*, *Onychium japonicum*, *Aspidium capense*, *Adiantum Capillus-Veneris*, *A. formosum*, *Cyrtomium falcatum* and *Dicksonia antarctica*. In Winter a minimum temperature of 45 degrees will keep all of the Ferns named above in healthy condition. For the tender kinds 10 to 15 degrees higher will be necessary.

**Shading**—Some Ferns, such as *Cheilanthes vestita*, grow in dry places in the full sun, but the vast majority thrive only under conditions exactly the reverse. In Winter the very thinnest shade will be sufficient, and from the 1st of April to the end of September it should be heavy enough to intercept the sun's rays.

**Preparing Soil for Fern Spores**—The greatest hindrances to raising Ferns from spores are the lower forms of plant life ever present in the soil, and very often in the water. These consist of Mosses, Liverworts and the various conervoid growths. Many of them, owing to the favorable conditions presented, vegetate as quickly as the spores of the Ferns and grow into a mass, choking the prothallus in the first stages of growth. The only means of getting around this difficulty lies in sterilizing the soil, or, at least, that part of it on which the spores are to be sown; and this can only be done safely by subjecting it to a temperature sufficiently high to kill all plant organisms, by baking, steaming or boiling. The last method will be the most available in the majority of cases. The soil may be boiled for 15 or 20 minutes, and afterward poured into wide flat boxes to dry. Shallow pans are the most convenient in which to vegetate the spores; they should be well drained with potsherds and these covered with a layer of sphagnum. The kind of soil to be used is of little importance, provided it be porous and free of vegetable organisms. Loam, leaf mould and finely broken brick, in equal parts, make an ideal mixture. Press it firmly and give water always by sinking the pan up to the rim in a vessel containing water.

**Gathering and Sowing Spores**—Many failures in germinating some of the rarer kinds of Ferns may be set down to harvesting the spores at the wrong time. They should always be gathered with the aid of a hand-magnifying glass, which will show when the cases are about to burst. Cut off the entire frond, or as much as may be wanted, and put between sheets of white paper to dry. In a day or two the spores will have fallen from the frond; if not, a gentle rubbing between the fingers will release them. They should then be scattered on the surface of the soil in the pan, taking care to sow very thinly, as they are very liable to dampen off when the prothalli are too close together. Cover with a pane of glass and put the pan in a shaded frame, or in a heavily shaded part of the greenhouse. When the prothallus develops, and just as the first tiny leaves appear, the glass covers may be removed, to harden the seedlings a little. A day or two after they may be pricked off into other pans of soil, taking one small patch at a time on the end of a knife blade and merely pressing them into a previously made cavity on the surface of the soil. They may then be watered through a fine rose.

**Viviparous Ferns** are those which develop bulbils along the midribs or on the lateral branchlets of the fronds, thus providing a ready means of propagation. *Polystichum angulare*, *Asplenium bulbiferum* and *Woodwardia radicans* are good examples. There are also several other well-known Ferns which possess this peculiarity. To increase Ferns by this means sink the pots up to their rims in a suitable mixture of soil to enable the fronds which are provided with bulbils to be easily pegged down, so that plantlets may be encouraged to develop roots quickly. When they have made a sufficient quantity to enable them to become self-supporting they may be separated from the frond and potted separately into 2½-inch pots, or, if too small for pots, they may be pricked off into boxes or pans.

**Insect Enemies**—If the plants are not subjected to adverse conditions, such as too high a temperature, or insufficient moisture in the air or at the roots, they will seldom be attacked by insects. The Mealy Bug, Thrips and Brown Scale, are sometimes troublesome. Scale is not easy to remove, and the only efficacious method is to use a sponge and water. For the other insects fumigation or vaporizing may be resorted to, or, if only a few plants are affected, they may be laid on their sides and the insects removed by using the hose. Slugs are the greatest enemies of the Ferns, and a close watch should be kept for them. Various methods are employed to capture them, such as a board smeared on the under side with lard, cabbage leaves, and sliced turnips, or potatoes laid among the plants; or by using camphor among the pots, and air-slacked lime on and under the benches. If the slugs are numerous, hand-picking should first be resorted to. They feed at night and rest during the day. They will usually be found in the angular space beneath the rims of the pots.

## Hardy Perennial Plants.

**ACÆNA MICROPHYLLA**—A native of New Zealand. In localities where this species will thrive it will be found one of the best trailing dwarf sub-shrubs. The flowers are inconspicuous, but the flower heads, on maturing, are covered with long, crimson spines, which give the plant a very ornamental appearance. For a rockery few plants surpass it in forming neat, compact masses. It is not particular as to soil. In this locality young plants are best put out in their permanent positions early in the Fall, as when put out in Spring they do not make sufficient growth to insure a healthy, vigorous condition during the hot months. It is propagated by division and from seeds.

**ACANTHUS**—In warm spots, at least three of the species are hardy with us, but they bloom only sparingly. In one or two of the species, but notably in *A. spinosus*, the flower stalks have a handsome appearance for quite a while after the flowers are dead. *A. mollis* and *A. m. latifolius* were used for bedding in this city a few years ago. These kinds are easily increased by division of the roots. Seeds are readily obtained. The seedlings may be planted out in places where they are to remain a few weeks after germinating. They are deep-rooting plants. In the colder parts of the country all of the species should have the crowns protected in Winter.

**ACHILLEA MILLEFOLIUM**—A native composite, with large flat corymbs of white, red, or purple flowers. The leaves are much divided. It is one of the easiest plants to cultivate in the open border, spreading very rapidly and flowering profusely. Large clumps may be divided with a spade at any time during Spring or Autumn and replanted. It usually grows from one to two feet high.

**A. ptarmica flore-pleno**—The variety of this known as The Pearl is one of the most desirable of hardy herbaceous plants, because of the flowers, which are double and white. They are produced in great profusion if the plants get fair treatment. This Achillea should not be divided in Spring, for unless favorable weather conditions follow the operation the plants will receive a check from which they do not thoroughly recover the same season. If taken up and divided during the first half of October, replanted and watered if necessary, they will develop working roots before freezing weather, and send up flowers the following season as if nothing had happened. Do not divide the plants too closely, and if the ground in which they are growing is dry, water well before the operation and give another watering when the pieces are replanted.

Other varieties of *A. p. flore-pleno* are known as Snowball and *Elegans*, all of them are white flowered.

**A. tomentosa** is a dwarf, woolly-leaved evergreen, with yellow flowers. Increased by division.

**A. mongolica** grows about 18 inches high, bears single white flowers. Comes into bloom early, and is used for cutting. All of the kinds need full sunshine.

**ACIPHYLLOA** **SQUARROSA** and **A. COLENSOI**—New Zealand umbelliferous plants, with dense rosettes of sharp-pointed leaves. In a young and flowerless stage they are attractive, and may be used in Summer for rockwork. In the colder parts the plants should either be lifted and stored in a frame, or protected by a covering of some kind. Both are raised from seeds sown during the latter part of February.

**ACONITUM** (**Monkshood**)—In the warmer parts of the country, where the Delphiniums will not thrive, some of the Aconitums will be found to be pretty fair substitutes, as they thrive moderately well where the sun is only allowed to strike them through a leafy shade. If the soil around them is given a mulch of 2 or 3 inches deep, to preserve moisture, they will flower all the better for it. The species are very numerous and have a wide geographical range. *A. napellus* is the best known; unfortunately it is one of the most poisonous of cultivated plants, but hurtful only when taken internally. Some of its varieties are *A. n. album*, flowers white; *A. n. longibracteatum*, rich blue; *A. n. bicolor*, white and lilac; *A. n. Braunii*, deep purple. *A. ochroleucum* and *A. pyrenaicum* have pale yellow flowers. *A. napellus* and its forms flower about midsummer. *A. Fischeri*, a pale blue flowered native species, blooms late in Summer. Propagated by division in Fall or Spring.

**ACORUS CALAMUS VARIEGATUS** (**Variegated Sweet Flag**) is a grassy-looking plant, with finely marked leaves. It is well suited for growing on the margins of artificial lakes; few other places will keep it in a healthy state unless the soil be moist and partly shaded. It should be propagated by division of the rhizomes, as growth commences in Spring. *A. gramineus variegatus* is an exceedingly handsome little variegated plant, growing only a few inches high. It will thrive in much dryer soil than the first-named species. It makes a great number of grassy-looking growths, so that division is an easy matter at almost any time.

**ADONIS**—The annual species, of which there are two—*A. aestivalis* and *A. autumnalis*—are more commonly grown than the perennials of which there are four. *A. vernalis* and *A. pyrenaica* are very elegant species for borders or rockwork. The flowers are large, yellow; the foliage much divided. They do best with slight shade. Propagation by seed is a rather slow method. Large plants will best stand division in early Autumn.

**ÆTHIONEMA CORIDIFOLIUM**—A slender, evergreen shrub, growing about 6 inches, suitable for edgings of borders or for rockwork. Very readily raised from seeds which should be sown in Autumn and the seedlings put out early in Spring. When in rockwork pockets give a mulching of leaf soil or moss to prevent baking of the earth and to keep the

roots cool. It belongs to the Nat. Ord. Cruciferæ. Other good species are *Æ. grandiflorum* and *Æ. pulchellum*.

**AGROSTEMMA (Lychnis) CORONARIA**—This species and its varieties are always satisfactory in the herbaceous border. They are very quickly raised from seed, or by division. The foliage is silvery throughout; the flowers are rose colored; *A. c. atro-sanguinea*, crimson; *A. c. alba*, white; *A. c. hybrida*, rosy crimson. They grow from one to two feet high. Almost any kind of soil will suit them, but they must have full sunshine.

**A. flos-Jovis** differs from *A. coronaria*, in having umbellate heads of bloom, with the foliage narrower. The flowers are purple or scarlet.

All of the above are useful plants for florists to handle. Sow the seed in the Fall; keep in a cool house. As soon as the seedlings are large enough prick off into boxes. They may be put out in a cold frame very early in the season. Or by sowing early in September the seedlings can be wintered in frames.

**AJUGA**—The creeping or stoloniferous species are much used as dwarf plants for forming dense carpets, either on rockwork or in the open border. As they grow in dense masses they usually are self-supporting during the hot months. *A. reptans* var *rubra* has dark purple foliage. *A. r. variegata* is beautifully mottled with yellow. *A. genevensis* is a variable species with dull red, white or blue flowers; does well in shady places. All of the above are readily increased by division either in Fall or Spring.

**ALTHÆA ROSEA (Hollyhock)**—One of the tallest growing herbaceous plants, also one of the showiest. It is what may be called an old-fashioned flower, and it is doubtful if there has been any improvement in the size and shape of the bloom for a goodly number of years. A host of varieties used to be kept true to name years ago; these were perpetuated by cuttings, divisions and grafting on roots; but now the best sorts come tolerably true from seeds. The principal colors are white, yellow, pink, red and purple. Seeds to produce flowering plants within a year should be sown as soon as ripe—usually in August. Sow in a box of rather light soil and cover very lightly with screened moss. The seedlings being large from the start should be put singly in small pots, and as they get too large for that size, shift into two or three sizes larger. Keep them in a cold frame; give an abundance of ventilation in favorable weather so that they may become stocky and robust. The ground should be well prepared for their reception, otherwise they will not attain full size—6 to 8 feet tall—and only remain in bloom two or three weeks. The plants should be put out as early as the ground can be worked. Good kinds should be marked for seed as they bloom, and extra good sorts may be propagated by any of the above mentioned methods.

**ALYSSUM (Madwort)**—In this genus there are several rockwork or border plants, which, in their seasons, make a good show while in bloom. *A. saxatile* and *A. s. compactum* are Spring bloomers. The plants are

of a dwarf shrubby nature with grayish-green leaves and dense heads of deep yellow flowers. *A. s. variegatum* has the foliage marked with yellow blotches, which, when the plant is out of bloom, renders it more valuable than the type as an ornamental plant during the Summer. *A. gemonense* is nearly allied to *A. saxatile*, but is less hardy, and continues longer in bloom. *A. rostratum* grows about 1½ feet high and blooms later than any of the above named. The species and forms are not particular as to soil, usually growing very freely wherever planted. They are easily raised from seed, which should be sown in August and the seedlings kept in a light, airy position until large enough to be planted out.

**ANEMONE JAPONICA**—This species and its varieties are late flowering herbaceous plants, growing from one to two feet high, with large white or pale rose-colored flowers, useful for cutting. The varieties are *A. j. alba*, *A. j. rosea* and *A. j. Whirlwind*. Root propagation is the method employed, and it may be done at almost any season, but preferably in early Spring. Dig up some of the oldest plants, saving even the small roots. Cut both large and small into pieces about 2 inches in length and put in boxes of sandy soil, covering the pieces with an inch of the same material. Keep fairly moist and in a cool frame. When the roots have developed growths from 2 to 3 inches high put in 3-inch pots, plunging these in ashes and keeping them covered for a few days. After the plants make a sufficient quantity of roots they should be put out in their permanent quarters, where preparation should be made for them in advance by having the ground deeply worked and well manured. During Summer, both young and old plants should be heavily mulched if the maximum number of flowers are expected from them. During dry weather the plants, if neglected, are apt to stand still and throw up only a few feeble looking flowers, so it is important that they be kept moderately moist by mulching. Short grass, leaves, or half-rotted stable bedding will answer. In this genus there are about 85 species, several of which have numerous varieties. Most of them are desirable plants, but some are weedy, and increase too rapidly in gardens.

*A. alpina*, a European species, grows about 18 inches high, forming large clumps. The flowers are usually solitary, from 2 to 3 inches in diameter, white inside, purplish outside. There is a very fine yellow flowered variety of this named *A. a. sulphurea*. Both kinds are slow in making flowering plants from seeds.

Among the slender, tuberous rooted section, *A. Appenina* and *A. nemorosa* are early flowering dwarf species well suited for naturalizing among deciduous, low-growing trees and shrubs, as they make most of their growth before the shrubs and trees are in leaf.

**ANTIRRHINUM (Snapdragon)**—The varieties of *A. majus* have long been grown as hardy perennials in Europe. In the northern and middle parts the climatic conditions are more favorable for their growth in the late Summer and Autumn months, as they flourish best in a moist, cold atmosphere. In America, especially in the Middle and South Atlantic States, they are best treated as biennials, as the plants which survive the Winter are usually not in as vigorous a condition as could be wished.

Cuttings may be put in during October and given the protection of a frame during the cold months. Or seeds should be sown late in September to have good-sized plants by the following Spring. The tops of the seedlings may be rooted quickly in the propagating bed of a cool house; or they may be grown from the start with the view of flowering them in pots, for which purpose they are entirely satisfactory. The principal colors are white, red, purple and yellow, several kinds having combinations of two or more of these colors. *A. asarina*, from the south of France, has a trailing habit; the leaves are grayish green and of a clammy nature; flowers yellowish white. It thrives best in positions partly shaded from the sun. It reproduces itself freely from seeds which ripen in abundance and may frequently be seen growing in the chinks of shady walls.

**AQUILEGIA (Columbine)**—Hardy perennial plants with very showy flowers. The colors include red, white, blue and yellow; often there are two or more of these colors in the same flower. About 30 species are in cultivation. There are numerous varieties, the results of hybridization, few of which, however, surpass the species in attractiveness as border plants. The Aquilegia is so easily hybridized that it is almost impossible to obtain plants from seeds true to name when two or more species are grown near each other; even with two species apparently very distinct, such as *A. chrysanthia* and *A. flabellata*, they readily mix, but the progeny has a very undesirable combination of colors in the flowers. It is always advisable to protect a few flowers of the desirable species from the visitations of insects, so as to make certain of having the seedlings true. I have found the best way to do this is to flower a few plants in pots and keep the blossoms covered with fine cloth while fertilization is in progress. The seeds germinate irregularly when they remain long out of the soil, but when sown as soon as gathered they vegetate very freely, even in midsummer. Spring sowing is unsatisfactory, because the seedlings do not make desirable growth during hot weather, and often more than a year elapses before any flowers are produced. Sow in moderately light soil, and cover lightly with screened moss; keep in an airy, cool house. When the seedlings are large enough they may be pricked off into boxes, or round the edges of small pots of soil. Put them out in a frame when they are large enough to stand sunshine. If planted outside, where they are to flower, by the end of September they will make fairly strong crowns before cool weather sets in, and in the following Spring will bloom strong and vigorous. Among the red flowering kinds we have *A. formosa*, *A. californica*, *A. truncata* and *A. canadensis*; in white there are several, among the best being *A. californica alba*, *A. flabellata*, a dwarf-growing species with very ornamental foliage; *A. caerulea alba*, and *A. vulgaris alba*. The best of the yellows are *A. chrysanthia* and *A. c. flavescens*. In the blue-flowered forms there is a large number to choose from: *A. caerulea* is a very satisfactory species; *A. vulgaris caerulea*, *A. olympica* are both good. In *A. glandulosa* the sepals are blue and the petals white. Several of the species and varieties are very easily forced into bloom, among them *A. flabellata*. It is a trifle later in coming into flower than *A. canadensis*, which usually is in full flower in this latitude by April 10. *A. chrys-*

antha is later in flowering, but a hybrid between it and *A. flabellata*, with the last named as the seed parent, bloomed this season a week ahead of *A. canadensis*. The color of this hybrid is a little puzzling; there are several dozen plants and not a single specimen is different from the others. The petals are yellow, the spurs of which are the same color as the sepals—deep purplish blue. All of the plants are quite dwarf, resembling *A. flabellata* in this respect. The Aquilegias have a habit of dying out after the second and third year. Any species which it is desired to increase in the absence of seeds should be lifted, divided and replanted early in the Fall, so that the pieces may have a chance to become established before Winter.

**ARABIS (Rock Cress)**—Many of the species of Rock Cress are of no horticultural value and are seldom seen outside of botanical collections. Three of them, however, are among the most desirable of Spring flowering plants, and may be found in nearly every garden of any size. They are *A. albida*, *A. lucida* and *A. alpina*. *A. albida* is the best known; it forms a dense carpet, the stems being long and wiry, with dense rosettes of leaves at the ends. The flowers, which are pure white, are borne in great profusion, almost hiding the foliage. *A. alpina* is not such a free grower, but is equally suitable for rockwork, especially the variegated form. *A. lucida* is dwarfer than the other two; this has also a variegated form which, like the variety of *A. alpina*, should not be allowed to flower. The variegated varieties should be propagated by division, or by cuttings put in early in the season. The green-leaved kinds are best raised from seeds, treated in the same manner as recommended for Aubrietia.

**ARALIA (Fatsia) PAPYRIFERA** is the rice paper plant of the Chinese. It is one of the noblest plants in cultivation for sub-tropical effects. The leaves are palmately divided, supported by strong stalks from a stout central stem. The whole plant has a grayish cast to it. In the Northern States it stands the Winter if the crowns are protected with some rough material. In a single season strong crowns will grow 8 or 10 feet high. It is propagated by cutting up the rhizome-like roots into pieces about 3 inches long and covering them with moss or sand. Keep the boxes containing the roots in a cool frame all Winter, introducing them into a little heat early in the Spring so as to have the plants large enough to plant out by the middle of May. The flower is not the least attractive part of the plant. In the Southern States the plant is in bloom during the months of September and October; but in this latitude it is usually unfolding when its career is cut short by cold weather. The color is greenish white, the flowers being arranged in drooping panicles 2 to 3 feet in length.

**ARGEMONE (Devil's Fig)**—Most of the species grown in gardens are of annual duration. They will germinate outdoors late in Spring and develop very rapidly into flowering plants. *A. grandiflora* is a perennial with white flowers 3 to 5 inches in diameter, but not so free in blooming as the annual species. It must be given a position in full sunshine. Seedlings should be pricked off into small pots as soon as the seed leaves are developed, as the roots will not endure much disturbance.

**ARMERIA** (*Sea Pink*)—Of the Sea Pinks *A. vulgaris* is the best known. It grows in dense low clumps, having narrow grass-like leaves. The flowers are in close heads, on scapes only a few inches high. There are numerous forms of this species, with red, lilac, deep pink and white flowers. *A. cephalotes* has much larger leaves than the above, and the flowers, which are deep rose, or crimson, are borne on very long scapes. *A. plantaginea* is intermediate in size between the two first-named species. The choicer varieties are best increased by division; the pieces should be potted in sandy soil in the beginning of October and kept in a close frame to encourage roots. All of the species are best raised from seed. Sow late in Autumn, in a cool house, prick off the seedlings and remove to a cold frame early to thoroughly harden off. In this section we put out plants of this class in the open ground as soon as it is in a workable condition, so that they may be well established before the hot weather arrives.

**ASCLEPIAS TUBEROSA** (*Pleurisy Root*)—One of our most showy flowered native herbaceous plants. It is deep rooting, and is frequently seen growing luxuriantly in dry fields in positions fully exposed to the sun, with the surrounding herbage almost withered. It is late in blooming and valuable on this account. In removing plants from their native places they should be taken only after they have completed growth. As many of the roots as possible should be saved, as the species dislikes removal. Raising plants from seeds is the most certain method of propagation. As they grow but slowly in the seedling stage sow only a few seeds in a pot of rather firm soil, and allow the young plants to remain in these pots for at least a year before planting out. When cultivated in gardens the blooming period is longer than is the case with wild plants.

**ASPERULA ODORATA** (*Sweet Woodruff*)—A slender growing plant of the Bedstraw family (*Rubiaceæ*.) with pure white flowers in May. It will succeed in clumps if given a partially shaded situation, but as it blooms only for a short season, and the foliage is not very attractive, it is sometimes grown in a quite satisfactory way in company with other plants, such as *Vinca herbacea*, *V. minor*, and even with varieties of the English Ivy when used for covering ground among shrubs and under trees. The flowers of the Woodruff appearing among the foliage of these plants makes an exceedingly pretty picture. It is propagated by division and from seeds. The leaves, when dried, have a very agreeable aromatic odor.

**ASTER** (*Michaelmas Daisy*)—Nearly a hundred species and varieties of these popular border plants are offered by some of the European nurserymen. Many of the plants are indispensable for the ornamentation of the herbaceous border in late Summer and Autumn. They are all of free growth and will thrive in ordinary garden soil without much attention; but if the soil be worked deep, and well manured before planting, the plants will show the results of it in the size and number of flowers. These asters are best increased by division before starting into active growth. Of *A. novi-belgii* there are numerous forms, some of them only 18 inches high and from that ranging to a height of 6 feet.

The flowers are lavender or violet blue, rose and white; *A. novæ-angliæ* is one of the best-known species, tall growing, with purple flowers; its variety, *A. n.-a. rubra*, bearing rose-colored flowers, should always be included in a collection. Other good forms of this species are *A. n.-a. præcox*, crimson purple; *A. n.-a. Woolston*, light purplish blue, and *A. n.-a. pulchellus*, violet blue.

**ASTILBE JAPONICA**, usually known in gardens as *Spiræa japonica*. The *Spiræas* belong to the Rose family, while *Astilbe japonica* is classed with the *Saxifragas*, but *A. Lemoinei* is said to be a hybrid between *A. japonica* and a species of *Aruncus*, which is also a rosaceous genus. If this be the case then both plants must necessarily be closely related, and if not of the same genus then they are of the same family. *Astilbe japonica* is better known as a forcing plant than as a subject for the hardy border. It is best grown in partial shade, for when in sunny places, unless kept supplied with water during dry spells, the foliage is apt to suffer before the close of the Summer. There are several fine varieties. *A. j. compacta* has more compact panicles than the type. *A. j. grandiflora* is larger; *A. j. variegata* has a yellowish variegation; *A. rivularis* makes a splendid border plant in this section, growing to a height of 5 feet, and blooming late in the season. *A. Thunbergii* grows about 18 inches high, and is much used as a forcing plant. In the border it thrives best in heavy, retentive soil. All of the species are propagated by division, in the early Fall.

**AUBRIETIA DELTOIDEA**—A low-growing, evergreen Spring-flowering plant, forming dense cushions of growth and thickly studded with small, purple flowers early in the season. There are numerous forms; some of the best are *A. d. Hendersonii*, more robust than the type, with deep violet-blue flowers; *A. d. Eyrei*, a free-growing form, and *A. d. græca*, a large light-purple flowered variety. *Aubrietas* are well adapted for rockwork culture, as they like well-drained situations and rather light loamy soil. They will stand full sunshine. The readiest means of propagation is by seed which may be sown early enough to have the seedlings established before freezing weather; or, the old plants may be divided and potted in sandy soil, keeping them in a frame during Winter, and planting out as soon as the weather will permit.

**BAPTISIA PERFOLIATA** is a native of the Southern States, and is but seldom seen in cultivation. Owing to its beautifully arranged perfoliate leaves it forms a striking object in the herbaceous border. In Washington it is perfectly hardy, and ripens an abundance of seed yearly. They are sown soon as gathered; kept in a cold frame they germinate the following Spring. *B. australis* grows from 3 to 6 feet high; the flowers are blue. It seems to do best in deep sandy soil. Raised from seed. *B. alba* and *B. leucantha* are white-flowered species.

**BEGONIA EVANSIANA**—This, the hardiest of the Begonias, is also known as *B. discolor* and *B. grandis*. It is a native of China, Japan and Java. It is one of the species which form bulbils, or resting buds, in the axils of the leaves. These bulbils, when ripe, fall to the ground, and it is from them that the young plants grow late in the following

Spring. They come safely through a temperature of several degrees below zero, but just how much cold they will stand I am unable to state. The plants thrive best in the shade of dwellings, or anywhere except under the shade of trees, and in positions where direct sunlight reaches them during the middle of the day. The bulbils pass the Winter successfully fully exposed on the surface of the soil, but precautions must be taken to provide against rapid thawing and freezing. When the bulbils are left to themselves they usually sprout too thickly together. The weaker plants should therefore be thinned out, to give those which are left full opportunity to develop, otherwise their period of blooming will be short. To have plants early in bloom the bulbils may be harvested shortly after the plants are done blooming, kept during the Winter in a bottle and sown in time to have the plants in 3-inch pots by the middle of May. Notwithstanding the many fine varieties of Begonias for bedding, this is one of the best for borders which get the benefit of full light from the north.

**BOCCONIA CORDATA** (*Plume Poppy*)—Probably the most imposing in appearance of all hardy herbaceous plants, making growths of from 6 to 10 feet high. The plant has a grayish green appearance. The leaves are large and much cut up, or lobed. The flowers, borne in large terminal panicles, are not showy, but they harmonize grandly with the foliage. The plant is well fitted for isolated positions on lawns, among shrubs, or for large herbaceous borders. While thriving best in deeply worked, fairly rich soil it will succeed in stiff and poor ground. Seeds, of which a medium-sized plant will produce large numbers, are best for propagating in large quantities. They should be germinated in April and the seedlings potted off when small. The plant is also increased from suckers, which are produced in abundance. It is a native of China and Japan, and very hardy.

**CALLIRHOE**—A genus belonging to the same family as the Abutilon (*Malvaceæ*). *C. involucrata*, the most useful species, has long, trailing stems, with fair-sized purplish red flowers in the axils of the leaves. It spreads very rapidly during the Summer months. A good subject for borders of moderate width. It should be propagated from seed. Old plants need to be frequently renewed, as they seem to exhaust themselves, probably owing to their rampant growth. In *C. i. linearifolia* the leaves are smaller—a good form for the rockery.

**CAMPANULA** (*Bellflower*)—The perennial species are nearly all desirable border or rockwork plants, but a few of them become troublesome by increasing too fast. *C. rapunculoides*, when once it becomes established on rockwork, is sometimes very difficult to keep under control. None of the kinds usually grown is hard to manage thriving in ordinary garden soil. They are propagated most freely from seeds. The best time for the operation is in late Summer, wintering the seedlings in frames so that the plants may be in good condition for planting out early the following Spring. *C. persicifolia* and its forms are easily increased by division, which should be done after the flowering season. The species in cultivation range in height from 2 or 3 inches to several feet; but the rare dwarf kinds are seldom seen in America, nor do they

succeed so well here as they do in the cool, moist countries of Europe. Of the tall growing border kinds *C. alliariæfolia* reaches a height of from 2 to 3 feet; flowers white. *C. medium*, the Canterbury Bell, is a biennial which, raised from seed one year, will flower the next. *C. m. calycanthema* has the calyx colored like the corolla, forming the well-known cup and saucer arrangement. *C. pyramidalis*, although a perennial, is best treated as a biennial. In a young state it should be given the protection of a frame during Winter, and if the plants are raised from Spring sown seed they ought to be large enough to Winter in 5-inch pots. A few should be kept for flowering in pots, as they make exceedingly handsome subjects for the decoration of the conservatory in Summer. *C. persicifolia* is the most useful florists' flower in the genus. *C. p. alba grandiflora* has very large pure white flowers. *C. p. alba coronata* produces white cup and saucer-shaped flowers. *C. p. alba-plena* is double white, and while it lasts it is one of the best Summer white-flowering plants. There are also single and double blue-flowered forms. All of them grow about 2½ feet high. Plants which remain in the ground over Winter will be benefited by a mulching around the crowns—of leaf soil mixed with short manure. Of *C. Trachelium* there are double blue and white-flowered varieties; height about 2½ feet. *C. grandis* and *C. g. alba* are both good; height 3 feet. *C. Van Houttei*, a hybrid form with dark blue flowers, grows about 2 feet high. Among the many dwarf species *C. isophylla* and *C. i. alba*, blue and white, are trailers, and where they succeed they may be used in baskets and vases, but they do not thrive in very dry soil. *C. carpatica* is probably the most popular of the dwarfs; it is a plant which throws up a great number of stems, forming a dense mound of compact growth usually about a foot high, and when in full flower it is one of the most attractive of hardy perennials. There are several forms having blue, pale blue, lilac and white flowers. *C. c. turbinata* is dwarfer than the type; very suitable for the front part of an herbaceous border, or for the rockery. *C. rotundifolia* is rather an attractive species, but as a garden form *C. r. Hostii* is an improvement.

**CATANANCHE CŒRULEA**—A plant with grayish green, long, narrow leaves, and blue or blue and white flowers borne on long slender stalks. It is of the easiest cultivation, and a desirable herbaceous plant. Sow seeds late in the Fall and keep indoors; they will germinate very early. Prick off into boxes and remove to a cold frame when large enough.

**CENTAUREA**—Of this genus *C. cyanus* is the Cornflower and *C. moschata* the Sweet Sultan. Both are annual in duration. Seeds will germinate in the open ground. *C. americana* is another good annual species which is sometimes grown for Summer cut flowers; the color is pale rose. *C. babylonica* is a good species to plant in the back part of an herbaceous border; the foliage is silvery white; flowers thistle-like, bright yellow. The plant reaches a height of from 6 to 12 feet. Increased by division during the latter part of March. *C. montana* is the perennial Cornflower, blooming during the greater part of Summer. There are forms with lilac, rose, red, white and sulphur colored flowers.

**CERASTIUM BIEBERSTEINII**—A dwarf plant with a dense mass of growths; flowers pure white: in bloom during May. The leaves are very woolly, giving the plant a whitish appearance all the year round. It stands our hot Summers better even than the well-known *C. tomentosum* (Snow in Summer.) This is a species with smaller and lighter colored foliage. Both are used for edging in beds or borders. The plants may be divided very early in the season with or without roots and replanted with long stems, deep in the soil, well firmed, and kept moist until they begin to grow. *C. Biebersteinii* is easily raised from seeds. *C. grandiflora* is a green-leaved species well adapted for growing in dense carpet-like masses over rocks.

**CHEIRANTHUS CHEIRI** (Wallflower)—A plant much grown in Europe, where the climate is very favorable to its perfect development. In the warmer parts of America its period of blooming is but a short one. The seeds are sown in April, and as soon as large enough the seedlings are planted out where they are to flower the following Spring. There are many fine double forms, some of which have varietal names. Double flowering kinds can be raised from seed. The colors of the flowers are yellow, and reddish brown.

**CHELIDONIUM MAJUS FLORE-PLENO** (Double Celandine)—A reliable plant for half-shaded positions in woods. It is especially at home among damp rocks, growing in vegetable humus. In such positions it will reproduce itself from seeds. The double form is smaller growing than the single-flowered plant. The foliage of both has a bright green appearance for the greater part of the Summer.

## CHRYSANTHEMUMS.

For nearly ten months out of the twelve Chrysanthemums are so little seen that when the flowers are in season they are eagerly welcomed by the flower-buying public as a change from the blossoms of Spring and Summer. There may be a change from the stiff and artificial looking flower, which is grown on single stems, to the more natural looking spray with smaller flowers; but it is safe to say that the Queen of Autumn will remain popular in some shape or other for a long time to come. Within the last ten years the cultivation of this flower has made rapid strides. The size of the blooms is due to this improved cultivation quite as much as to an improvement in the varieties by selection of sports and cross breeding during that time. Many good kinds have been raised, but these kinds, when grown according to old methods, do not show the wonderful improvement that is claimed for them. Indoor bench culture and growing one flower to a plant is the means by which the flowers are developed to their utmost size.

**Stock Plants**—Selected roots for this purpose should be heeled in on the bench of a house where they can be kept cool; a temperature high enough to keep out frost is best. If such accommodation can not be spared the next best place is a frame around which stable bedding is

banked up level with the sash. Give abundance of ventilation in favorable weather and cover the sash when there is danger to the plants from frost.

**Propagating for General Crop**—The ideal months for this operation are April and May, as then the cuttings are in good condition and the temperature is not too high to make the operation a difficult one. For cutting material the moderately thick shoots should be chosen, avoiding those which are very succulent, or those which are weak and show long spaces between the leaf joints. The short, stocky, soft growths are best, and should be preferred to all others. The early-flowered kinds should be given attention first. Put the cuttings in the sand bed, and during the rooting process a high temperature with a stagnant atmosphere should be avoided. When the roots are from one-half to three-quarters of an inch long the cuttings should be potted, as their roots weaken by a longer stay in the sand. Put in thumb pots, using soil a little lighter than the regular potting compost and obtained by adding a small quantity of leaf soil. In this stage keep them in the same temperature as that in which they were rooted until their roots show through the ball of soil. They should then be removed to a cold frame, standing them on a bottom of sifted ashes. As soon as the plants show signs of needing a shift they should be put in 3-inch pots, and as a precaution against hardening of the stems they should be plunged in the ashes, and during excessively warm weather some leaf soil should be thrown over the tops of the pots to help in keeping the roots cool. Planting may be proceeded with by the beginning of June for the early flowering varieties, taking care that the plants are well watered before being knocked out of their pots.

**Late Flowering Plants**—To extend the season of some of the latest flowering varieties till Christmas the cuttings should be taken late, and as soon as rooted keep them in a growing condition to prevent the wood getting hard. Growing points of previously potted cuttings make good wood, if they can be kept from wilting during the rooting process; but this operation is somewhat difficult after the middle of July. Too much shade will cause damping and too little favors wilting, so close observation will be necessary to hit the exact conditions. The single-leaf cuttings are easiest to root at this season. If the sand be rough grained and free from foreign material, have the leaf with the under surface lying flat on the sand. Keep the plants shaded for some time after they are planted out. Very short stems are only avoided by supplying conditions favorable to growth.

**Selecting the Bud**—There are two kinds of buds, known as "crown" and "terminal." The crown bud appears directly on the end of the shoot, and is naturally the first seen. In some varieties, particularly the early ones, this is the proper bud to select to develop into a flower, but in some well-known kinds growers do not agree as to which is the proper bud to select. There is no doubt, however, that with some soils, also under certain cultural methods, the proper bud to "take" under those conditions would be the wrong one under others. The terminal bud shoots are usually three in number and develop from the axils of the

leaves below the crown bud. One of these bud shoots is allowed to remain when a terminal bud is selected, and the other two pinched off together with the crown bud. The terminal bud is the one selected in the large majority of varieties; it consists of the end bud, or that which terminates the selected lateral shoot. Other buds will, in course of time, appear in the axils of the leaves of this shoot; these must also be removed.

**Specimen Plants**—These are not grown so much as they were a few years ago, owing to the demand for pot plants beyond a certain size being very limited. Plants which can be sold at a moderate figure give the best results, and for this purpose they can be grown with very little attention, compared with pot-grown specimens, if they be planted out in the field, and attention given them occasionally during dry weather with water and the cultivator. Pinch to produce bushy plants. The number of times that pinching should be done must be governed by the kind of plant wanted; if only a few stems one pinching may be sufficient. In September the plants should be transferred to suitable sized pots. If protected from the sun and given a moist atmosphere for a few days after the transfer they will show no bad results. Plants for pots are also grown on benches which have been occupied during the Winter by Carnations. They are lifted and potted in time so as not to interfere with the housing of field-grown plants of Carnations. In either case May is early enough to start the plants. Specimen plants of the largest size are started from cuttings as early as December, and from that time on till the end of January. The cuttings should be fairly strong, and either put separately in thumb pots or rooted in the sand bed. The plants must never be allowed to go to rest, and should be kept in healthy vigor from the start. During the Winter a position near the glass, in a house running north and south, suits them well. The best plants are grown in the house from start to finish; but in this case they take a large amount of space.

**Soil**—The Chrysanthemum is not fastidious as to soil, but being a gross feeder at least one-fourth of the bulk of the soil should be of well-rotted cow manure, the remainder, loam. Four or five inches in depth for benches is sufficient, and before the plants are put in position it is made firm by tramping, or, in the case of side benches, by pounding with a brick. If the soil is dry, give a good watering a day or two before planting. Syringing should be practiced several times daily while the plants are growing; this, together with full ventilation, will provide perfect atmospheric conditions. Watering should not be overdone at any time; the condition of the surface soil will readily suggest when the operation is necessary.

**Ventilation**—This is a very essential item in the cultivation of the Chrysanthemum indoors. To one unacquainted with the exact atmospheric conditions under which the best flowers are grown in a greenhouse, it would seem somewhat strange that a hardy herbaceous plant should be cooped up in a hothouse all Summer; but this is far from being the case, because with abundant ventilation top and bottom, and frequent syringing, the house is kept in a more favorable state for their

growth than one would imagine; and in the absence of sun the conditions are much more favorable than outdoors. If there are no means of side ventilation provided, panes of glass should be removed to let in all the air possible. The doors should also be kept open.

**Insects**—The number of kinds which are troublesome are small, but their representatives are numerous enough. There are several species of *Aphis*, which attack the young shoots; these pests must be combated with tobacco in any of its forms. Grasshoppers are also troublesome, and they must be attended to individually. Caterpillars are best prevented from appearing by catching the perfect insects in the shape of moths and butterflies as they appear in the house. When the eggs hatch hand picking is the only efficacious means of ridding the plants of the caterpillars.

**Types or Races**—The varieties common in gardens are divided into numerous types. The principal ones are as follows: Anemone Type; this has the flowers single (all *Chrysanthemums* have single flowers, but the so-called single flowers have the outer florets as they grow in a natural state; that is, having long strap-shaped or tubular florets, usually called ray florets; the inner ones are shorter, more or less bell-shaped, yellow in color, and are known as disc florets), with the disc florets raised in the center. They are regarded more as ornamental garden plants. The Pompon Type is not grown to the same extent in America as in Europe, where they are principally used out-of-doors for early flowering. The Chinese Incurved Type is much grown as a flowering plant indoors. The florets curl gradually toward the center of the flower, forming a globular head. The Japanese Incurved Type is less incurved than the preceding, but few authorities agree as to where the line should be drawn. The Reflexed Type, as commonly understood, has the florets pointing away from the center of the flower head, or, as the word would indicate, curled in the opposite direction to those of the incurved varieties. The Japanese Types include the tubular and quilled varieties, but the boundaries of this type are also continually shifting.

**Varieties**—It would be useless to recommend a list for any particular locality. Soils differ to such an extent that those which thrive in one place may not turn out the same in another. Again, much depends on the customers as to predilection in color, etc. Careful observation will quickly suggest the best kinds to grow. Cultivators are usually loath to discard a good sort, even though it is an old one. Many of the kinds grown in England to-day originated 20 years ago; and in this country many growers could not fill the places occupied by some of the kinds they grew, which were raised early in the nineties.

**Raising New Varieties**—There is nothing to hinder anyone from raising new varieties. The operation is of the simplest, and may be accomplished as successfully by the beginner as by those who have been engaged at it for years. Seedling raising is simply chance work. To go about the work take two good flowers of the same color, which for some reason are desirable to blend, shorten the ray florets so as to have the stigmas readily accessible. Transfer the pollen from the anthers of

one flower to the stigma of the other. Carefully keep them in a dry atmosphere until the seeds are ripe. Keep the seeds in paper, properly labeled as to parentage, then about the middle of March they can be sown. The resulting seedlings will be almost certain to give some flowers passably good, probably some as good as the parents, and possibly some even better. A great deal depends upon selecting the parents; but rules for this cannot be laid down, as the selection of apparently unpromising parents will sometimes give good results, showing that the crossing of plants is little more than guess work.

**Other Species of Chrysanthemum** well worth growing are *C. uliginosum*, a tall growing plant, with large white flowers; very useful for cutting. It blooms late and must have a deeply worked, rich, moist soil to bring the flowers to perfection. If planted in dry soil it remains dwarf and unattractive. *C. coccineum* is better known as Pyrethrum roseum; an early Summer blooming species, well worthy of extended culture. Hundreds of varieties of it are in cultivation. It is not a difficult plant to manage, thriving in well-drained borders; or on rockwork the plants are thoroughly at home. They are well suited for providing flowers for cutting. There are double forms in white, pink, carmine, rose, lilac and yellow. They are increased in Spring by dividing the plants into small pieces, and rooting in the sand bed of a cool house before potting. *C. leucanthemum* is the Ox-eye Daisy of the meadows. *C. parthenifolium aureum* is the Golden Feather, used in filling beds or for borders in Summer. It is a hardy plant, putting on its gayest colors early in the season; but it is more satisfactory when raised annually from seeds.

**CLEMATIS**—During July and August one of the most useful plants for producing white flowers is the herbaceous Clematis known as *C. recta*. It grows from 2 to 3 feet high and if in deep rich soil the quantity of flowers to a plant is very large. In *C. tubulosa* and *C. Davidiana* we have two blue-flowered species from China. The last named is fragrant. They are reliable plants for the herbaceous border, growing about 2 feet high. They are all increased from seeds sown as soon as gathered; also from division of the crowns, and by cuttings taken from the plants before coming into flower.

**COREOPSIS**—*C. lanceolata* and *C. grandiflora* are yellow-flowered composites, much used for Summer cut flowers. Old plants may be divided, but they are best raised from seeds, and the young plants put out early where they are to bloom. *C. verticillata* is of little service for cutting, but owing to the finely divided foliage it is a desirable border plant. Easily increased by division.

**DELPHINIUM (Larkspur)**—The species are numerous, most of them being choice border perennials requiring deep, rich soil. They are propagated principally by cuttings of the young growths in early Spring from seeds sown about the beginning of March, and by division of the roots when dormant in Autumn or late Winter. *D. grandiflorum* and *D. formosum* have numerous fine varieties, which are much grown for cut flowers.

**DIANTHUS—Carnation Pink.**

There are nearly a hundred distinct species, many of which are in cultivation. Most of them are desirable as border or rockery plants. They usually make dense tufts of grassy-like growths. Nearly all have attractive flowers. *D. alpinus* and *D. glacialis* are true Alpine plants, seldom seen in cultivation, and thriving indifferently. *D. barbatus* is the Sweet William. There are innumerable forms in cultivation. Good strains are secured from seed. *D. cæsius* (Cheddar Pink) stands our hot Summers well—a useful species for the rockery. *D. deltoides* and *D. d. alba* (Maiden Pink), should be raised indoors during the Autumn months and planted out early. A very free blooming species, *D. petræus* (Rock Pink), grows about 6 inches high. *D. plumarius* is the parent of the garden Pinks, of which there are many named double sorts in cultivation. They are propagated by cuttings taken in the Fall; they root very readily in cold frames. Care must be taken to plant them out before they start into growth in the Spring. *C. chinensis*, the Chinese Pink, is a biennial, and to have it at its best it should be treated as such instead of as an annual. When sown in Spring the plants will flower during Summer, but not nearly as abundantly as from Autumn-raised plants. The varieties from this species are numerous; all of the kinds are desirable, making very handsome border plants of moderate size.

**DIANTHUS CARYOPHYLLUS.**

This is the species from which the Carnation of to-day has sprung. Variation in the flowers, the result of continuous cultivation under artificial and highly favorable circumstances, produced in the first place, well marked varieties; these variations were perpetuated by cuttings, and from them by means of cross-breeding and from sports distinct races have been evolved, gradually showing a wider range of color and habit. In America the climatic conditions are peculiarly favorable for the development of the flower under glass, and little by little a race has been obtained perfectly adapted to Winter production of bloom. Not many years have elapsed since the best cultivators of plants would have predicted a short life for the Carnation raised under glass, and this would probably be the case were its entire life, or rather the lives of several generations, spent in this way. But the utmost vigor is imparted to the plants shortly after the cutting stage is passed by their cultivation out-of-doors for the best part of the Summer. Another very favorable means, which is without doubt highly instrumental in maintaining and strengthening the vigor of the race, is the raising of new varieties from seed. The development of the wonderful blooms of to-day, as represented in such varieties as Ethel Crocker, Mrs. Lawson, Genevieve Lord, Mrs. George M. Bradt, Jubilee, White Cloud and others too numerous to mention, dates back only a very few years, when the blooms were of very ordinary dimensions, stems weak and calyx often imperfect. Cultivation and environment have undoubtedly to be credited with part of the success attained, but judicious selection and rejection are the primary agents which have been instrumental in producing those results.

**Propagating House and Benches**—The ideal propagating house is the north part of a span-roofed house, with a partition of boards, leaving a space of about  $4\frac{1}{2}$  feet available for bench and passage way. The latter need only be wide enough for one to move about in comfortably. The floor should be made of concrete, so that it can be kept scrupulously clean at all times. The length of the house should, of course, vary with the needs of the establishment. The bench should run close up to the side of the house and the front part, or that nearest the passageway, nailed up with boards, with a swinging door on leather hinges every few feet to increase or diminish the temperature of the sand by allowing heat to escape. It is a good plan to have one of the ends hotter than the other, not necessarily for Carnations, but for cuttings of other plants. Valves should be so arranged in the heating pipes of this part of the establishment that the heat may be under perfect control to suit the various uses to which it may be put. When a specially constructed propagating house is not available, a part of an ordinary growing house, preferably the north side, should be selected for the purpose. The conditions favorable to the process of rooting are: Sufficient humidity to prevent the cuttings from wilting, and protection against the sun's rays, which cause an evaporation of moisture from the leaves of the cuttings greater than can be spared, owing to the inability of the cutting to replace the loss quickly from the moisture in the sand.

**Sand**—When there is a choice, a rather large grained sand and one free from all impurities should be selected; from 3 to 4 inches deep will be sufficient.

**Cuttings**—These may be put in any time during the Winter months, but February is the safest time for the ordinary crop. Those rooted previous to that month are apt to put on a spindly growth, owing to root accommodation being necessarily of an unfavorable nature. Restricted root room has a tendency to promote hardening of the stem and firmness in the foliage, and while the Carnation is in reality an ever-green shrub, it is a soft wooded one, and should be kept in a growing state from the cutting to the flowering plant. The cuttings are usually pulled from the plant; this is the worst possible method, because the exceedingly delicate vessels in the immediate neighborhood of the break are strained and displaced, according to the tension exerted in severing. They strike all right, evidently so, but they should be severed with a knife.

**Material for Cuttings**—In this as in other matters, judicious selection of the material to form future plants will go a long way in determining whether these plants will attain the maximum state in healthy vigor, combined with flower productiveness. It does not take a very experienced Carnationist to tell at a glance whether the growths are flabby, as a result of being forced in too high and humid an atmosphere, or crisp and stocky, owing to having been subjected to favorable conditions. Grassy growths at the base of the plant are avoided, as they show a tendency to perpetuate this condition to a degree unfavorable to floriferousness. As the extra floriferous nature of a single branch of a tree or shrub can be perpetuated by propagating from that branch, in like man-

ner the best material for cuttings is formed on the flowering branches of the Carnation. They are found in the axils of the older leaves, and should be taken when they are from two 2 to 3 inches long.

**Treatment During Rooting**—The leaves of the cuttings are sometimes shortened back at the tips, but this is immaterial, and the practice has arisen probably through a desire to have the batch look uniform in size and to economize space. Each cutting should be dibbled in by itself, to insure perfect rooting conditions; but by making a cut in the sand with a small, flat trowel, guided by a narrow strip of wood placed and held firmly against the last row of cuttings (this precaution will prevent the loosening of the sand next the cuttings by the action of the trowel), the operation is hastened. The temperature should be from 50 to 55 degrees at first, increasing to 60 degrees later on. After rooting has commenced examine the cuttings so that potting or boxing may be completed before the roots get weak in the sand. It may safely be commenced, when the roots are three-quarters of an inch long, and finished before they are over 1½ inches. After the cuttings are potted, or boxed, keep them shaded for a time, gradually giving them the benefit of full sunshine and an abundance of air. Before planting out time they should be removed to a cool frame. The soil may be made up of loam, leaf mould and sand.

**Planting in the Field**—In this locality the plants are safe out in the field by the end of March, but climatic conditions are the only safe guide for different localities. The ground is previously prepared by manuring, and plowing and harrowing, and the plants set out 15 inches apart each way, or 15 inches apart and 3 feet between the rows, according to the method of cultivating. Let the plants be in the ground some time before getting their first pinching. Cultivating must be assiduously practiced during their stay in the field. It serves three purposes: Keeps the roots cool, prevents loss of water by evaporation, and discourages the growth of weeds. Flower shoots are nipped out as soon as they appear until the plants have made sufficient growth, or a short time before they are removed to their flowering quarters.

**Lifting and Planting**—This is done at different seasons, sometimes early, but usually in September. In some soils it is difficult to lift with a ball; in others, easy. Some growers shake the soil from the roots, no matter in what soil plants have been grown. As the Carnation is rapid in forming feeding roots it is easy to understand why it is desirable to have the roots entirely in the most favorable soil, such as that with which the benches should be filled; but the safer and more logical method is to have a moderate amount of soil accompanying the roots from the field to the bench. When the plants are lifted without soil clinging to the roots they should be protected from the drying influence of the atmosphere as much as possible. As soon as lifted place them in a receptacle, from which they do not have to be removed until they are planted in the bench soil. Put the roots about the same depth in the bench as they were in the soil from which they were taken; make moderately firm; water well and shade for the first few days. Use a shade which is easily removed. A solution of freshly mixed Indurine may be

applied with a garden syringe; test it before applying to ascertain if it comes off easily, as it sometimes sticks on longer than wanted.

**Soil**—This should be of a friable loam, mixed thoroughly some time in advance of using with one-fifth of its bulk of rotted stable manure. The depth of soil may be from 4 to 5 inches. The plants are given space according to the variety. In this connection it may be stated that a good place to look for the kind of flower common 25 years ago is on a bench the soil of which is completely hidden by the plants. As much light as possible should be admitted to all parts of the plant, and it is as important that air should have free circulation among the plants.

**Supports**—The different methods are getting to be about as numerous as the varieties of Carnations. A good circular wire support should be easy to apply, easily removed and stored, give the minimum amount of shade to the plants and be moderate in cost. Several of the designs on the market are satisfactory in all of the above particulars, excepting the cost, which, while as low as one could expect, is the only hindrance to their use.

**Temperature**—A minimum temperature of 50 degrees, rising during the day to 65 degrees, will be found the proper range for the best results. The humidity of the atmosphere must be greatest immediately after the plants are benched to induce the formation of new feeding roots, gradually reducing it when the plants show signs of having become established.

**Syringing**—In dull weather there is usually enough moisture in the atmosphere for the needs of the plants, so far as atmospheric conditions are concerned. In bright, sunny weather, syringing should, of course, be more frequently practiced. No rules can be laid down for this, however, as much depends upon the nature of the floor of the house in the quantity of moisture it gives off, together with the condition of the bench soil. If the atmosphere be too dry, combined with dryness at the roots, the foliage suffers to a certain extent, producing conditions favorable for the attacks of red spider, aphides and fungoid diseases. To strike the happy medium good judgment as the result of close observation will be necessary.

**Feeding**—The plants by their behavior will suggest the necessity for this. When manure is given in the liquid state it should be weak and applied often rather than in strong doses at long intervals. Top-dressing with manures and fertilizers should be made the subject of careful experiment. It is not safe to follow given rules, as what may suit some soils will not act the same way with others.

**Disbudding**—The lateral buds should be removed as soon as they are large enough to be handled. If allowed to develop, they are simply a drain on the resources of the terminal bud; and, although they look well with the flower, still large flowers without them bring higher prices.

**Ventilation** is of primary importance at all times. The houses ought to be closed only when the outside temperature is too low to permit of airing.

**Varieties**—The best varieties to grow in any one place cannot be pointed out except by experiment, as there is no variety which does equally well in all soils. When once the best sorts for any particular soil are selected they should not be discarded until new and improved or other kinds have been tested for at least a season.

**Carnations to Follow Chrysanthemums**—Where Chrysanthemums are grown in large numbers on benches it is sometimes difficult to decide what should occupy the space vacated by them. Carnations have been tried with successful results. Boxes with easily removed sides and ends are placed close together in the field, filled with suitable soil, and the plants, six or eight, according to the width of the bench, put out in each box. On the approach of unfavorable weather the plants are given the protection of a frame until the indoor space is ready for them. The bottoms of the boxes are of stout material, and when placed side by side on the frame work of the bench they may either be laid on the old bench boards or take their place. Soil is added after they are in position, to make the surface level. If necessary, rested roses may be substituted for Carnations. Souvenir du President Carnot and Kaiserin Augusta Victoria give good satisfaction by this method.

**MARGUERITE CARNATIONS**—These were introduced about eight years ago as Summer flowering Carnations. They are very free in blooming, fragrant, and quite varied in color. To have an early crop of flowers seedlings may be wintered in frames, and another sowing made early in March. In most places they may be safely put out in April.

**DICENTRA SPECTABILIS (Bleeding Heart)**.—One of the most beautiful herbaceous plants in cultivation, flowering usually in May, splendidly adapted for forcing. It is one of the first plants to push its growths above the soil. In some localities it is apt to suffer from late frosts. The time for propagating is just before the plant starts into growth. Division of the crowns is the most reliable method. Dig up the plants, saving every root; wash free of soil and preserve every piece of the plant having a bud. Those pieces of the roots which are not necessary to the buds should be cut into lengths of about 3 inches and put in boxes, keeping them uniformly moist. While they will not all grow, a certain proportion of them will pay for the labor. The divided pieces may be potted or boxed, according to fancy, using sandy soil to induce a good growth. Pieces of the crown on which there is a number of buds, but not enough roots to warrant further division, may be gently forced into growth, and when the young shoots are of sufficient length, taken off and rooted.

**D. eximia** is not so tall growing as the above named; the leaves are more finely divided and the flowering period is much longer.

**DICTAMNUS FRAXINELLA (Burning Bush)**—A good, old-fashioned border plant, growing 2 feet in height, with spikes of red or white flowers. The plants should be given a good permanent position, as they dislike removal. Increased by seed.

**DIGITALIS PURPUREA (Foxglove, Witches' Thimbles)**—One of the most stately of hardy perennials. The flowers, which are large and bell-

shaped, are arranged in very long racemes. The color is usually rose and white. Although perennial, it is generally treated as a biennial. Plants are easily raised from seeds.

**DODECATHEON** (*American Cowslip*)—*D. media*, the only species which I have seen in a wild state, grows in shaded positions, but it makes most of its growth while the surrounding trees are leafless. The soil is composed largely of vegetable humus. Most of the species thrive well, but are not much grown in gardens; this is probably because their period of bloom is short and the plants are apt to be lost sight of and neglected when out of bloom. *D. Clevelandii* and *D. Hendersonii* are Californian species of great beauty. Many varieties of hybrid origin are cultivated in Europe, but they are seldom seen in America. The seeds should be sown in places where they can remain undisturbed for at least a year, as after germinating little progress is made the first season beyond the formation of a root stock.

**DORONICUM** (*Leopard's Bane*)—Useful plants, with yellow, daisy-like flowers, blooming in May. *D. plantagineum excelsum* is one of the best. Other good kinds are *D. austriacum*, *D. caucasicum* and *D. pardalianches*. They should be increased by division in the Fall.

**ERPETION** (*Viola*) **RENIFORME**—A very dwarf plant, covering the ground rapidly by means of runners, which are thrown out in great profusion. It blooms all Summer if given a shaded position on the rockery. The flowers are small, blue and white; very showy. It will thrive in any kind of soil if kept slightly moist during dry weather. In the latitude of Washington, D. C., it is perfectly hardy. It is increased by seeds or by division.

**FARFUGIUM GRANDE**—This fine Japanese plant is now known as *Senecio Kämpferi aureo-maculata*. It is among the best constitutioned plants for the dwelling house. There is a beautiful kind with white spotted leaves, which I have only grown for a couple of seasons, but I suppose it to be as hardy as the yellow spotted one, which, by the way, has stood outdoors at Washington, D. C., for the last 15 years. Old plants, with numerous growths, will stand division best in early Spring. Give the pieces a week in the sand bed previous to potting, in order to start new roots. They thrive well in a loamy soil, well drained. The pieces are potted after midsummer in a compost consisting largely of leaf mould and sand, placed under cover of sash on the approach of cold weather, to preserve the leaves in a fresh state, and brought indoors when wanted to bloom.

**FATSIA** (*Aralia*) **PAPYRIFERA** (*Rice Paper Plant*)—In this latitude the plants are annually killed to the ground, but they send up shoots in Spring from the roots, which grow very rapidly, making very attractive growths, sometimes 6 feet high, so that it may be treated as an herbaceous plant instead of a shrub, which it really is in its native country and in localities with mild Winters. Its habit of growth resembles to a certain extent that of the Castor Bean, but the plant is furnished with leaves and retains them from the ground up all through the season. Propagation is by pieces of the roots cut into lengths of 2 or 3 inches.

The operation may be performed any time late in Fall, or very early in Spring. The roots should be put in boxes of soil and started into growth in a greenhouse about the beginning of March. When potted they may be put in a cold frame early.

**FERULA COMMUNIS**—This plant is grown principally for its very large, handsome leaves, which are very much divided, giving it a feathery appearance. The leaves, which are sometimes 5 feet in width and fully as long, are divided seven times, the leaflets being only one sixteenth of an inch broad. The flower stalks attain a height of from 6 to 10 feet. It is one of the earliest plants to show above ground, sometimes pushing up the first leaves late in the Fall. After blooming, which occurs about midsummer, it goes to rest, losing all of its leaves before the end of July. The seeds, which are ripened in great abundance, should be sown about the middle of March and encouraged to make all the growth possible before the resting period.

**FRAGARIA INDICA** (Rock Strawberry)—The flowers of this species are bright yellow. The fruit is dark red and produced all through the Summer and early Fall months. It sometimes increases so rapidly that it becomes a weed.

**FUNKIA** (Plantain Lily)—A small genus of very handsome foliage and flowering plants of the Lily family; most of them are from Japan. There are numerous garden forms all well worth growing, as they make large clumps, and the foliage is, in every case, ornamental. All the variegated forms are well marked, preserving their leaves well all through the season, and thrive with little attention.

**F. ovata** has blue or white flowers and large, broad leaves. The variety **F. o. marginata** has the foliage margined with white. **F. lanicifolia**, one of the species most frequently met with, has short, narrow leaves; flowers small, white, with a purplish tinge. This has several prettily variegated forms. All of the kinds are propagated by division of the crowns early in the season. If divided to single growths the pieces should be potted and kept under cover for a time to encourage growth. They thrive best in heavy, rich, loamy soil.

**F. Sieboldiana** is a strong-growing species, with large glaucous leaves. The flowers are white, tinged with lilac—a very desirable species thriving well in sun or shade.

**F. subcordata** has very large, pure white flowers on long stalks. The leaves are light green, but somewhat soft. In places exposed to full sunshine the foliage is apt to suffer; it should therefore have partial shade. Blooming late in the season, it is one of the handsomest herbaceous plants in cultivation.

**GAILLARDIA ARISTATA**—There are several handsome flowered varieties in cultivation. They are exceedingly effective border plants. Raised from seed in August or September.

**GALAX APHYLLA**—A dwarf evergreen, the leaves of which are much used by florists in forming backgrounds for floral pieces. It thrives well

in partial shade in the rockery. Increased by division before growth begins.

**GENTIANA** (*Gentian*)—Although these are among the most beautiful of hardy plants they will not pay the florist to handle them. With one or two exceptions the kinds which are so popular in northern Europe do not succeed in the Middle Atlantic States. Our hot, dry Summers are against them. *G. Andrewsii* and *G. saponaria* are both natives. They may be planted in half-shaded situations, where their roots will penetrate deeply.

**GERANIUM SANGUINEUM**—This species is about the only satisfactory one in the genus for our hot, dry Summers. For rock work it is probably the best all-round plant grown. It seldom invades the territory of other plants, never looks weedy, and is in flower from early till late. The flowers are solitary, about  $1\frac{1}{2}$  inches across, crimson. Propagated by division, or from seed. The plant is quite hardy.

**GYPSOPHILA**—*G. paniculata* is grown to a considerable extent for cutting. The flowers are small, whitish, but produced in great profusion, in large panicles. Increased by seeds. The seedlings must get all the light possible, as they are very liable to get weak if kept at all shaded. *G. prostrata* is a very dwarf species suitable for rock work. Increased from cuttings in Spring or Fall.

**HELIANTHUS** (*Sunflower*)—The perennial species are, for the most part, useful late blooming plants. In favorable positions some of the species grow very tall. They are among the easiest plants to increase by division. *H. decapitatus*, single flowered, usually grows about 6 feet high. *H. a. multiflorus* varies considerably; in some forms the florets are arranged like those in the anemone-flowered chrysanthemum; other forms have them of a uniform size. A most useful plant for supplying cut bloom. *H. orgyalis* blooms in September. *H. rigidus* and *H. mollis* are both good species.

**HELLEBORUS** (*Christmas Rose*)—There are about a dozen species, with numerous varieties principally of hybrid origin. All of them are well worth growing because of their early-blooming nature. *H. niger* is the true Christmas Rose, which, under favorable conditions, will sometimes flower in December, and in colder parts of the country it comes into bloom after one or two genial days. *H. n. altifolius* has flowers much larger than the type. *H. colchicus*, a species with deep purple flowers, blooms early in March. *H. orientalis* (the Lenten Rose) has rose-colored flowers—one of the best in this latitude. Among its many varieties *H. o. guttatus* is white flowered with purple-spotted sepals. Propagation is effected by root division. Seeds of most of them are freely ripened. If sown as soon as gathered, and kept in a cold frame, they germinate well; but the seedlings take two or three years to make flowering plants.

**HEMEROCALLIS** (*Day Lily*)—*H. fulva*, the species so common in waste places all over the Eastern States, is not a native; but with *H. flava*, less commonly seen, it has escaped from cultivation. *H. graminea*

is the earliest to bloom, opening during the latter half of May. *H. Dumortieri* has orange-yellow flowers tinged with brown. *H. Middendorfii* is deep golden yellow. The rarer species are successfully raised from seed sown in Summer as soon as ripe, and the young plants allowed to remain in the seed boxes until the following Spring, when they may be planted out in rows to increase in size. The double flowered and variegated forms of *H. fulva* should be increased by division. They are all desirable border plants.

**HEUCHERA** (*Alum Root*)—Of this genus there are some twenty species native of North America, most of which are hardly worth cultivating. There is one, however, which is rightly considered as being among the most ornamental of late Spring blooming perennials; this is *H. sanguinea*. It has long panicles of reddish pink or white flowers. Large plants which show signs of weakness should be lifted, divided, and replanted. They will need this treatment about once in two years, as they are inclined to get weak when they remain long in one place. October is the best month for dividing. Seeds should be sown during March, in the greenhouse. The seedlings are quite small at first, and they should be allowed to make considerable headway before being potted off.

**HEPATICA TRILoba**—One of the earliest Spring-flowering plants. In their native habitats they are usually found growing on southern slopes partially shaded by the foliage of trees and shrubs in Summer, but with the benefit of full sunshine when developing flowers and seeds. Of the above species the varieties are very numerous, some of them having been long under cultivation in European gardens, where they are highly prized. *H. t. rubra* is bright red; *H. t. alba*, white; *H. t. cœrulea*, lilac. There are also double red and double blue varieties, the former being very common, the latter somewhat scarce. *H. angulosa* is a distinct species, with very large, blue flowers. If allowed to remain in the same position for several years they form very large clumps. Propagation of the varieties is easiest accomplished by division in Autumn.

**IBERIS** (*Candytuft*)—The perennial species are in reality dwarf, evergreen shrubs. They are attractive in appearance all the year round. They come in bloom the latter part of April and last till the end of May. There are about half a dozen species and varieties. *I. sempervirens* and *I. s. superba* are the best; they grow from 9 to 12 inches high. *I. semperflorens* is a taller growing species with large, pure white flowers. *I. Tenoreana* grows about 6 inches high. It blooms in May; flowers purplish white. *I. correæfolia* has the flowers in flat, compact heads. *I. gibraltarica* is the largest of all; the flowers are white tinged with pink. It is somewhat straggling in growth. *I. g. hybrida* is more compact, with the flowers at first white, changing to rosy purple. Although most of the species produce seed freely enough the seedlings are of a straggling growth for the first season. Much better plants are raised from good-sized cuttings taken at the end of September, and put in sand, in a cold propagating frame. If kept close and moist they will root well. The cuttings, when rooted, should be put in 3-inch pots, and plunged in a cold frame for the Winter.

**IRIS**—A large genus. There are upward of 100 species; the varieties of some of them are numerous. The genus is divided into two sections. In one section, known as Xiphions, the species have tuberous rootstocks; one or two of them, such as *I. reticulata* and *I. persica*, produce the flowers before the leaves. Most of the species have thick rhizomes, which creep along the surface of the soil, or a short distance beneath. To this section most of the very numerous garden varieties belong. They are known as German Irises, but having been in cultivation for a long time, it is impossible to tell just from what species some of them have originated. The species which are commonly included among the German Irises are *I. neglecta*, *I. squalens*, *I. variegata* and *I. germanica*. Numerous varieties have sprung from each species, and from these there are evidently many cross breeds. *I. germanica* is a handsome species. *I. g. alba* is pure white, very early in blooming, and forces well. *I. g. velveteen* has dark purple falls and standards. The flowers of the known varieties of the *I. phylla* have a white ground, with the margins marked lavender and purple. *Mme. Chereau* is a well-known form. *I. plicata* is white frilled with blue. The varieties of *I. amœna* have the standards usually white and the falls variously marked with violet blue. In *I. variegata* the very numerous varieties have the standards yellow; the falls are of a wide range of color—dark yellow, maroon, dark purple and crimson brown. The forms of *I. squalens* have the standards copper-bronze and fawn colored, and the falls among other colors are maroon, purple, bronzy-yellow, violet and lavender. *I. pallida* has lavender standards, and the falls of the same color shaded with rose. *I. p. dalmatica* is a very large and sweetly-scented flower—one of the best in cultivation; the standards and falls are deep lavender. In the varieties of *I. neglecta* the standards range in color from lavender to purple, and the falls crimson, purple, violet, white and intermediate shades. *I. florentina* is almost pure white, and comes into flower from the 15th to the end of May. *I. pumila*, a dwarf species, is usually out of bloom early in May; it has many fine varieties. *I. cristata* is a native of the Eastern States, and is well adapted for half-shaded places in the rockery. It is the dwarfest of all the rhizomatous species. *I. versicolor* and *I. pseudacorus*, although thriving under conditions which suit most of the garden forms, will do better when the soil is continually moist. *I. graminea* and *I. sibirica* are both worthy of cultivation; they have long, narrow leaves, and small flowers. *I. lœvigata*, better known as *I. Kämpferi*, will also thrive in borders, especially when given a deep mulch of well-rotted manure; but they show up to better advantage when grown in fairly moist ground. This species is one of the latest to bloom; it has many varieties, some of which are very large and showy. The expanded flowers, when used for cutting, will not stand much handling; but the buds, when nearly full size, will open out when placed in water; in this condition they may be shipped long distances.

**Propagation**—Most of the bulbous species are offered at reasonable prices by dealers. The rhizomatous species and forms may be rapidly increased by division. Large masses may be reduced in size and replanted early in March without interfering with the crop of flowers. In dividing into smaller pieces, it is better to wait until the plants have

completed their growth, when they may be cut in small pieces, heeled in where they are slightly protected in Winter, and put in permanent positions in March or April. They will stand a rich soil, but should not be deeply planted, as they are then liable to decay during wet weather in Summer and Autumn.

**KNIPHOFIA ALOIDES**—Better known as *Tritoma uvaria* (Torch Lily,) is an old-fashioned, border plant with long, narrow, dark green leaves and tall spikes of flowers, at first coral red, changing to orange, and subsequently to a greenish yellow. It is a native of South Africa, and in localities where the Winters are severe it should, along with the other species and varieties, be protected by covering the crowns with half-decayed leaves or stable litter. *K. a. maxima* has larger flowers. *K. Macowani*, is an orange-red flowered species. *K. Leichtlinii* is one of the tallest of the species. There are numerous hybrid forms, all of them desirable for the herbaceous border. They thrive best in deep rich soil, and in fully exposed situations. Seedlings of most of the kinds may be raised, but they are somewhat slow in making flowering plants. Old specimens are easily divided, and give good-sized pieces to start with.

**LEONTOPODIUM ALPINUM (Edelweiss)**—Although a native of the Alps of Switzerland this plant thrives luxuriantly when planted out on rockwork fully exposed to the sun. Seedlings are best raised in September and wintered in pots, in a cold frame. When planting out put some flat pieces of stone around the bases of the plants.

**LESPEDEZA BICOLOR**, also known as *Desmodium penduliflorum* and *L. Sieboldii*. The plant has a shrub-like growth, reaching from 4 to 6 feet in height. The flowers, which are small and pea-shaped, are very numerously produced in long, pendulous-branched panicles late in the season. The colors are rose and white. Cuttings taken before the flowers appear will root freely. They should be kept indoors to encourage growth before going to rest. Old plants may be divided before starting into growth.

**LINDELOFIA SPECTABILIS**—A low-growing borage-wort, with handsome, bluish-red flowers. It grows 12 to 18 inches high. It is a very reliable herbaceous plant, quite hardy and stands the sun well. If seeds are sown late in Summer, the plants will bloom the following season.

**LOBELIA**—The native species *L. cardinalis* and *L. syphilitica* are, in this latitude, much more satisfactory than any of the gaudy-flowered forms of *L. fulgens* and *L. splendens*. Seedlings should be raised in late Summer to provide flowering plants the following season. *L. cardinalis* is among the handsomest of herbaceous plants; the flowers are bright scarlet. It must have abundance of water when growing. *L. syphilitica*, a blue flowered species, will succeed well in a drier soil.

**LYCHNIS**—There are numerous species in this genus which are desirable as border or rockery plants. *L. vespertina flore-pleno* has large double white flowers; increased by root cuttings. When sown late in Autumn and kept indoors, seedlings of *L. fulgens* and its varieties are in good condition for planting out by April. The scarlet Lychnis, *L. chal-*

*cedonica*, is a midsummer bloomer; it should be lifted and replanted every second year. The double kinds are increased by division. The double flowered variety of *L. viscaria* has an extended blooming period. It is an erect-growing plant, usually about a foot high, with rosy red flowers. Best increased by division in early Spring.

**L. coronaria** (*Agrostemma*)—This plant has silvery-gray foliage, which in itself would be sufficient to insure a place for it in the herbaceous border. The flowers, however, are exceedingly showy. The type has red blossoms. There are varieties with crimson, pink and white flowers. Seeds should be sown in September; the seedlings pricked off into boxes and wintered in a cold frame. They should be planted out very early.

**LYSIMACHIA** (*Loosestrife*)—Most of the species are of weedy growth and increase rapidly. *L. nummularia* is the Money-wort or Creeping Jenny; useful as a creeper or for hanging baskets or vases. There is a beautiful form with yellowish leaves. *L. clethroides* is a handsome species, growing from 2 to 3 feet high; the flowers, which are white, are arranged in long, drooping spikes. It is readily propagated by division.

**LYTHRUM SALICARIA** (*Purple Loosestrife*)—This species grows from 3 to 4 feet high. The flowers are of a rosy-purple color. Increased by division.

**MERTENSIA VIRGINICA** (*Virginian Cowslip*)—There are several species of *Mertensia* all worth cultivating, but unfortunately some are not so easily grown as *M. virginica*. This is by far the showiest species, and if the conditions under which it grows in a wild state are imitated, there will be no difficulty in its cultivation. In Spring most of its growth is made without shade—that is, before the trees are in leaf. It is usually found in damp woods. In this locality its period of blooming is from April 15 to the middle of May. It grows from 12 to 18 inches high. The leaves have a slightly glaucous hue; the flowers are arranged in drooping terminal clusters, reddish-purple in the bud, subsequently changing in the open flower to a beautiful light blue. It is one of our handsomest native plants. Propagated by division.

**MONARDA** (*Horse Mint*)—These plants, although not averse to moisture, will thrive in very dry soil. There are several species, and one or two varieties common in gardens. The best known is *M. didyma*, a species with bright scarlet heads of flowers. *M. fistulosa* has purple flowers. *M. f. alba* is pure white. They are in bloom during midsummer, and among the easiest plants to increase by division.

**MORINA LONGIFOLIA**—A very choice perennial, reaching 2 feet in height. The flowers are produced in whorls arranged on a long stalk. The buds are white, changing later to pink and crimson. Seeds of this species are easily obtainable. When sown in Spring they do not bloom till the following year.

**MYOSOTIS** (*Forget-me-not*)—In this genus there are numerous species, most of which are of little value. *M. dissitiflora* and *M. sylvatica* are commonly cultivated. Seeds may be sown late in Summer to have

bushy flowering plants for Spring blooming. There are blue, white, and pink forms. In Washington, D. C., they are planted in the Public Gardens, and along with Pansies they bloom during April and May. They are sometimes effectively used among Hyacinths and Tulips, in well-protected spots, keeping up a good display of bloom until the time arrives for filling the beds with their usual Summer occupants.

**OENOTHERA** (*Evening Primrose*)—Handsome plants for rock work or border. *O. Lamarckiana* grows to a height of 5 feet; flowers yellow. It is biennial in duration. *O. Fraseri* is a dwarf species suitable for the rockery. *O. missouriensis* has large yellow flowers on trailing stems. *O. taraxacifolia* is a trailer, with very large, pure white flowers, opening at night. Plants come up freely from self-sown seed. *O. eximia* is a choice dwarf species, with very large white flowers. *O. amœna* var. *rubicunda* has the flowers deep rose colored; there are several forms. All of the kinds are raised from seed sown in September.

**ONONIS** (*Restharrow*)—*O. rotundifolia* is a very desirable dwarf, shrub-like plant, with pea-shaped rose colored flowers. Raised from seed. A native of southern Europe.

**ONOSMA STELLULATUM V. TAURICUM**—A dwarf, evergreen plant, forming dense tufts of narrow hairy leaves. The flowers, which are bright yellow, tubular, and 1½ inches long, are arranged in branching cymes. The plant is best propagated by seeds, and by cuttings of the ripened growths taken during the end of September. They must be rooted cool.

**OPHIOPOGON**—Dwarf evergreen plants, with grass-like foliage. The most useful species is *O. gracilis*; it is used for planting in dense shade where few other plants thrive. The leaves are narrow; flowers small, white, followed by beautiful blue berries, which continue on the plant all Winter. Increased by division in Spring. *A. Jaburan* is a taller species; the variegated form is a handsome plant. *O. japonicus* has also a variegated form. Both of these are successfully propagated by early division. In this locality they stand the Winters unharmed.

**OROBUS** (*Lathyrus*) **VERNUS** (*Bitter Vetch*)—This species comes in bloom during April and lasts only for a short time. The flowers on opening are purple and blue, the purple changing to blue as the blossoms mature. Seeds should be sown as soon as ripe. As the plants make but little headway during the first season, they should be allowed to remain in the seed pan till the following Spring. There are several other desirable species, such as *O. pannonicus*, *O. flaccidus* and *O. aurantius*.

**PACHYSANDRA**—There are only two species in this genus, both of which are in cultivation. *P. procumbens* is a North American plant. The flowers are very inconspicuous, produced in March and April at the bases of the stems made the preceding year. In *P. terminalis* they are situated on the ends of the shoots. Both species are evergreen. *P. terminalis* is of a brighter green than *P. pachysandra*. They are very useful for planting under trees; are deep-rooting and stand drought well. Increased by division.

**PAEONIA (Pæony, Peony, or Piony)**—This genus is divided into two sections or sub-genera—Shrubby and Herbaceous—the last-named section is subdivided into three groups, with well marked botanical characters. The double-flowering herbaceous kinds, which bloom during the latter part of May and in June, are varieties of *P. albiflora*. There are hundreds of kinds in cultivation, varying in color from white through the different shades of pink to deep crimson. Their successful culture demands a deep and well-manured soil, with a heavy mulching of manure during the Winter and Spring months. The varieties of the European Pæonies come into flower several weeks in advance of the Chinese varieties. *P. officinalis* has double rose, red, and pinkish-white forms. *P. paradoxa fimbriata* has double purple flowers. *P. tenuifolia flore-pleno* bears medium-sized double flowers, bright crimson in color. The leaves of this species are of a feathery nature. It is one of the most distinct and handsome Pæonies in cultivation. There are several showy European species, some of which have numerous single-flowered varieties. They all bloom much earlier than the Chinese Pæonies, and are useful for the embellishment of the herbaceous border and for cutting. *P. anomala* blooms during the first week in May; this sort is sometimes sold as *P. tenuifolia*. The leaf divisions are fewer than in that species and broader. *P. a. insignis* has crimson flowers. *P. arietina* is the earliest species to flower, expanding in this locality by the end of April. There are about a dozen distinct varieties. *P. Witmanniana* is another early bloomer. Of *P. officinalis* and *P. peregrina* there are numerous single-flowered varieties. The Herbaceous Pæonies are increased by seeds and by division of the crowns. The seeds are sown as soon as ripe, so that they may germinate the following Spring. They should be sown in a frame, and allowed to remain for a year before transplanting. Old plants are best divided in October; except with rare kinds the divided pieces should be large. Plant deep enough to make certain of the crowns being well beneath the surface.

**PAPAVER (Poppy)**—In the Herbaceous section of this popular genus *P. orientale* and its variety *P. o. bracteatum* are the most important kinds. There are several forms of each, varying chiefly in the colors of the flowers. Most of them are of different shades of scarlet, and very large. The plants, according to variety, vary in height from  $1\frac{1}{2}$  to 3 feet. They bloom during May and June, according to locality. The stock is best increased by seed. When the capsules show signs of ripening they should be carefully watched, as they open at the top, and a slight movement of the atmosphere will displace the seeds. Sow in boxes soon as ripe, but not too thickly, so as to do away with the necessity of pricking off—an operation which does not succeed as well as could be wished. The seedlings will make sufficient headway to pass the Winter securely in a cold frame. During March bring into a cool house, and when they show signs of growing pot off into  $2\frac{1}{2}$  or 3-inch pots, according to size. They should always be planted from pots, as they do not lift well.

**P. nudicaule** is a choice species with orange, yellow or white flowers. The double forms are often used as cut bloom. In the warmer parts of

the country the plants will succeed fairly well if they be raised from seed sown during September, and either planted out late or wintered in a frame and put out very early. In the colder parts plants are freely raised from self-sown seed. It is a species which dislikes extreme heat.

**PENTSTEMON**—The garden varieties are the offspring of *P. gentianoides* and *P. Cobaea*. In localities where climatic conditions are favorable they are much prized. In this section they are short-lived, owing to the extreme heat. There are many extremely handsome species. *P. (Chelone) barbatus* and *P. b. Torreyi* will thrive almost anywhere, as they cover the ground with dense, short growths. The flowers are produced in panicles about 3 feet high; they vary in color from light pink to carmine. The Pentstemons are very easily increased, at almost any time, by division.

**PHLOX**—*P. subulata* (Moss Pink) is the parent of many beautiful forms extensively used for the edges of borders and for rock work. In April they are covered with myriads of flowers close to the foliage. Among the white-flowered forms are *P. s. Nelsoni*, *P. s. aristata* and *P. s. nivalis*. *P. s. Vivid* has rose-colored flowers with carmine center. *P. s. frondosa* is a pink variety with dark center. Their propagation is usually effected by cuttings—a slow method. If the plants are kept supplied with water during September they will emit roots at the bases of the principal growths, and during October these may be cut up and heeled in on a sheltered border, potted, or removed to permanent positions, very early in Spring. Other desirable dwarf species are *P. amoena*, *P. reptans* and *P. divaricata*. The well-known and deservedly popular herbaceous Phloxes are divided into two sections, early and late flowering. The first or early blooming section is known as *P. suffruticosa*, being varieties of *P. glaberrima suffruticosa*. The late blooming section is known as *P. decussata*, and among the species which have contributed varieties are *P. maculata* and *P. paniculata*. The varieties are exceedingly numerous. In recent years some very beautiful forms have been sent out. They stand well as cut flowers. The plants should be lifted, divided and replanted every second year, as when they remain long without removal the panicles are small. Early in March is the best time for the operation. Cuttings may be taken from the plants as they start into growth and rooted in a temperature suitable for Carnation cuttings. The growths will be much improved by a heavy mulching of manure about the crowns during the growing season.

**PHYGELIUS CAPENSIS** is hardy in places where the mercury does not fall lower than 10 degrees F. The trouble with this very desirable plant is that it continues to grow during the Autumn months instead of going to rest. The growth made at this period, however, furnishes good material for cuttings, which, if put in the sand bed of a cool house, will root in a few days. They may be wintered in a cold frame.

**PHYSALIS FRANCHETTI**—The attractive feature of this plant is the large red-colored calyx, enclosing a large berry of the same color. It is apt to encroach on other plants, so rapidly do the underground stems spread.

**PLATYCODON GRANDIFLORUM** (*Chinese Bellflower*)—An erect growing plant, with flowers resembling those of the *Campanula*. *P. g. Mariessii* is a variety of dwarfer habit, and bears larger flowers. The roots are thick and fleshy. Seedlings raised early in Spring sometimes bloom late the same season.

**PRIMULA** (*Primrose*)—There are few of the species but what are worth growing. Many of them, however, are unsuited to the climate of the Eastern States, it being too cold in Winter and too hot in Summer. A few of the species and many of their varieties do well. *P. vulgaris* and the varieties with double yellow, red, purple, white, and lilac flowers succeed well if they are given water during the growing period. They will even stand in almost full sunshine, but they thrive best in half-shaded spots. All of them are best increased by division very early in the season. *P. elatior* is the Oxlip, and what is known as the Cowslip is *P. veris*. The Polyanthus is a garden race, said to be a hybrid between the last-named species and *P. vulgaris*. The different varieties are useful for rock work and for borders. A good selection of forms may be had from seed sown in Spring; but the plants will not bloom until the second year. Some of the Himalayan species do fairly well in this latitude if given a position shaded from sun in Winter and mulched in Summer. *P. denticulata* and its forms are among the best. *P. sikimensis* should be tried in damp, shady ground by the margins of lakes. *P. cortusoides Sieboldii* produces pure white, crimson and lilac colored flowers; very useful for cutting. The plants have creeping root stocks, and thrive best when protected by a frame in Winter. In the Fall those plants which are to remain in the open during Winter should be gone over, and those which have their crowns above the surface of the soil lifted and replanted, so that the roots may be protected.

**RUDBECKIA** (*Coneflower*)—Nearly all of the species are worthy of a place in the herbaceous border. A few of them are valuable for supplying cut flowers. *R. speciosa* (*R. Newmanni*) grows from 2 to 3 feet high; the color of the outer florets is orange-yellow, while those in the center are almost black. *R. maxima* is a much taller species, valuable for cutting. *R. laciniata* attains a height of 4 feet. The variety known as Golden Glow has large double yellow flowers; the best of all for cutting. *R. purpurea* (*Echinacea purpurea*) has purple florets. Some of the species are easily raised from seeds, but most of them may be divided freely if the work is done before they make much growth in Spring.

**SALVIA PRATENSIS**—This species has very long spikes of flowers in bright blue, rose, and white. They flower in May, and are exceedingly attractive. They all seed freely, and if sown early in the Fall, will bloom the following Spring. *S. azurea* and *S. a. grandiflora* are tall-growing species, with blue flowers. They are easily increased from cuttings in the Fall months.

**SANGUINARIA CANADENSIS** (*Blood Root*)—A dwarf-growing native plant that, in sunny positions, is one of the earliest to open its flowers, which are pure white, about 2 inches across. It is increased from seeds and by division.

**SANTOLINA INCANA** (*Cotton Lavender*) is a dwarf, shrubby plant with silvery-white fragrant foliage. It will thrive in almost any position with very little attention. Cuttings should be put in during the first half of October; they will root in a cold frame.

**SAPONARIA OFFICINALIS** (*Bouncing Bet*)—Naturalized over a wide area in the United States. The flowers are usually double. *S. ocyoides* is one of the best rockwork trailers. It passes the Winter with a mass of short growths near the crown; these, on the approach of warm weather, grow very fast, subsequently forming wide-spreading masses of light or dark pink flowers. *S. o. splendidissima* has rosy-crimson flowers. The plants are in full bloom during the latter part of May, with scattering flowers for a long time after. Seeds should be sown in September, and the plants wintered in a frame. Early planting is necessary.

**SARRACENIA** (*Pitcher Plant*)—In the District of Columbia the only species which does not stand the Winter out-of-doors is *S. Drummondii*. *S. purpurea* is the hardiest of the number when plants are obtained from Northern sources. They should be planted in a mixture of peat, sand and moss, and the surface given a coating of moss, which must be kept damp, especially during the growing season. Pockets of suitable soil should be made for them at the margins of artificial lakes and ponds.

**SAXIFRAGA** (*Saxifrage*)—The extremes of temperature in Summer and Winter work havoc with the great majority of the species, especially those of the mossy and encrusted sections. *S. peltata*, a Californian species, does grandly where it enjoys moist soil. The leaves are from 1 to 2 feet in length. The plant blooms during the latter part of April. *S. sarmentosa* (*Aaron's Beard*), a Japanese species, has withstood the Winters here for a long number of years. The foliage is handsome, even in midwinter. There is a form with the leaves beautifully marked with creamy-white and red. The section to which *S. ligulata* belongs has some exceedingly handsome species, among which are *S. purpurascens*, flowering in May. *S. cordifolia*, with bright pink flowers, is frequently seen here peeping through the snow. *S. crassifolia* is another early bloomer. All of them are easy to increase by division.

**SCUTELLARIA** (*Skull-Cap*)—A rather large genus, embracing stove, greenhouse and hardy species. *S. macrantha* is one of the best for outdoor use. The stems are at first procumbent, the flower spikes ascending. Our hot, dry Summers suit this plant well. It blooms during July and August. The flowers are purplish-blue, and are produced in great abundance. It grows about a foot high. Increased from seed. *S. japonica* does equally as well as *S. macrantha*; the flowers are much smaller. In *S. orientalis* the flowers are yellow; the plant grows from 9 inches to 1 foot high.

**SEDM** (*Stonecrop*)—Many of the species differ from each other in habit; some of them are herbaceous plants. *S. spectabile* grows 2 feet high, forming large and neat clumps; flowers pink. *S. Maximowiczii* is an erect growing species, about 1 foot in height, with yellow flowers. *S. maximum*, a very variable species, sometimes attains a height of 2½

feet. *S. Sieboldii* is quite hardy in this locality; it makes a fine plant for pots or baskets, but it does not associate well with other plants in the same receptacle. *S. acre*, *S. a. aureum* and *S. sexangulare* form dense growths from 2 to 3 inches in height. The yellow flowers are produced in great abundance about the beginning of June; their mossy-like growths are attractive all the year round. *S. spurium* (*S. stoloniferum*) has very handsome pink flowers, produced sparingly from midsummer till late in Fall. All of the species named are increased by division.

**SEMPERVIVUM** (Houseleek)—Dwarf succulent plants, well suited for dry, exposed positions in the rockery. The hardy species are easily increased by division. *S. tectorum* is the species commonly grown. *S. arachnoideum* has small rosettes of leaves connected at the tips by a cobweb-like formation. Other well known species are *S. californicum*, *S. Funckii*, *S. hirtum* and *S. soboliferum*. They will thrive in almost any kind of soil.

**SILENE** (Catchfly)—Among this very large genus there are three perennial species, each one growing only a few inches tall, which are among our finest rockwork plants. *S. Schafta* has bright purple flowers; it is a very deep rooting species, and stands dry weather well, keeping in bloom for several months. It can be raised from seed; or old plants divide well in October. Dig up the plant carefully, saving all of the roots, and in dividing give each piece as much root as possible; put in pots and keep in a cold frame for the Winter. *S. alpestris* is a neat growing little plant with white flowers; easily raised from seeds. *S. maritima* forms a dense carpet of growth, the branches from a single plant covering a large surface. The flowers are white and are rather showy; they last only a short time, however. The foliage is handsome for the greater part of the year, being very neat and of a whitish cast. Seeds ripen in abundance; they should be sown early in September.

**SPIRÆA** (Meadow Sweet, Goat's Beard)—There are several very handsome herbaceous plants in this genus; all of them are of easy cultivation. They are best increased by division either in Fall or early in Spring. *S. aruncus* is a variable species; the plant found in the Eastern States seems much more dwarf than the one commonly cultivated in European gardens. To grow this plant to best advantage it should be given an isolated position. It usually attains a height of from 3 to 6 feet, according to variety. *S. astilboides* is dwarfer than the above named; flowers white, borne in dense panicles. *S. filipendula* is a valuable rockwork plant, the finely cut leaves remaining green all the year round. The flowers, especially those of the double variety, are showy. *S. palmata* is without question one of the handsomest flowered herbaceous plants in cultivation, but unfortunately other worthless kinds are often sold for it. The flowers are bright crimson, in large panicles; the leaves are palmately five to seven-lobed. *S. ulmaria* (Queen of the Meadow) has creamy white, very fragrant flowers. The plant grows from 2 to 4 feet high, and, like all of the others, it delights in damp soil, with partial shade during midday. They are all best increased by division.

**STACHYS LANATA** (*Hedge Nettle*)—This plant is a valuable one for hot, dry situations and for planting under trees. The flowers may be cut off as they make their appearance, as it is the foliage which is the most ornamental. The leaves are covered with a wood-like substance, imparting a whitish appearance to the plant. Increased by division at almost any time in Spring.

**STATICE** (*Sea Lavender*)—Several species do well here as border plants. They need sandy soil with a little peat or leaf soil added. *S. elata*, *S. eximia*, *S. tatarica augustifolia* and *S. latifolia* are all good kinds. They are raised from seeds.

**TANACETUM VULGARE** (*Tansy*)—There is little in this subject to recommend it, beyond its habit of keeping green and fresh-looking during the Summer. It is a favorite cottage garden plant. The flowers and foliage are very fragrant. The variety with curled leaves is rather ornamental. Increased by division.

**THYMUS** (*Thyme*)—*T. Chamaedrys lanuginosus* and *T. serpyllum* are well suited for growing in dry and exposed parts of the rockery. They are low-growing and wide-spreading plants, with small leaves and flowers. *T. s. vulgaris* is the Lemon Thyme, a highly fragrant and ornamental plant, growing from 8 inches to 1 foot high. Well colored pieces of this should be rooted in Autumn; the other kinds are raised from seed.

**TIARELLA CORDIFOLIA** (*False Mitrewort*)—A native species, well suited for shady spots in the front part of the herbaceous border, or on the rockery. It blooms early, and throws out numerous runners after flowering, providing a ready means of propagation.

**TRICYRTIS HIRTA** (*Japanese Toad-Lily*)—This curious but beautiful plant is the latest of the hardy herbaceous plants to come in flower with us. It usually blooms in October and November. During Summer the foliage is quite ornamental. The individual flowers, of which there are many on a stalk, are shaped like those of a lily, only much smaller. The divisions of the flower are pinkish-white spotted with purple. This subject should be planted in moist soil, or where a mulch can be given, in order to preserve the foliage till the blooming period. The plant divides easily, or cuttings may be made from the flowering stems and put in a cold frame late in the season.

**VALLORADIA** (*Plumbago*) **PLUMBAGINOIDES**—A hardy species, with deep blue flowers, growing to a height of one foot. It blooms from July till freezing weather. Propagation is effected by division. The plants should be lifted during the first half of September, the shoots shortened back, and several pieces put together in 4-inch pots, saving as many of the creeping underground stems as possible. Keep plunged in a cold frame for the Winter. If a large number of plants is wanted those in pots may be divided again during the end of April, and each piece put into a 3 inch pot. They will flower at the proper season if planted out by the end of May.

**VERBASCUM (Mullein)**—*V. olympicum* is one of the handsomest of a large number of species. It grows from 4 to 6 feet high. Although a perennial, it is best treated as a biennial. The seeds should be sown in August or September. It is a good plant for the back part of a sunny border.

**VERONICA (Speedwell)**—A large genus, including a number of shrubby species, principally from New Zealand. There are only a few herbaceous species which are worthy of a place in the garden, as the majority are of a weedy appearance and last only a very short time in bloom. *V. gentianoides* attains a height of 12 inches when in bloom. There is a handsome variegated form, the flowers of which should be removed, as this tends to induce growth at the base. *V. incana* has whitish foliage and deep blue flowers; it is best raised from seeds. *V. amethystina* is one of the best of the tall herbaceous kinds, growing about 18 inches high. *V. taurica*, *V. Teucrium*, *V. prostrata* and *V. satreioides* are first-class rockery plants, which should be increased by division early in the season.

**VINCA (Periwinkle)**—*V. herbacea* loses its foliage in the Fall. In April it makes short flowering growths, followed later by long vine-like shoots, which take root at the extremities and form new plants. It thrives well in full sun. *V. minor*, the commonest kind, has blue flowers, also double blue, double purple, single white and variegated leaved forms. It is much used in planting among shrubbery and for covering shady spots under trees. It will thrive in almost any position, and takes possession of the ground to the exclusion of most other herbaceous perennials.

**VIOLA (Violet)**—*V. odorata* is the parent of the numerous single and double forms which are grown for their flowers in Winter and Spring. Propagation is effected by cuttings and division of the old plants. From the nature of the species the method of building up a plant from the cutting, or runner, is the surest way of obtaining free growing, healthy specimens. The plants send out runners, and those intended for propagation should be allowed to develop to a certain extent. In the latter half of February, and during March, they are taken off and either inserted in the sand bed of a cool house or dibbled in boxes of sand and kept under conditions favorable to rooting. When rooted they are put in 2-inch pots. After the roots show on the outside of the ball they are given a shift into 3-inch pots and placed in cold frames, affording abundant ventilation and shaded either with naphtha and white lead, or with lath slats. In this section the plants are given their Winter quarters in June. They are largely grown in frames from which frost is excluded by banking the outside with stable litter level with the sash, and running at least one  $1\frac{1}{2}$ -inch heating pipe in the front or back part of the frame. But even under those conditions the flower crop is not continuous during very severe weather. In planting in benches, or beds, the operation is usually completed by June 15. Benches are used with about 5 inches of soil. Narrow and low-roofed, equal-span houses, running east and west, with the benches as near the glass as possible, produce satisfactory results. Houses of the same order running north and

south do not produce as many nor as good blooms during midwinter. The temperature is safe for the plants as long as frost is excluded, but 10 degrees above the freezing point should be the minimum for continuous flowering. In Winter the temperature may rise to from 55 to 60 degrees. Airing must be carefully attended to so as to maintain a cool, dry atmosphere. A hot, moist, stagnant atmosphere supplies perfect conditions for weak, sickly growth, and is certain to encourage the development of fungoid diseases. The soil should be loamy, mixed with at least a sixth of rotted cow manure and a very small quantity of pure bone meal. After planting the glass is shaded with turpentine or naphtha and white lead, allowing full ventilation. Water only when moderately dry. In August, or beginning of September, the plants should get a shallow mulch of leaf soil mixed with dried horse manure. All leaves which show the least signs of decay should be removed and burned. During Summer, syringing should be attended to frequently, for the purpose of ridding the plants of red spider, their greatest enemy. For this purpose the water must be applied with considerable force to the lower surfaces of the leaves. The plants can, however, be kept tolerably free of this pest if proper growing conditions are supplied, as red spider is only found on plants which are enfeebled through some cause. When syringing is to be done it should be attended to in the early part of the day, and in bright weather, so that ventilation may be relied upon to dry the foliage before night—a most essential item. For ridding the plants of aphides, the use of hydrocyanic acid gas is much preferable to tobacco in any of its forms, as it leaves no objectionable odor.

**Leaf Spot**—When this, the most dreaded of the fungoid diseases, appears, the leaves should immediately be picked off and burned, for by being allowed to continue on the plant the fungus will ripen its spores and spread to other leaves. It is present more or less in all houses, and is only kept under control by supplying favorable conditions for the growth of the plants. When grown outdoors or in frames without protection the leaves are apt to suffer from too much moisture in the shape of dew. This condition is very favorable for the increase of spot. There are several other more or less hurtful fungoid diseases which can only be guarded against by giving the plants proper treatment, and their ravages curtailed by picking off and burning the infected parts. Very weak liquid cow manure may be afforded occasionally if the plants are in need of a stimulant.

**Hardy Violas**—Among the hardy Violas *V. cucullata* is the species most frequently grown in gardens. It often becomes a troublesome weed, and keeps on producing apetalous flowers long after the long-stemmed showy blooms are gone, and from the short-stalked apetalous flowers large capsules of seed follow in almost every instance. *V. pedata*, and its forms, are among the earliest of our native species to bloom. *V. blanda* has pure white flowers, growing in dense tufts; this species delights in sandy soil.

## Hardy Shrubs.

**ABELIA RUPESTRIS** (Rock Abelia).—This is one of the most pleasing and satisfactory of all flowering shrubs. It is not reliably hardy north of Washington, but for the Southern States it is equally as desirable as the Crape Myrtle (*Lagerstroemia*). In Washington, during the very severe Winter of 1898 and 1899, the Abelia escaped with only the ends of the branches killed. It blooms from midsummer till frost. The flowers are usually to be seen on the plants up to the end of November. It propagates freely from cuttings put in during October and November. Select them from the tips of the shoots; make them about 4 inches in length, put them close together in boxes of sand; place in the coolest house and shade from bright sunshine. By the beginning of January the batch should be gone over, as by that time many of the cuttings will have rooted. Those which have a sufficient number of roots may be put in thumb pots in the usual way, but in cases where only one or two roots appear the plants are best placed in the sides of the pots, as in that position they make roots more freely than when in the center. In a short time they will have made growth enough to be shifted into 3-inch pots, and before the time comes when the houses are crowded with Spring stock they may be transferred to the cold frame. This shrub, it may be added, is one of the very best for planting in cemeteries. Where the weather is not too severe it is evergreen; grows only to a moderate height and bears white flowers in great abundance.

**ACER PALMATUM** and **A. JAPONICUM** (Japanese Maples).—Most of the Japanese Maples have very handsomely cut leaves, and especially during Spring and early Summer they are very highly colored. The specimens usually seen are from 3 to 8 feet high. The species from which the varieties have sprung attain a height of 20 feet. All of them are very hardy, and should be planted in sunny positions so that they have freedom to develop into symmetrical specimens. They should not be planted in shade, or even partial shade, on account of losing their color early in the season. Some of the varieties known as *A. palmatum atropurpureum*, *A. p. dissectum* and *A. p. sanguineum* set seeds freely and produce plants like the parents; these seedlings are much more vigorous than grafted plants. From old plants of *A. palmatum* seedlings are raised on which the finer varieties are grafted. Veneer grafting is the system most commonly employed.

**AMORPHA FRUTICOSA** (Bastard Indigo).—A pretty and interesting shrub. The leaves are pinnate and at a distance have a feathery appearance. The flowers, arranged in spikes, are very dark purple. It is propagated by seeds, also by green or hard wood cuttings.

**ARALIA JAPONICA** (Angelica Tree).—This with *A. Mandshurica* and *A. spinosa*, have very large bipinnate leaves and stout prickly stems. They are useful for permanent positions where a sub-tropical effect is desired. They are propagated by taking roots and cutting them into

pieces about 3 inches in length, starting them during Spring, in sand or moss. *A. pentaphylla* is a dwarf shrub, with small palmate leaves; does well in shade. It may be increased like the above, or from seeds.

**AUCUBA JAPONICA.**—A dwarf evergreen shrub belonging to the Dogwood family. It is one of the most desirable evergreens for the warmer parts of the country. While frequently hurt by late frosts in this locality, it is only the imperfectly ripened ends of the previous season's shoots which suffer. In the Fall those shoots which are likely to get hurt make good material for cuttings. They may be made quite large; pieces 8 or 10 inches long will root easily in the cold propagating house. The roots emitted from the cuttings are thick and easily broken, and if left for any length of time in the sand bed, or boxes, after the roots are about 2 inches long, they are difficult to handle successfully. Some of the varieties of this plant are almost as handsome as the Crotons for decorative work, and as a berry-bearing plant it has not had the attention it deserves. The sexes are on separate plants. They flower early in Spring. A branch of the staminate plant, when the pollen is in suitable condition, if carefully shaken over the pistillate flowers on a calm, sunny day, will almost certainly insure a crop of the large, bright red berries. In favorable situations the berries last in good condition through the following Winter. Some of the better known kinds are *A. j. aurea*, *A. j. albo-variegata*, *A. j. bicolor*, *A. j. latimaculata*, *A. j. macrophylla*, *A. j. ovata*, *A. j. longifolia*, *A. j. limbata* and *A. j. pygmæa sulphurea*.

**AZALEA.**—The deciduous species and varieties, including the Chinese species (*A. mollis*), and the Ghent Azaleas, which are hybrids between *A. pontica*, the American species, and *A. mollis*, are well-known flowering shrubs. The species are raised from seeds, and the seedlings are used as stocks on which to graft the finer varieties. It does not pay to raise these plants in small quantities as they are supplied by dealers at low prices. The evergreen species include the well-known *A. indica*, several of the varieties of which are successfully grown out of doors from New York southward. In Washington some large plants have stood out unharmed for over 20 years. *A. amena*, an allied species, is probably the hardiest of this section. The color of the flowers is a rich rosy-crimson. For pot culture it does not approach in beauty the forms of the Indian Azalea, but for outdoor planting in the colder sections it is more to be depended on. The cuttings should be taken about the beginning of November; at that time numerous strong shoots with small rosettes of leaves on the ends will be found above the main body of the bush. These make the best cuttings; lengths of about 4 inches will suffice. They should be inserted close together in the sand bed of a cool house. The roots which they emit are exceedingly fine. Previous to potting, if watered well before lifting, a small quantity of sand will adhere to the roots. The plants should be potted in the smallest-sized pots, using finely sifted sandy soil, with at least half of its bulk leaf mould or peat. Owing to the low price of imported plants of Indian Azaleas, it is generally conceded that it is cheaper to buy than to raise plants. This is no doubt true of the finer and slow growing kinds, which are propagated

by grafting on the strong growing varieties, and also on some species of *Rhododendron*. This is done in Winter and also when the growth is ripe later in the year. Some of the strong growing forms, especially those having single white and red flowers, are, however, hardy, and for planting out they may be propagated by cuttings. Plants raised in this way have a more natural appearance than when grown as standards, in which shape they are usually imported. The cuttings should be put in the sand of a cool propagating house by the middle of August; the roots being small will need fine soil of a peaty nature for the first potting. In this operation use clean thumb pots; put the pots in water before using so as to absorb as much as possible. Instead of placing the rooted cutting in the middle of the pot put it at the side; this will facilitate rooting. At the next potting it is an easy matter to have the plant in the center of the pot. In planting out-of-doors it must be remembered that they will not stand drought, so they must not be left to take care of themselves. The soil should be prepared to a depth of at least 18 inches. It may consist of loam, leaf mould and sand, in about equal parts. The plants should be planted moderately close together so that the foliage will keep the sun from the soil; but to insure moisture they should always be mulched during Spring and Summer, and frequently watered during dry spells. Digging, or deep hoeing, should never be practiced, as the roots are almost certain to be injured thereby.

**BERBERIS THUNBERGI** (Barberry).—A Japanese species growing from 3 to 6 feet high; by far the most ornamental of the deciduous kinds. It is very symmetrical, seldom needing the aid of the knife to keep it in shape. It loses its foliage in the late Fall, but during the Winter and up till the time when the new leaves expand, the bushes usually present a very pretty appearance from the small but very numerous fruits. The readiest method of increase is from seeds, which should be collected when the leaves fall, gently rubbed between the hands to bruise the covering, and sown in sandy loam, in shallow boxes, making the soil firm. If placed in the cool greenhouse they will germinate uniformly, and by the end of the first year they should be over a foot high. This is a species well adapted for ornamental hedge work.

**B. vulgaris** is the common Barberry. It has rather ornamental yellow flowers, in May or June, followed by bright red fruits, which remain on the bush during Winter. There are numerous varieties; one named *B. v. atropurpurea* has purple-colored leaves. *B. amurensis* var. *japonica* and *B. sinensis* are also good deciduous kinds. Among the evergreen species *B. Fremontii*, while tender further North, thrives well here. It has small glaucous leaves. Increased by Fall cuttings in a cold frame. *B. stenophylla* has small, simple leaves. *B. (Mahonia) pinnata* thrives here only in sheltered positions. *B. (m.) japonica*, *B. (m.) nepalensis*, and *B. (m.) aquifolium* are all well-known evergreen shrubs, thriving in this section even in the most exposed positions. The flowers are produced early in the season, followed by handsome clusters of fruits which ripen during the latter part of May and June. The plants are easily raised from seeds.

**CALLICARPA.**—The species of this genus are grown solely on account of their beautiful fruits, which are quite small, but produced in abundance. The color of the fruit is bright violet. In northern latitudes the branches are apt to get Winter-killed, but new growths are produced, and these flower and fruit the same season. *C. purpurea* and *C. japonica* are the two species most worthy of cultivation. *C. japonica* is the hardiest of all the species. Propagation is easiest accomplished by taking cuttings of the half-ripe wood and rooting them indoors.

**CALYCANTHUS (Sweet Scented Shrub).**—Of this genus there are four well-known species—*C. occidentalis*, *C. laevigatus*, *C. glaucus* and *C. floridus*. The last named is the most common in gardens, and has several varieties. They vary in height from 3 to 12 feet; *C. occidentalis* being the tallest and also the most tender, sometimes suffers severely in this locality. All of the species are prized by some on account of the vinous fragrance of the flowers, which are dark claret in color. *C. occidentalis* and *C. floridus* bear seeds freely, which take only a short time in germinating after being sown. The seeds may be kept in their capsules during Winter and sown in a frame during the first half of April. The seed leaves are very large, disturbing the surface soil a good deal in unfolding, therefore the seed should be sown thinly. The seedlings may be allowed to remain a year in their germinating quarters before being transplanted. Plants are also secured by layering the branches.

**CARYOPTERIS MASTACANTHUS** is unmistakably one of the finest shrubs introduced in recent years. It was, and is, sometimes called the Blue Spiraea, but it has no relation to that genus, as it is a near relative of the chaste tree (*Vitex*) which is among those plants comprising the Verbenae family. The Caryopteris has been tried for several years, and in Northern sections, owing to its being killed to the ground in Winter, should there be treated more as an herbaceous plant than as a shrub. In the latitude of Philadelphia and favorable positions further North it has come out all right through recent Winters. In Washington bushes of it are now 6 feet high. It is one of the last shrubs to come into flower, opening out about the first half of September and lasting several weeks. The flowers are produced in fair-sized heads in the axils of the leaves on the shoots made during Summer; the color is bluish-purple or white. Propagation can be carried on at any time during the Summer or Fall, preferably during the latter season, for which preparations should be made some time in advance by cutting back some of the stronger shoots to induce them to send out side shoots. The blind wood can be used during the flowering period. As soon as the cuttings are ready for removal from the sand they can either be potted or boxed and stored in frames for the Winter.

**CERASUS LAUROCERASUS.**—The Cherry Laurel can be depended upon as a hardy shrub in ordinarily well-sheltered situations south of Mason and Dixon's line. In the grounds of the Department of Agriculture and in Capitol Park many old plants have stood almost unharmed in exposed places for years. The late John Saul, of Washington, D. C., gave this plant a good deal of attention; during a long number of years he made a collection of all the varieties to test their hardiness. While some

varieties suffered with the thermometer standing at 10 degrees F. three or four were left untouched. *C. latifolia*, *C. angustifolia* and *C. caucasica* are the hardiest. In situations which induce growth late in Summer, or late enough not to ripen thoroughly, the growths are almost certain to get nipped by frost. This species is called the English Laurel; it is not native of England, but of the Levant. Propagation is effected by layers or cuttings, preferably the latter, as they will root in pretty large pieces —over a foot in length. The rarer varieties should be grafted on stocks of the common one. Cuttings will succeed any time after the wood is ripe; a piece of the wood of the preceding year attached will give all the better results.

**CERCIS JAPONICA** (Red Bud, Judas Tree).—This species has lighter colored and larger flowers than either the American or European species, *C. canadensis* and *C. siliquastrum*. Some of the original plants brought to this country from Japan are in the parks at Washington, and seldom does a season pass in which the branches are not completely hidden by the flowers. I have never seen it ripen seeds, however, and do not know if it does so in other localities. It takes kindly to layering. The other species seed very abundantly. *C. japonica* in this locality does not grow over 8 feet in height.

**CHIMONANTHUS FRAGRANS** (*Calycanthus praecox*).—The flowers of this shrub are produced on the wood of the previous year's growth long before the leaves are developed. In this locality it often blooms during the end of January. It is not reliably hardy north of Washington, as all of our plants were killed to the snow line during the Winter of 1898 and 1899. Previous to that time it had remained unhurt for a long number of years. It is a trifle slow to increase from cuttings of the ripened wood, doing better from the half-ripe wood, with the foliage attached. Large plants are secured in a short period by layering in midsummer. The species and its variety *C. f. grandiflora* are grown solely on account of the wonderful perfume emitted by the rather inconspicuous flowers. Cut in the bud state they open out well if kept indoors with the stems in water.

**CHIONANTHUS VIRGINICA** (Fringe Tree).—A native shrub sometimes growing to a height of 30 feet; but specimens will give an abundance of bloom when only a few feet high. The flowers are disposed in drooping panicles, are pure white in color and very graceful. It is raised from seed and by budding on stocks of *Fraxinus ornus*.

**CISTUS VILLOSUS**.—Plants of this species have survived the past two Winters in Washington, during which we frequently had zero weather. For the Southern States, this and other species should be given a trial, as they are very handsome shrubs, with large white or purple flowers, somewhat resembling a single rose. Cuttings root freely, under cool treatment, late in Summer.

**CITRUS TRIFOLIATA**.—As a dwarfing stock this is used extensively for budding and grafting the different varieties of oranges, and for a hedge plant, one that will make an almost impenetrable barrier, scarcely any other subject will answer so well. But its usefulness is yet by no

means exhausted. As an ornamental shrub it makes quite an effective appearance early in the season, before the leaves appear, when covered with its pure white flowers, two inches in diameter. In late Summer and Fall the branches are loaded down with its golden fruit. In the grounds of the United States Department of Agriculture several old plants in the fruiting stage attract great attention from Northern visitors. Its propagation is effected by seeds, of which there is a plentiful supply; sown in the Fall out-of-doors, every seed will germinate after good weather sets in. During some seasons this species bears two crops of flowers—the first in Spring, the second along about the month of August. The second crop of fruit fails to ripen before cool weather.

**CLERODENDRON TRICHOTOMUM.**—A very handsome, free-flowering Japanese species, thoroughly hardy in the Middle Atlantic States; further North, although annually killed to the ground, it makes strong growths, and on these it blooms freely. The flowers are white with a dark red calyx. Propagation is accomplished by cutting up and sprouting the roots. The plant seems to delight in rather dry soil. In dry weather, when other shrubs suffer for want of water, this one is always fresh and green; but probably this is caused by the roots going deep into the soil. *C. foetidum* is not so hardy as the above, but where the crowns can be saved it will flower splendidly from herbaceous stems. It is one of the best shrubs for the Southern States. It sends up many shoots from underground stems. To increase it in quantity the roots and underground stems should be dug up, cut in small pieces, and started indoors early in Spring.

**CORNUS FLORIDA** (*Flowering Dogwood*).—In the Southern States this Dogwood grows sometimes 30 to 40 feet high; further North it is a shrub 10 to 15 feet high. The flowers are small, greenish-yellow; the bracts are very large and pure white. It blooms in early Spring before the leaves are developed. In Autumn a well-fruited bush, with its red foliage, is a most beautiful object. *C. f. rubra* is a rosy-pink flowered variety of recent introduction, well worthy of cultivation; both it and the type should be planted in well-drained situations. They are increased by budding and grafting on seedlings. *C. sanguinea* has dark red branches—a very effective plant among other shrubs. *C. candidissima* and *C. mas* are commonly grown, the former for its flowers, the latter principally for its fruits.

**COTONEASTER MICROPHYLLA** is a dense, low-growing, evergreen shrub, with small leaves and bright red fruits that remain on the plants the best part of Winter. It is propagated best by taking cuttings, about 6 inches long, and rooting them indoors in August or September. *C. Simonsii* is almost evergreen and perfectly hardy south of New York; its bright red fruits is the main feature of the plant.

**CRATÆGUS** (*Hawthorn*).—There are numerous American species cultivated as shrubs, or dwarf trees, the best of which are *C. coccinea*, the scarlet-fruited Thorn, and *C. crus-galli*, the Cockspur Thorn. Owing to their bright red fruits, often remaining a long time after the leaves fall, they are valuable decorative subjects. *C. oxyacantha* is the English Hawthorn; the many kinds grown, and which are known as varieties of

this species, make very symmetrical specimens. They are more floriferous than the American kinds. Some of the best are *C. o. alba-plena*, double white; *C. o. punicea-plena*, double scarlet; *C. o. bicolor*, pink edged with white; *C. o. rosea*, pink with white claw. They are increased by budding or grafting upon seedlings of the type. The seeds do not germinate until the second year from sowing, consequently they should be mulched in Summer to prevent drying out.

*C. pyracantha* is the evergreen Thorn. The fruits are the principal decorative feature of this shrub; they are of a beautiful scarlet color, remaining on the branches during Winter. *C. p. Lelandi* has bright orange-scarlet fruit—a very ornamental and quick-growing variety.

**CRYPTOMERIA JAPONICA (Japan Cedar).**—With us this is one of the most satisfactory of the evergreen coniferae. It looks well in a 5-inch pot, and from that to a specimen 30 feet high. It varies very much, there being nearly a dozen well-defined varieties. In the New England States it is not thoroughly at home as a tree, and this condition is not to be met with until we get as far South as Maryland. As a pot-grown plant it is very little inferior to the costly Norfolk Island Pine (*Araucaria excelsa*), and it can be gotten up in quantity at less than one-tenth the cost of the latter. Cuttings root well if put in by the end of October, in a cool sand bed. They can be inserted large enough so that by the middle of May following they will be ready to be shifted into 5-inch pots. Although plants raised from cuttings make the best furnished plants for using in pots, seedlings, if grown on without a check, furnish plants within a year from sowing, which will not look too small in 5-inch pots. The seed should be gathered as soon as ripe, which it usually is about October 15, else there is danger of it being lost through the cones bursting open, the seed falling out through a little disturbance of the branches. For sowing, prepare shallow boxes of firmly pressed soil—loam, leaf mould and sand in equal proportions will suit. Sow the seed, not too thickly, and cover with half an inch of screened leaf soil and sand; put near the glass in a temperate house. They will germinate the first half of January, and can remain in the boxes, if not sown too thickly, until the end of May. Pot off singly or three in a 3-inch pot at first, using sandy soil. Keep in a growing temperature until they are too large for small pots. The plants will stand in cold frames during the Winter in most places without hurt, other than a slightly yellowish tinge to the leaves, but where they are wanted to make marketable plants in as short a time as possible from the seedling stage, they should be kept in a cool house where, if suitable rooting conditions are provided, they will make rapid progress during the Winter months.

**CYDONIA JAPONICA (Japanese Quince).**—The common form will give good flowering specimens from seed. The finer varieties may be grafted on seedlings of the type. Cuttings of the ripe wood taken in the Fall and stored till Spring are rooted successfully. It is also raised from cuttings of the roots, from suckers and by layering. There is a form with variegated leaves and pale flowers, also a pure white and double red. They are among our most desirable hardy shrubs, coming into bloom along with the Forsythias and *Jasminum nudiflorum*.

**C. Maulei** is a much dwarfer species, with reddish flowers produced in great abundance. **C. M. superba** has the flowers of a deeper shade of red. **C. M. tricolor** has the leaves variegated with pink and white.

**DAPHNE CNEORUM**.—A hardy dwarf evergreen trailing shrub growing not more than a foot high. It flowers in April and May; the color is dull pink. It makes a neat symmetrical plant, with very sweet-scented flowers. It is rather slow to increase from cuttings. The best method of propagation is to layer the trailing branches in Spring, making an incision, or tongue, in the under part of the stem. Have the cut part at least 2 inches under the soil; secure with wooden pegs; press the soil firmly over it, and cover with sphagnum to insure moisture. Leave until the following Spring before separating from the parent plant. **D. Blagayana** is also a desirable hardy trailing species, not so well known as the above. **D. Mezereum**, a hardy deciduous species, is sometimes used for forcing, more on account of the fragrant flowers than for their appearance. It is raised from seed, and its forms grafted on seedlings of the type. **D. odora**, **D. o. marginata** and **D. o. alba** make very satisfactory growth in sheltered positions out-of-doors here, but it may be stated that the plants were imported direct from Japan. I have tried greenhouse-grown plants in similar situations with unfavorable results. **D. pontica** and **D. laureola** are perfectly hardy here, but they do best with partial shade in Summer. The last named is scentless.

**DEUTZIA SCABRA**.—A very free growing and handsome flowered shrub from China and Japan. It blooms according to locality in May and June. In Washington it reaches a height of 8 feet. It blooms on short growths made on the previous season's wood. **D. s. crenata** is a form with smoother leaves than the type. There are several other varieties with double flowers more or less tinged with rose. **D. c. Pride of Rochester** has the flowers large and double white. In the Northern States they should be planted in protected situations. It is among the easiest shrubs to propagate. The cuttings are taken after the leaves fall from the current year's growths; they should be tied in bunches and heeled in moss in a cold frame. In early Spring they are put in boxes of sand, with a little soil at the bottom, and kept in a greenhouse. When rooted they are hardened off and planted out in rows, where they will make fair-sized plants before the growing season is over. These plants make splendid growth in tubs, and are easily forced into bloom for the decoration of large conservatories. **D. gracilis** has never been known to suffer from cold weather in this latitude, and it is said to stand the Winter, when in sheltered positions, in the Northern States. As it blooms on short growths made on the wood of the previous season, the plant would be of no service where its branches are apt to get winter-killed. It is one of the grandest of our dwarf flowering shrubs, blooming in Washington from the first to the middle of May, and growing from 2 to 3 feet high. It is well suited for planting in cemeteries. For forcing into bloom, it is an easy subject. The plants may be lifted from the open ground as late as the weather will permit. They lift with a mass of fine fibrous roots, and should be potted before getting a chance to dry. Place them in a deep frame till wanted; put them in heat very gradually

else there will be a tendency to have flowers without foliage. This species is best propagated from green wood cuttings taken shortly after the plant is done blooming. Dull weather should be chosen for the operation, as then the cuttings stand an almost certain chance of rooting. Make the pieces about 4 inches long; avoid the thick, succulent growths, taking only those which have most substance to them. Put closely together in the sand bed of a cool house, or frame, and shade to prevent wilting. As soon as rooted, put in boxes or small pots until taken a little with the soil, then plant in rows outside, where they will make bushy little plants before Autumn. The next year after that in which they are struck from cuttings will give plants large enough to go into 6-inch pots for forcing. *D. Lemoinei*, a hybrid between *D. gracilis* and *D. parviflora*, is also a good subject for forcing. It is quite as free in rooting as *D. gracilis*, and, along with *D. parviflora*, should be treated in the same manner in the same propagating bed.

**DIERVILLA** (*Weigelia*).—*D. rosea* is the best known of the species; it blooms in May and June. As it is not particular as to soil or location the species and its varieties should be in every collection. *D. r. floribunda* has dark red flowers with whitish stamens—a very prolific bloomer. *D. r. Desboisii* has deep rose-colored flowers. *D. grandiflora* is a tall growing plant with large leaves and flowers. There are several varieties with white, red and pink flowers; some of these give scattering blooms throughout the Summer and Autumn months. *D. rosea* and its forms force very easily. In its propagation, cuttings of the dormant wood root quickly if put in gentle heat about the end of March, or the growing tips may be used in Summer when kept in a humid atmosphere during the rooting process.

**ERICA** (*Heath*).—These are attractive low-growing shrubs useful for bordering those of taller growth. The cuttings taken from the tips of the current year's growth should be put in during late Summer. Few florists have just the proper facilities for rooting these and kindred plants. The structure, a cool frame, should face north and will be all the better if in the shade of a house. The idea is to have the atmosphere while rooting as moist and as cool as possible. *Erica vagans* is an early kind, as is also *E. mediterranea*; *E. cinerea* and *E. tetralix* are later in blooming. *Calluna vulgaris* (*Heather*), with the double and white flowered kinds, are all good; they need peaty soil, or loam mixed with an abundance of leaf mould and sand, and should not be allowed to get dust dry at the roots while in a young state.

**EUONYMUS** (*Spindle Tree*).—Up till within a few years *E. japonicus* was among the finest of our evergreen shrubs in this section, but owing to the ravages of a small scale insect the plant is now comparatively seldom seen and will only thrive where severe measures are taken to keep it clear of the pest. Several forms have very handsome variegations; their names are *E. j. latifolius-aureus*, *E. j. aureo-marginatus*, *E. j. albo-marginatus*, and *E. j. latifolius-albus*. They bloom about the end of July and usually ripen large quantities of seeds. The variegated kinds are propagated by cuttings, put in about the end of October, in a cool house or frame.

**E. radicans variegata** is usually best known in its place in the shrubbery, but it is extensively used for a very different purpose, and that is as a carpet bedder. For this work, to fill even a small space, a great many plants are necessary. In public parks and gardens the same plants may be used several seasons, or the growing points may be rooted afresh each Fall. The shoots are collected in bundles of 50 or 100 together, and with a strong knife they are cut to a uniform length —4 or 5 inches. The lower leaves are stripped and the cuttings put very thickly together in boxes of sand, and placed in a cool frame, where they root freely.

**EXOCHORDA GRANDIFLORA** (*Pearl Bush*).—The only fault with this plant is its short blooming season, which is during the month of May, but it is exceedingly handsome while it lasts. It is a native of China. Although sent out in the early seventies it is still by no means common, owing to its propagation by the usual methods being somewhat difficult. In several localities it has ripened quantities of seed for several years, and when seed is obtainable no difficulty is experienced in raising plants, as the seeds germinate very evenly. Severe pruning, such as this plant is likely to get from cultivators, on account of the desirable sprays for cut flowers, evidently works against the setting of seed, for the specimens which have borne abundant crops of seeds in this locality are those which have never been touched by the knife. This plant was sent out under the name of *Spiraea grandiflora*, which clings to it yet in some places.

**FORSYTHIA**.—Japanese shrubs, usually covered with bright yellow flowers very early in Spring. There are two well-known kinds in cultivation. *F. suspensa* has long, drooping branches, while *F. viridissima* is more erect in growth. Nothing in the shrub line is easier to increase. All that is necessary is to cut the previous season's growths into lengths of 8 or 10 inches and heel them in deeply in a protected piece of ground, covering during hard weather with leaves or loose litter. November is the month for this operation. The cuttings will also root in a very short time, if put in moderate heat in March. Both kinds flower before the leaves make their appearance, a day or two of warm sunshine being sufficient to bring them out. The plants should be pruned only after they are done flowering, as the flowers are produced directly on the wood made the preceding Summer.

**GORDONIA** (*Loblolly Bay*).—These plants thrive in this locality when given a deep, sandy soil and well supplied with moisture. They produce their large camellia-like flowers from July till frost. They are propagated by layering, allowing the layers to be well rooted before removing. *G. pubescens* and *G. lasiantha* are the species grown. The last-named has pure white flowers, about 4 inches in diameter.

**HALESIA** (*Snowdrop Tree*).—These shrubs, or small trees, are in full flower before the leaves are fully developed. In this section *H. Meehanii* forms a very symmetrical, small-sized tree. *H. diptera* and *H. tetrapetala* differ from each other in the number of wings to the fruit. All of the kinds are raised from seeds, which sometimes remain in the ground

over a year before germinating. Seedlings of *H. tetraptera* are used as stocks for the beautiful flowered Japanese *Styrax*.

**HIBISCUS SYRIACUS** (*Shrubby Althaea*) is a deciduous shrub of easy cultivation, and needing very little attention after being planted beyond an occasionally thinning out of the branches. Most of the numerous varieties are very neat and compact, growing from 5 to 12 feet in height. They bloom late in the season, when most of the other shrubs are out of flower. The double-flowered varieties root easily from cuttings of the dormant wood, in early Spring, or from green wood in Summer. The cuttings from the ripened wood should be made in the Fall and heeled in out of the reach of frost in moderately dry sand. They may be put in rows in the open as soon as weather permits, or they may be rooted indoors early and planted out later. Several of the single varieties come true from seed, of which an abundant crop is usually produced. *H. s. totus-albus* is a useful single white variety and flowers when very small. *H. s. camelliæflora* is double white, with pink throat. *H. s. Boule de Feu*, double, violet colored flowers. Other good double flowered forms are *H. s. Leopoldii flore-pleno*, *H. s. rubra pleno*, *H. s. purpurea flore-pleno* and *H. s. Jeanne d' Arc*.

**HYDRANGEA HORTENSIS** is the common garden Hydrangea, of which there are numerous varieties, all of them being hardy in the District of Columbia. Some are cut to the ground during Winter, but they never get injured permanently. *H. h. Lindleyana* and *H. h. stellata prolifera* usually survive the Winter with the stems several feet above ground. These plants form very large specimens, and are very handsome when in bloom, changing in color, as the flowers mature, from greenish white to a deep rose. The central flowers are fertile, the outer ones sterile. *H. h. japonica* has one or two very handsomely variegated forms. Cuttings of these are apt to lose their leaves in the sand bed, but in this condition they will root, making young growths simultaneously with the rooting process; and if they are carefully put in very small pots they will make fair-sized plants within a year. But they must be kept in pots during this time, as the roots are much weaker than those of the green-leaved plants. The variety known as *H. h. aurea-variegata* is probably the handsomest of our hardy plants. *H. h. otaksa* has large heads of rose-colored flowers. *H. h. ramulus-coccinea* has dark colored stems and pink flowers. *H. h. Thomas Hogg* has pure white flowers. Cuttings will root any time after the shoots are moderately firm. Where wood is scarce the large stems may be split down the middle with a leaf to each piece. Where pruning is necessary it should be done early in the season, to throw vigor into the shoots springing from the base of the plant.

**H. quercifolia**, from the Southern States, opens its large pyramidal heads of flowers late in the season and is valuable on that account alone; but the handsome foliage and its spreading, graceful habit combined make it a most desirable shrub. It will thrive either in partial shade or full sun. In propagating, the smallest of the ripened shoots should be taken with the leaves attached, placing the stems deep in the sand bed of the cool propagating house. If put in about the middle

of October, most of them will root by the end of February. Suckers, with small roots attached, may be lifted and potted in Spring. The most certain method is to layer the lower branches, allowing them to remain at least a year before removing. Seeds are not always obtainable, but they germinate readily in sandy soil covered with finely screened sphagnum.

**H. paniculata grandiflora** is one of the best of the late blooming shrubs. The flowers are creamy-white, in large pyramidal heads, terminating the current year's growths. It comes into bloom, according to locality, from July to September. It is grown both in bush and standard form. In propagating green cuttings may be taken during the first part of July. Select a dull day for the operation. Take those shoots which are not too robust and only the ends; shorten back the leaves one-third and put in sand, in a cool, humid atmosphere. Cuttings of the dormant wood may be made 8 or 10 inches long and inserted, either in the Fall, or kept heeled in, or buried in a cold frame during Winter, putting them in rows in the open as soon as weather will permit. Cover thinly with spent hops, or old manure, in either case.

**HYPERICUM (St. John's Wort)**—*H. kalmianum* is the species most commonly seen in cultivation; it thrives in almost any soil and in a sunny position. *H. patulum*, a Japanese species, forms a bush from 4 to 6 feet in height, in favorable situations. *H. Moserianum* is not so tall as *H. patulum*, but the flowers are larger; both of them are apt to be hurt in Winter in exposed situations. Cuttings root quickly at any time during the Summer months. *H. calycinum* is one of the handsomest and most useful of the dwarf evergreen shrubs. It forms dense clumps of growths, not over a foot high, with very large, bright orange-yellow flowers; much used for the front portions of shrubberies. Increase is by division. In parts of the country where the Winters are too severe it is easily protected by branches of evergreens, or rough stable litter.

**ILEX (Holly).**—*I. aquifolium*, the English Holly, is, unfortunately, tender in the Northern States. Philadelphia is said to be the northern limit of its hardiness. Around Washington it is perfectly hardy, but it is much shorter lived than our native species, *I. opaca*. Except with comparatively small specimens of the English species on which the fruit is in larger clusters and brighter colored, the native one is to be preferred for specimen plants. Several specimens in the parks here are over 40 feet high, and not much inferior as berry-bearing plants to the English one. *I. opaca* is very common in a wild state in the woods here; but I have never seen what could be termed a presentable plant. They are generally found in the shade of other trees, conditions which make them scraggy looking. When grown in the open, in prepared ground, their appearance is quite altered; the branches grow close together, and the outline of the tree is rather conical, not spreading as in *I. aquifolium*. *Ilex cornuta*, from Japan, is a very satisfactory species, but the berries, of which there is a plentiful supply, do not ripen until after the time when they would be most welcome. The English species takes well on stocks of *I. opaca*. The operation should be done indoors either before growth is active in Spring, or after the wood is fairly ripe

in August. *I. opaca* is more difficult to raise from seed than *I. aquifolium*. A good method is to sow in a mixture of peat and sphagnum moss, made quite firm, and place in a greenhouse where it will get the full sun, keeping the mixture moderately wet. Plants grown for their berries, or, in fact, for any purpose except for hedges, should never be selected from seedlings, as there are two kinds, one with the female organs, imperfectly developed, but with the stamens well formed bearing abundance of pollen; they are the most abundant bloomers, but do not bear fruit. The other kind has fewer flowers, with the pistils all well formed and quite prominent in the center of the flower. The stamens on the other hand seem imperfect in most cases, but doubtless there is enough pollen on them to fertilize the flower, as fruiting plants set seed all right a long distance away from the pistillate plants. Therefore, cions should always be selected from berry-bearing plants. There is a variety of *I. aquifolium* with yellow fruit which is desirable. There are also many kinds with curiously-formed leaves, not so popular here as they are in Europe. *Ilex aquifolium* flowers on the growths of the preceding Summer; *I. opaca* flowers later, and on the current year's wood. The outer covering of the seeds of Holly is quite hard, and often they do not germinate the same season as sown. If sown as soon as ripe, in very sandy soil, and care taken to keep them from drying out during the dry months of Summer, they will germinate the following Spring. Sow the seed rather deep and cover with a mulching in Winter, which covering is easily removed when freezing weather is past. *I. cornuta*, grown in company with varieties of the English species, does not come true from seed.

***I. cornuta*.** It would be an interesting experiment were some of our Southern woodsmen to plant the Japanese Holly (*Ilex cornuta*) for the sake of its berried branches as a Christmas Holly along with the English (*I. aquifolia*) and the native evergreen kinds, *I. opaca* and *I. cassine*. The last named is the prettiest of the three, but both berries and leaves are small; the berries shrivel up too quickly and sometimes fall off before they can be used. *Ilex cornuta* fruits more freely than any of the other species. In the vicinity of Washington, by the middle of December, the berries are only beginning to turn red. Whether this fault would appear where the flowers expand earlier in the season I cannot say. A most noticeable feature in connection with the Japanese plant, the mentioning of which may be of use to some one some day, is that it bears a much more abundant crop of berries when male plants of the English species are in the immediate neighborhood. The hardiness of this plant is about the same as that of the English kinds, probaby a little more tender. I understand it can be grown as far North as Philadelphia. In Washington it stands the most severe Winters without hurt, and grows much stronger than the English species.

**ITEA VIRGINICA.**—The cultivated form of this is much superior to plants found in the wild state. It has long racemes of rather pretty greenish-white flowers. It may be propagated by division, or from seeds which ripen freely. It usually grows from 2 to 4 feet high.

**JASMINUM NUDIFLORUM** (*Chinese naked flowered Jasmine*).—This may be used either as a bush plant on the lawn or open border, for covering walls or arbors, or for forming a light hedge. It is not particular as to soil or situation, growing almost anywhere. Its flowers are produced during mild Winters. Beginning in December they expand as the weather permits till April. Propagation is effected by putting in cuttings of the ripe growths out-of-doors in Autumn. Good-sized branches can be layered successfully. It is one of the easiest shrubs to root. *J. revolutum*, *J. fruticans* and *J. floridum*, all of them yellow-flowered species, usually stand the Winters here. *J. revolutum* is the hardiest. They are propagated by layering, and from cuttings of the ripe wood, kept in a cool house over Winter.

**JUNIPERUS** (*Juniper*).—*J. sabina* var. *tamariscifolia* is a most useful dwarf, trailing evergreen, seldom growing over 18 inches high. *J. procumbens* is another species of creeping habit. Cuttings may be put in after the first slight frost. Where only a limited number of this and other evergreen coniferous shrubs is required, the best method, I have found, is to fix up a few boxes, say about 4 inches deep, with sandy potting soil at the bottoms and pure sand on top; make the cuttings about 6 inches long, half of which should be in the soil. Put them in fairly close together, and firm well. Give one good watering. Stand the boxes in the coolest part of the house under the benches; keep moderately damp, and by Spring, if the conditions have not been unfavorable, a goodly percentage will have rooted. If not too close together they will take little harm from passing the Summer in the same boxes. The kinds available for this method of propagation are *Biotas*, *Cupressus*, *Thuja*, *Retinospora*, *Cephalotaxus* and *Taxus*.

**KALMIA LATIFOLIA** (*Calico Bush*).—A native evergreen shrub growing from Maine southwards. In the Northern States it is a bush, 4 to 8 feet high. Further South it is frequently met with 20 feet high. It blooms during May and June. It is cultivated much in the same way as Rhododendrons; but under cultivation we seldom see the plants flourishing equal to those in their native habitats. It is raised from seed and from layers. *K. glauca* has lilac colored flowers, and whitish under the leaves; *K. angustifolia* has purple flowers. All three are used for forcing, imported plants being employed for the purpose. *K. angustifolia* has lateral corymbs; in *K. latifolia* and *K. glauca* they are terminal.

**KERRIA JAPONICA** is a popular flowering shrub which is not too particular as to soil or situation. It attains a height of about 6 feet. There are three forms—the double flowered, single flowered and variegated leaved. They are all good. The variegated one keeps the color in the leaves all through the season just as showy as in Spring; it usually bears a crop of flowers, which are bright yellow, over an inch in diameter, along about the first part of May. This plant is capable of being used as a hedge subject, as it stands clipping well. The other two kinds are more profuse bloomers, especially the double, which is the strongest growing of the three. It is seldom without flowers all during the Summer and Fall. The plants are best propagated from ripe growths during the latter part of August, indoors.

**KŒLREUTERIA PANICULATA** is one of the very best small sized deciduous trees in cultivation—such as florists are often called upon to suggest for small gardens and in places unsuitable or too small for the development of forest trees. The Kœlreuteria was certainly not named by anyone having its popularity in view, as I am inclined to think the long name is responsible for the plant not being more common. There isn't a sufficiently taking popular name under which the species is known. The leaves are compound; the flowers yellow, in immense panicles, well above the leaves; they are produced in June and July. The seed, which is somewhat like that of the Canna, if sown in the Fall will germinate the following Spring. Stock is also got up readily from root cuttings.

**LAGERSTREMIA INDICA**, (*Crape Myrtle*)—Northern nurserymen, as a rule, do not handle this plant, owing to its being tender in the North. However, it is hardy enough to stand zero weather; but when the mercury gets much lower the plant is apt to be killed to the ground. In the Southern States the Crape Myrtle is perhaps the best known of all the flowering shrubs, as there are few, if any, which exceed in beauty a well-developed specimen in full bloom. The flowers are bright pink and are arranged in immense heads, even on one year-old plants from seed. Large specimens grown in tubs, and kept in a cool greenhouse, can be made to flower two or three times during the year by cutting back the flowering branches. *L. i. alba* has pure white flowers, others are bright and pale shades of purple, rose and red. It is hardy in this section and is successfully grown much further North with a slight protection during Winter, for if the roots are protected with a covering of leaves, or rough litter, they will sprout vigorously and bloom profusely before the Summer passes. It is best propagated from seed, as all the colors come true. Sow in boxes about the latter part of September, on very firm soil, covering the seeds with finely sifted peaty soil. They will germinate in Spring, and if liberally treated some of them will bloom the same season. Young plants are always much more tender than those three years old and upward.

**LAURUS NOBILIS** (*Bay Tree*)—In sheltered situations this well-known shrub occasionally survives the Winters in this section. It sometimes makes growths 6 feet long in a single season; these are necessarily soft and ill-prepared to stand severe weather. During the Winter of 1898—1899 every plant was killed to the ground. Large specimen plants grown as standards and pyramids are imported for decorative purposes. They may be had in good condition for several years by attention to watering and keeping them indoors when there is danger from frosts. Owing to their restricted root room there is little danger of their growing out of shape.

**LIGUSTRUM** (*Privet*)—In this section *L. japonicum* is a very desirable evergreen species with large leaves. During very severe Winters the outer branches suffer considerably. *I. Ibota*, *I. ovalifolium*, and *I. lucidum* are very attractive-looking shrubs when in flower. The European Privet, *L. vulgare*, has small flowers and foliage, and is the hardiest of the number. There is a form with glaucous leaves, the margins of which are bordered with white. The deciduous species are among the easiest

shrubs to root from dormant cuttings. These may be put in as soon as the leaves fall. The evergreen species usually bear large quantities of seeds, which are slow in germinating; when they remain in the ground over Summer a mulching should be given to prevent drying.

**LONICERA** (*Bush Honeysuckle*)—*L. Standishii* comes in flower before the leaves appear, usually in February and March. The blooms are sweet-scented, but rather inconspicuous. In favorable seasons the ornamental fruit is ripe during the first half of May. Seeds sown in September will germinate the following Spring. The branches may be layered any time after midsummer. *L. fragrantissima* is almost an evergreen species here; it blooms early in the season, the flowers are very fragrant. It forms beautiful specimens when not interfered with by other shrubs and trees. It is best propagated by cuttings taken any time during a wet spell in Summer, and rooted indoors. After this process they may be heeled in boxes of soil, and, afterward, either planted in rows outside or kept in a frame till Spring. *L. Albertii* is a dwarf species with small and narrow glaucous leaves and purplish flowers. *L. Morowii* and *L. Ruprechtiana* are both valuable on account of their handsome red fruit, which ripens in great abundance. *L. tatarica* has numerous forms, differing from each other in the color of the flowers and fruits. *L. t. grandiflora* has bright red flowers striped with white; *L. t. splendens* has the flowers dark rose; *L. t. grandiflora alba* is pure white. They do best in sunny positions and are increased by layering; also from seeds.

**MAGNOLIA**—All of the hardy species, some of which are fair-sized trees, are well worth growing. They may be divided into two sections—North American and Asiatic. Those of the former produce their flowers after the leaves are formed, while the deciduous, Asiatic species bloom for the most part on the naked wood, and very early in Spring. *M. grandiflora*, an evergreen species, native of the Southern States, begins blooming here about the end of May and continues throughout the Summer. In this section it is hardy, but during Winter, when the thermometer registers from 5 to 10 degrees below zero, the leaves are almost certain to fall, although without apparent injury to the plant. North of here it has a struggle for existence. Seeds sown in Autumn usually germinate in Spring. Seedlings are more vigorous than grafted plants, but they nevertheless take a considerable time before attaining a flowering size. *M. macrophylla*, another native, is known as the great-leaved Magnolia; it is much hardier than *M. grandiflora*. The leaves are from 2 to 3 feet long, and proportionately broad. The flowers are nearly a foot across. It is easily raised from seed. In this locality its blooming period is during the last half of May and early in June. *M. glauca*, *M. g. Thomsoniana* and *M. g. Watsoni* are all desirable hardy shrubs. The two last named have larger flowers than the type. Among the Chinese and Japanese species and varieties, *M. stellata* is the earliest to come in bloom; it is sometimes in full flower here by the middle of March. *M. conspicua* follows a week or ten days later; this is the finest of the Chinese species. As the large flowers expand before the foliage it is indeed a conspicuous plant when in bloom. *M.*

*Soulangeana* is thought to be a natural hybrid between *M. conspicua* and the dark purple flowered *M. obovata*. This is probably the case, as the color of the flowers would indicate; moreover, it is later in blooming than *M. conspicua* and earlier than *M. obovata*. *M. Kobus* is a very shapely small tree, with small flowers which open early. It is used as a stock for grafting purposes. The seeds are certain to germinate evenly when sown as soon as ripe. *M. Lennei* is the showiest of the dark purple-flowered kinds. The bloom is cup-shaped and very large; the petals are dark purple on the outside, lighter within. *M. stellata* is sometimes used as an Easter plant. When flowered in pots for this purpose it should be home grown, and plants selected for forcing which show the most buds. For forcing they may be potted in the Fall, but if the ground is in a condition to allow the plants to be lifted they can be successfully flowered a week or two afterward. Propagation is effected by seed, budding, grafting, and layering. Stocks may be chosen from *M. Kobus*, *M. tripetala* or *M. acuminata*. Layering should be practiced before the plants are in active growth. The best season for planting is just before the plants start into growth.

**NEVIUSA ALABAMENSIS** is called the Alabama Snow Wreath. This name is a little misleading, as when in flower there is really nothing to suggest snow from the appearance of the bushes. The stamens are the most attractive part of the flower; they are greenish white. Propagation is by division of the old plants; they sucker very freely. Summer cuttings can be depended on to root quickly.

**OSMANTHUS**—This genus belongs to the same order as the Olive (*Olea*), under which the species are sometimes described. *O. aquifolius* has a certain resemblance to the English Holly (*Ilex*). The resemblance is still more striking in the variety *O. a. ilicifolius*, one of the handsomest evergreen shrubs outside of the Conifers. It has stood outdoors here for a long number of years. During very severe Winters it suffers very little, and in protected situations not at all. *O. a. myrtifolius* is a form with leathery, spineless leaves, but is not such a free-growing shrub as the others. Of *O. a. ilicifolius* there are one or two handsome variegated forms in cultivation, but they are less hardy than the green-leaved variety. They are easily propagated by cuttings, rooted indoors during the Fall months. *O. a. ilicifolius* seeds freely and the seedlings come true; they do not germinate till the second year. Privet stocks are used on which to graft the variegated forms.

**PÆONIA MOUTAN** (*Shrubby Pæonia*)—The shrubby Pæonies are varieties of this species. They are hardy in the North, but their flower buds are quickly developed during mild weather, consequently they are apt to suffer from late frosts. They force well early in the season, but are only good for variety, as few flowers can be had on a moderate-sized plant. As border subjects they are desirable, making an attractive display during April or the first half of May. Propagation is by seeds, division and grafting. The single and semi-double forms will, in favorable seasons, ripen a considerable quantity of seed; they should not be allowed to remain in the seed vessels after they are ripe, as they harden, and germination will take longer than if sown when ripe. Sow in boxes

and keep under cover for the Winter. They should germinate in Spring. Seedlings are not as free flowering as grafted plants. The operation of grafting is best performed during the first half of September, in order that the union may be perfect and new roots produced by the stocks to give the Spring growth a vigorous start. For stocks any of the numerous varieties of the Chinese species may be taken; those varieties having the poorest flowers should, of course, be selected for the purpose. The wood taken for cions should be from the less robust part of the plant, that in which the large flower buds are absent being preferred. The leaves should be shortened back, and the cion attached to a good-sized piece of the fleshy part of the root of the herbaceous species by the easiest of the ordinary methods of grafting. Tie on with a string which will not rot in the ground during Winter, as support is needed in this way even after the cion has taken with the stock. The position to be occupied by the grafted stocks is the most important part of the operation. Where the Winters are severe, a deep frame, facing north, is the best place for them. In this locality they are heeled in on a sheltered part of the open border, but deep enough in the soil, so that the lower part of the cion is covered. A layer of decayed leaves or sphagnum is kept on the surface of the soil, and the tops shaded for the first two weeks. In planting insert deep enough so as to give the cions every opportunity to send out their own roots. About the beginning of May the graft will have made considerable growth; each one should then be supported with a stick, else it is liable to become detached from the stocks. Division should only be attempted with plants which are well provided with short growths from the bases of the plants.

**PAULOWNIA IMPERIALIS (Empress Tree).**—Under favorable conditions this subject grows into a good-sized tree. During May, before the leaves appear, the large panicles of bright purple gloxinia-like flowers open out, making a most gorgeous appearance. A medium-sized tree will ripen an almost incredible number of seeds; they are quite small and need careful tending to germinate them successfully. Young plants, when cut down annually, throw up very strong shoots with leaves sometimes 2 feet in diameter, giving an effect not to be had with any other plant. It thrives in any soil. The Winter of 1898-1899 was the first to kill the flower buds on even large-sized trees in Washington. It is hardy in the North, but the flower buds, being naked, are usually killed by severe frosts.

**PAVIA MACROSTACHYA (Smooth-fruited Horse Chestnut)**—This is a desirable shrub, growing from 3 to 9 feet high, spreading rapidly by means of stoloniferous roots. It flowers in June; the flowers are white, disposed in upright racemes. It is most easily propagated by division. *P. rubra* var. *purpurea* blooms in a very small state; it will succeed either in sun or shade. Seedlings make satisfactory blooming plants.

**PERSICA VULGARIS (Peach)**—The double-flowering forms are among the most popular of dwarf-flowering trees. Their period of blooming is during April and May, according to locality. *P. v. versicolor plena* has the flowers either red or white on the same tree, or with both colors combined in the same flower. There are double red, double rose and

double white forms. They are increased by working on one-year-old seedling stocks of the common peach.

**PHILADELPHUS** (*Mock Orange, Syringa*)—All of the species and their forms are valuable flowering shrubs with large white flowers, some of which are very fragrant. *P. coronarius* is one of the best known; *P. c. primulæflorus* has double flowers; there is another with yellowish leaves. *P. grandiflorus* is a native of the Southern States; it has larger flowers than *P. coronarius*. *P. Gordonianus* is a late bloomer, with almost scentless flowers. They succeed in almost any soil. Cuttings taken after the leaves drop in Autumn will root very quickly if put in slight bottom heat in March or April; or in a protected place they root well in the open ground. Pruning should be done only after the flowers have faded. This will give the young wood an opportunity to ripen. The flowers are only produced on the wood made the preceding Summer.

**POTENTILLA FRUTICOSA** (*Shrubby Cinquefoil*)—A very hardy species growing from 2 to 5 feet high, with pinnate leaves and numerous bright yellow flowers, which are produced all through the Summer. Cuttings may be rooted at any time indoors during Summer. Small plants are very suitable for the rockery, and by pruning in the Spring they are easily kept within bounds.

**PRUNUS PADUS** is the Bird Cherry. It bears long racemes of white flowers, in May, followed by ornamental black fruit. *P. spinosa flore-pleno*, the double flowering Sloe, forms a large shrub, usually covered with double white flowers in early Spring. The dwarf white, double-flowering Almond is *P. japonica flore-alba-plena*; the red form is *P. j. flore-rubra-plena*. They bloom for only a short period, but are exceedingly handsome while the flowers last. *P. Pissardi* is the purple-leaved Plum, of which there are good and bad forms; the good varieties retain their coloring till the end of the season. The flowers, usually borne in great profusion, open in early Spring before the leaves expand. In this locality the fruits are ripe by the end of May. Most of the species and forms are propagated by budding and grafting, but it is cheaper to buy than to work them in small quantities.

**PUNICA GRANATUM NANA** (*Dwarf Pomegranate*)—Both the tall growing and dwarf Pomegranates stand our most severe Winters here without the least injury, and flower quite profusely during the Summer. They are all the more welcome, as their unique, bright scarlet flowers are produced when shrubs in bloom are scarce. In favorable seasons they ripen fruit, but we do not depend upon these for propagation. Cuttings are taken from one and two-year-old wood, stored and put in a cool house propagating bed about the middle of February; they root very evenly. They should be removed to a frame as soon as they will bear it. The dwarf form makes a very ornamental shrub, and should be tried wherever it is likely to thrive. Native of Cabul and Persia.

**PYRUS** (*Crab-apple*)—Highly ornamental low growing trees, usually covered with flowers early in Spring. Some of them have very highly colored fruits in Autumn. They are increased by budding and grafting

on seedling stocks. The flowers of *P. Malus coronaria* are large, single, pinkish-white, very sweetly scented. It bears fruit freely, but the seedlings are slow in making flowering plants. *P. M. floribunda* and the variety called *atrosanguinea* are most beautiful when the flowers are half expanded; they are then of a bright rosy-red color, getting lighter when fully open. The flowers of *P. M. Parkmanni* are double, of a beautiful deep rose; valuable for cutting. It is a very free flowering variety and should be largely grown. *P. M. carnea* and *P. M. lutea* produce large numbers of flowers on small grafted plants. The double white and double rose colored forms of *P. M. spectabilis* are very desirable; they are very regular bloomers, seldom missing a season. *P. M. floribunda* and *P. M. f. atrosanguinea* bloom freely in a small state, and should be grown more for forcing purposes.

**RHAPHIOLEPIS OVATA**—A charming little evergreen shrub, which is hardy here in sheltered situations. The flowers resemble those of a *Cra-tægus*; they are pure white, sweet-scented, about three-quarters of an inch across and arranged in terminal panicles. The leaves are leathery in texture and almost round. It ought to prove a good shrub for the Southern States. It is easily propagated by cuttings in the Fall, rooted indoors.

**RHODODENDRON**.—In some parts these do grandly. In this locality, when given sheltered and partly shaded positions, they thrive tolerably well, but when in the full sun they do not thrive unless very carefully watched. Hybrids of *R. ponticum* are less hardy than those of *R. catawbiense*. This species and *R. maximum* are natives of the Eastern States; they should be given treatment similar to that recommended for Azalea. They are propagated by layering and grafting on seedling stocks of the hardy species, principally *R. maximum*. *R. punctatum*, a species from N. Carolina with small pink flowers, is quite hardy North. There are many beautiful greenhouse species and varieties, comparatively few of which are cultivated in America.

**RHODOTYPOS KERRIOIDES** (*White Kerria*)—This is a very desirable Japanese shrub, seldom growing over 8 feet high, although in its native country it is said to reach twice that height. The flowers make their appearance as soon as the growths of the current year develop, and keep up quite a display from about the middle of May all through the Summer and Fall months; that is, if the ground does not get too dry. The flowers are snow-white, about 2 inches in diameter, and appear at the ends of the shoots. The plant thrives well on heavy soils, and, although not necessarily, in places crowded and partly shaded by overhead foliage. The seeds are in shape and size somewhat like those of the Canna. They may be sown as soon as gathered, as they are slow in germinating.

**RHUS COTINUS** (*Smoke Tree*)—A species from Southern Europe, with very neat foliage. The whole plant is usually covered during mid-summer with a fringe-like substance, which gives rise to the name "Smoke Tree." This substance consists of the elongated hairy pedicels. *R. glabra* is one of the handsomest species, on account of its large, odd-pinnate leaves. *R. g. laciniata* has the leaflets much cut up, resembling the fronds of some Ferns; both are easily propagated from cuttings of

the roots. *R. typhina*, the Staghorn Sumach, grows from 10 to 30 feet high. The leaves are odd-pinnate, having from 11 to 31 leaflets. *R. copallina* is a shrub, growing from 1 to 7 feet high. Both are propagated by root cuttings, and also from seeds. *R. Toxicodendron* and *R. venenata* are poisonous species; the former is known as Poison Oak and Poison Ivy, the latter as Poison Sumach and Poison Dogwood.

**ROBINIA HISPIDA**—The flowers of this species are deep rose colored, borne in hanging racemes. When grown on its own roots it suckers freely, and when planted among choice shrubs it soon appropriates space not intended for it. When worked on stocks of the False Acacia, *R. Pseud-acacia*, it is a more desirable shrub, but it requires frequent pruning to keep it in shape. Of *R. Pseud-acacia* there are low-growing and late-blooming forms; none of them are, however, superior to the type. They are worked on seedling plants of *R. Pseuda-acacia*.

### ROSA—(Rose).

The Rose is without question the most popular of flowers, and it can hardly be wondered at, as in the very numerous species and varieties we have nearly every shade of color in the flower—green, yellow, bronze, red, pink, white, purple and almost black. The flowers, be they single, semi-double or double, have much to please the eye, and their fragrance is unsurpassed. The cultivated varieties are divided into classes. Some of the varieties are differently arranged by different authorities. The arrangements are intended as aids to the published descriptions; thus the more easily do growers get an idea as to the habits of a new Rose when the originators class it with a section of the better-known varieties. But the varieties of the several groups have, to a certain extent, been crossed one with another, and there are very few people, even be they expert rosarians, who agree with each other on the position which some of our Roses should occupy in any system of classification. Again, as new breaks are made by the crossing of species and varieties, as has lately been done with the species *R. Wichuraiana* and *R. rubiginosa*, there arises a necessity for new class names. Some of the sections are but little grown in the Northern States, as the plants which do best in the colder parts of the country belong to only a few classes. The hybrid perpetuals, or hybrid remontants, are the best-known outdoor Roses, but for this purpose they are unsatisfactory both North and South. In the North they suffer during Winter, and in the South they are anything but ornamental after the flowering period, which is a short one. In this latitude they are at their best from the 25th of May till the 10th of June. They are, however, gorgeous while they last. Further North some of the kinds give a few scattering blooms in Autumn. General Jacqueminot, a variety raised nearly 50 years ago, is one of the most valued by amateurs, owing to its brilliant crimson, highly fragrant flowers. It is used to a considerable extent for forcing. When the plants are put out in solid beds, the sash are removed in Summer, to develop strong canes. At the proper season these are pruned, the plants top dressed, and the crop of flowers in early Spring is usually a heavy one. Some houses of this Rose in this vicinity have stood untouched, save in

pruning and top dressing, for 15 years. The varieties Ulrich Brunner, Mrs. John Laing, Mme. Gabriel Luizet and Anne de Diesbach force well, and for outdoor culture they are among the best.

**Forcing**—In forcing hybrid perpetuals the plants should be lifted when the growths are matured, pruned back, potted hard and placed in a cold frame. Plunge the pot among leaves, if there is a probability of their making a few roots before freezing weather without the buds starting into growth. Plunging will keep the roots safe and in a condition ready for active work. When brought into a cool house, in the early part of the year, they need to be brought on very gradually so as to have feeding roots when the buds break. An examination of the roots will show when it is safe to force growth by giving gentle heat. American Beauty, sent out in 1885, is a perpetual bloomer and has, to a certain extent, taken the place of most of the older forcing varieties of the so-called hybrid perpetual class. This variety has had a wonderful career as a forcing Rose, and it is unlikely that its place will be taken by newcomers for some time at least.

**Propagation**—Roses of this class for outdoor growth are propagated by budding, grafting and from cuttings. When it is desired to put in cuttings in the open ground the work should be done during the first half of October. Select a sheltered spot. Have the ground freshly worked, or, better still, the cuttings may be put in as the ground is dug. The cuttings should be at least 9 inches in length and only an inch or so should be exposed above the surface. Those cuttings having a heel are not so liable to decay as those cut between leaves, or at the base of a leaf. They should always be put in with the aid of a spade, as it allows firming with the feet; and if the soil needs it a little sand should be added while the trench is open, to induce healthy rooting. Half-rotted leaves, or rough stable litter, should be spread over the whole during hard freezing weather. When they are to be rooted indoors, the cuttings should be taken off later, tied in bundles and their bottom ends placed in moss, in a place low enough in temperature to keep the buds dormant. In Spring place in a gentle bottom heat, with the atmosphere cool. They will root readily by this method. The cuttings must be potted before the roots get long. In potting have the soil moderately moist, so that they will need little water until the roots begin to take with the soil. In grafting, which is done in Spring, cut back plants of the Manetti and Dog Rose are used, or pieces of the roots of these, or the roots of any of the free growing Roses, such as Mme. Plantier. Budding on stocks of Manetti, or the Dog Rose, is done in the open ground in late Summer.

**Propagation by Seeds**—New varieties are largely raised from seeds ripened from hand-pollinated flowers. In raising plants from seeds, if sown as soon as ripe, they germinate very irregularly. Some of the hybrid perpetuals will germinate part of a crop and some of them will flower in two months from date of sowing. Other seedlings, germinated at the same period, will take at least a year to bloom, while other seeds of the same batch will lie in the seed pan over a year before vegetating. The reason why the seeds sometimes remain a long time

in the soil before germinating is owing to their being inclosed by a horny substance. This should be softened before sowing, by allowing the seeds to remain in boxes of finely sifted sand during the Winter, the boxes to be buried several inches below the surface of the soil out-of-doors. In removing the seeds from the sand previous to sowing, use a sieve with a small mesh; empty the sand (which is likely to be wet) into this, and force the sand through the meshes with the aid of a stream of water from the hose. The seeds should then be sown before getting dry. Care must be taken to remove them from their Winter quarters before vegetating, which they are apt to do, even when they are deep in the soil, as soon as the temperature of their surroundings reaches 40 degrees.

**Teas and Hybrid Teas** are the most important of all the classes, because they include the Roses mostly grown under glass to supply flowers all the year round. Although the varieties annually raised are numerous enough, those mostly grown in large quantities are either old kinds or sports from old kinds. Catherine Mermet is the parent of two—Bride and Bridesmaid; it is over 30 years since it was raised. La France, a hybrid Tea, the parentage of which is unknown, but it is said to have been raised from seed of a Tea Rose, is between 30 and 40 years old. Although in some cities a back number, in Washington it ranks next to American Beauty in price during the Winter, and is much in demand. Two of its sports, Duchess of Albany and Augustine Guinoisseau, have had their innings as forcing plants. If Golden Gate could be grown everywhere alike in size of flower, stem and productiveness, as it is in this locality, it would be a more popular Rose. Some flowers obtained here and exhibited in a Northern city not long ago, were taken for extra fine specimens of Souvenir du President Carnot—a hybrid Tea, which, like many others, has not fulfilled the predictions made for it a few seasons ago when first sent out. It has a habit of going to rest during the season when most wanted; but grand results are easily secured by resting, freezing and starting the plants, to have them in bloom by Easter, and depending upon them later for a supply of bloom during the Summer. Kaiserin Augusta Victoria, another Rose of the same class, gives good results by similar methods. Meteor, a hybrid Tea, raised in the eighties, has been popular where tried, but solely on account of its color, which is dark crimson. The list of kinds which have been tried for forcing and discarded is a long one. Scarcely a year elapses without some new kind being sent out, and the fate of most of them is determined after a short trial.

**For Out-door Bloom** the Teas are getting more popular year by year, and deservedly so, as they flower continuously during the Summer and Autumn months. If given a mulching of rotted manure and watered occasionally during dry spells, they are much more satisfactory than the hybrid perpetuums. Most of the kinds are quite hardy in this section. The tops are, of course, frequently killed, but this makes little difference, as the strong flowering wood is made from the base of the plants. Even much further North many of the kinds will stand the Winter, if protected by some loose material over the roots. But even where they are killed annually, the plants used during the Winter in the benches

make excellent material for planting out. If cut back and potted they take about ten days, in a suitable temperature, to throw out roots enough to insure successful growth when planted in the open border. Kaiserin Augusta, Victoria, Bridesmaid, La France and its forms, Souvenir du President Carnot, Belle Siebrecht, Antoine Rivoire and White Maman Cochet are a few among a large number of others which can be depended upon to succeed. Among the other ever-blooming kinds *R. rugosa* and its hybrids are coming into prominence. One of the first hybrids, raised about 12 years ago, is named Mme. Georges Bruant. The flowers are large, semi-double, very sweetly scented, and in color are almost white, having a slight creamy shade to them. Under favorable conditions, that is, where they are encouraged to send up fresh growths, blooms will be produced all through the season. Blanc de Coubert seems to be a double form of *Rosa rugosa alba*; it bears a pure white flower, is free blooming, and should be in every collection. The hybrid climbing Roses include such kinds as Paul's Carmine Pillar and Climbing Victor Verdier. Coquette des Alpes and Coquette des Blanches are representatives of the Hybrid Noisettes. Other well-known ever-bloomers are Clothilde Soupert (*Polyantha*), Hermosa (*Bourbon*), and Champion of the World (*Hybrid Bourbon*).

**Cultivation Under Glass**—Teas and Hybrid Teas are the Roses most largely grown for this purpose. They are easiest propagated from cuttings of the half-ripened wood. It does not seem to make much difference whether flowering or blind wood is used. Cuttings may be taken to single eyes with the leaf shortened back, or made with two eyes and the lower leaf removed. A bottom heat of from 65 to 70 degrees will answer, the atmosphere of the house being 10 degrees lower. Propagation is carried on from January to March. The plants are put out on the benches during June, from 3 or 4-inch pots, according to variety. Four inches of soil is the usual quantity; the kind used should be rather heavy and fibrous loam mixed with rotted cow manure to about one-sixth of its bulk. Subsequent mulchings of rotted manure mixed with bone meal are given as the plants show the necessity for them. Abundance of ventilation is afforded during warm weather. If shading is necessary it should be done with a substance which is easily removed, such as grafting clay mixed with water and applied with a syringe or pump. Firing should begin when the outside temperature drops to 50 degrees; the minimum night temperature of the house should be kept in the neighborhood of 55 degrees, rising to 70 degrees during the day for the Teas and Hybrid Teas, with the exception of Meteor, which thrives best with a minimum of 65 degrees. Watering is an item of the first importance. The condition of the soil is the best indicator as to whether water should be given or withheld. The first buds are cut off to induce robust growth. Syringing is necessary, to prevent red spider from increasing, but should only be practiced in bright weather. Ventilation is not less important than watering, and good judgment must be exercised in opening and closing the house; the condition of the weather out-of-doors must always be taken into consideration as well as the indoor temperature, as cold draughts, or the temperature getting too low will

almost certainly provide correct conditions for an attack of mildew—a fungus which in a short period, if allowed to grow unchecked, will ruin the plants. When mildew makes its appearance, sulphur applied to the steam or hot water pipes is the best antidote. Aphides are best checked by vaporizing. American Beauty, as already stated, is a hybrid perpetual, and when cultivated under glass it is an ever-bloomer. It is grown in a slightly warmer atmosphere than the Teas, and is often very successfully cultivated in solid beds. Medium-sized wood should be chosen for the cuttings, and these made with two eyes. They should be planted out of 4-inch pots.

**Propagation by Grafting**—There seems to be a difference of opinion as to the benefits to be derived from this method of propagation, but each grower may settle it for himself by giving it a trial. The stocks should be prepared by potting in 3-inch pots; in thickness they should correspond as near as possible with that of the cion—the cion should never be of a greater diameter than that of the stock. Any of the common methods of grafting will answer. The cion should be securely fastened in position with raffia. As soon as tying is completed, it is necessary that the plants be kept in a suitable atmosphere to preserve the leaves of the cions so that the union may be hastened. In grafting hybrids this is not so necessary, as they can be handled without leaves. A brisk heat under the plunging material will quicken the action of the roots and effect a union safely without the aid of a frame; but with Teas it is necessary to have them in an almost air-tight structure. If only a few hundred are to be experimented with, part of a side bench may be set apart for the purpose of receiving the grafted plants, and may be prepared as follows: Have the front and back boards higher than the plants. Ordinary sash laid lengthwise of the bench will suit all right, provided they can be arranged so as to keep the atmosphere warm and humid. To facilitate easy access to the plants the sash may be temporarily hinged on to the back boards with pieces of leather, and the sash tilted in front with a stick. Select a stretch of bench that can be relied upon to supply a temperature of from 70 to 80 degrees inside of the frame. First put a layer of sphagnum on the bench—one inch closely packed will do. Over this put some ashes, or sand, on which to stand the pots. The other conditions necessary for a quick union will readily suggest themselves, air being given very gradually after the union has taken place. When hardened off, growth will be accelerated by a shift into larger pots.

**Summer Roses**—According to locality May, June and July is the period during which the Summer Roses bloom. They are known as Ayrshire, Prairie, Austrian, Moss, Provence (Cabbage or Centifolia), Multiflora, Hybrid Sweet Briars, Hybrid China, Musk and Hybrid Wichuraiana. Bennett's Seedling is a well-known representative of the Ayrshire class. Among the Prairie Roses Baltimore Belle and Queen of the Prairies are old but grand kinds, splendidly adapted as climbers; they are very hardy and late in blooming. The Austrian Briars are among the earliest to flower; they form good-sized bushes and require little attention in the way of pruning. Austrian Copper has large, single flowers of a brilliant coppery-red on the upper surfaces of the petals;

the under surfaces are much paler in color. Austrian Yellow has large single yellow flowers. Harison's Yellow and Persian Yellow are semi-double forms. The Wichuraiana hybrids are destined to cut quite a figure as hardy climbers. The female parent, *R. Wichuraiana* (*R. Luciae*) is a Japanese species, of a rambling habit, with clusters of small white flowers, which open late. The leaves are small and shining. The plant lasts only a short time in bloom, but a well-established subject bears thousands of flowers. This is the easiest of all Roses to propagate. The new race of hybrids which have been raised lately are, in some cases, several weeks ahead of *R. Wichuraiana* in blooming; they appear to be very hardy. The flowers of *R. Wichuraiana* are capable of being fertilized with pollen from a large number of different varieties, and the resulting progeny varies greatly. Some have large, single flowers exceeding in size any of the recent hybrid Sweet Briars; others are small, very double, with petals arranged like the florets of a Zinnia. Some again have the flowers so closely resembling those of the variety Hermosa as to be mistaken for these, but the habit of all of the seedlings, so far as I have observed, is the same. W. A. Manda, of South Orange, N. J., was the first to raise hybrids from this species. Lord Penzance's Hybrid Briars also belong to the Summer blooming class. *R. rubiginosa*, the Sweet Briar, is the seed parent; this has been crossed with various other Roses. The flowers of the hybrids are bright colored and showy, but the most attractive feature is the sweet-scented foliage.

During recent years the Summer blooming section has been enriched by a Rose concerning which little is known beyond its being a Japanese production. It was brought to Scotland early in the seventies, and for nearly 20 years grew in the garden of a Mr. Jenner, near Edinburgh. It was secured by Turner, of Slough, and sent out in 1894. The name "Engineer," which it had borne up to that time, was changed to Crimson Rambler. It is a climber, of very vigorous growth, and very hardy. The flowers are borne in large clusters. The color is bright crimson. As was to be expected the great popularity of this Rose suggested Pink, Yellow and White Ramblers, but while the Roses which are thus described are good in their way, we have yet to see pink, yellow and white forms of the Crimson Rambler. This Rose has become a favorite sort for forcing into bloom at Easter, the plants for which purpose are either grown in pots or in the open ground. Plants grown by the latter method are much stronger than those in pots, but they require greater care in handling. The roots should not be allowed to get the least dry before potting. It is propagated in Spring and Autumn. When the wood is ripe and the leaves begin to fall, quite a number of short stubby growths will be found on the flowering shoots of the previous Summer's flowering wood; these, if made into cuttings about 10 inches long, and buried up to within an inch of the ends of the shoots, will root freely. Place them in some shaded spot, and in Winter cover with half-decayed leaves or straw to prevent quick thawing and freezing. A quicker method of propagation is to take half-ripened wood from indoor plants in Spring; these are potted as soon as rooted, and either grown on in pots or planted out when weather permits.

**SHEPHERDIA ARGENTEA** (*Rabbit Berry*)—Under favorable conditions this species grows into a small tree. The leaves, owing to the presence of an immense number of small silvery scales, are almost white on both sides, and from a distance the plants look as if they were covered with white flowers. The blooms are small, produced singly or in pairs in the axils of the leaves; they are exceedingly fragrant. *S. canadensis* is a smaller species, reaching a height of 6 feet. Both are easily raised from seeds.

**SPIRÆA**—The shrubby species worth growing<sup>1</sup> are too numerous to mention here. One of the earliest to flower, and a favorite kind, is *S. prunifolia*; *S. Reevesii* and its double form are both popular. *S. Thunbergii* blooms very early in the season when there are but few leaves on the plant; the flowers are small, but they make up in numbers for what they lack in size. All of the above have white flowers. *S. salicifolia* and its varieties bloom in dense panicles late in the season. This, with *S. paniculata rosea*, another late bloomer, has pink flowers. *S. Van Houttei* is one of the best kinds which flower in May or June; it makes a good forcing plant. *S. Bumalda* and *S. B. Anthony Waterer* have the flowers disposed on the ends of the shoots of the current year's growths, in flat heads, several inches in diameter. In *S. Bumalda* the flowers are rose colored; its variety has dark crimson blossoms. Both are dwarf, but very vigorous and easily propagated from the young wood. *S. sorbifolia*, *S. grandiflora* and *S. Lindleyana* are distinct from the others in having odd-pinnate leaves and the flowers arranged in large panicles, produced late in the season. *S. sorbifolia* dies down to the ground each season, and during extra hard Winters the other two behave in a similar way; but they make growth enough the following Summer to flower. *S. Lindleyana* is useful for planting in large groups. A native of the Himalayas it is probably unsuited for Northern sections unless well protected. All three are easily raised from seeds, or by division.

**STAPHYLEA** (*Bladder Nut*)—*S. colchica* and *S. Bumalda* bloom very early in the season. They have the reputation of being the easiest shrubs to bring into flower under artificial conditions. They belong to the Maple family, and are natives of Japan and Europe. *S. colchica* has fairly large-sized racemes of almost pure white flowers, very agreeably scented. Young plants with flowering wood can be got up in two years by taking cuttings of dormant wood in Autumn, heeling in moss, introducing them to gentle bottom heat in March.

**SYMPHORICARPUS RACEMOSUS** (*Snowberry*)—This species is grown on account of the large white fruits which hang from the ends of the branches during the Autumn and Winter months. *S. vulgaris* has red fruits, but much smaller than those of *S. racemosus*. They are propagated by seed, cuttings, or by division.

**SYRINGA** (*Lilac*)—About a dozen species of this popular genus are in cultivation. Most of them, however, are of little value for cut bloom. They are handsome while in flower, but they do not pay to grow alongside of the varieties of the common species, *S. vulgaris*. Of these there is

an abundance to choose from. *S. chinensis*, a small-leaved kind, is valuable on account of the long stems which support the flower heads. *S. persica*, the Persian lilac, and *S. p. laciniata* make rather handsome bushes, which is more than can be said of most of the kinds, as they are decidedly unsightly when out of bloom compared with the majority of ornamental shrubs. They are all natives of the old world. *S. vulgaris* is indigenous of central Europe. Some of the finer varieties are as follows: *Alba grandiflora* and *Marie Legraye*, both large flowered and pure white forms; *Louis Van Houtte*, dark red; *Dr. Lindley*, purplish lilac; *Charles X.*, reddish-purple; *Leon Simon*, double, bluish-crimson; *Emile Lemoine*, double, rosy-lilac; *Mme. Lemoine*, double white. Propagation is effected on in a variety of ways—seeds, suckers, layering, cuttings from half ripe or dormant wood, budding and grafting. Raising plants from seeds is practiced for producing new varieties and for supplying stocks. The best stock is the Californian Privet, *Ligustrum ovalifolium*. Layering is a sure method, and when a limited number of plants is wanted it is the one which should be practiced.

**TAMARIX**—All of the species give little trouble in their propagation. If cuttings 6 inches long be made from the previous year's wood, and put in gentle heat in the early Spring, they will root in a few days. Outdoor propagation will require the cuttings to be made nearly a foot long.

**ULEX EUROPÆUS** (*Whin, Gorse, Furze*)—Although this beautiful shrub frequently gets winter-killed with us, yet we would not think of doing without it. It is useful for planting in the front of a shrubbery, in sunny places. It starts into active growth very early in the season, and late frosts do more injury than the very severe frosts of midwinter, although, like many other things, it does not like rapid thawing and freezing during Winter. Seedlings are easily raised, and with good treatment they will bloom when two years old.

**VIBURNUM**, (*Snowball, Guelder Rose*)—Owing to their large and showy heads of sterile flowers, several of the kinds are much grown in shrubberies, in groups on lawns, and for cutting. *V. Opulus sterilis* is the one most largely cultivated; it comes in earlier than the Japanese species, *V. plicatum*, which is the best for cutting, as the flowers last longer, having more substance to them. When propagated from cuttings the growing tips should be taken in Summer; this must be done during a wet spell or from bushes which have been kept watered, otherwise the cuttings are very apt to lose their leaves during the process. *V. macrocephalum*, as the name implies, has large heads of flowers; in fact, too large to be of much service in cutting. This form is shy in rooting from cuttings, and is usually worked on seedlings of any of the free-growing species. There are numerous species, but their flowers are not showy. *V. reticulatum* has very handsome foliage, and forms a neat tall bush. Propagated from green cuttings. *V. Tinus* is an evergreen species, frequently getting injured here during Winter; there are several desirable forms of it.

**VITEX AGNUS-CASTUS** (*Chaste Tree*)—In this section one of our best late blooming shrubs, surviving the Winter without protection,

The flowers are purplish-blue or white. The plant blooms in August and September. *V. cannabæfolia* forms large, wide bushes, but it suffers during very severe weather. Both species are best raised from seeds. There is a hybrid form between the two species, with *V. Agnus-castus* as the seed parent; it is equally as hardy as that species, and comes true from seed.

**XANTHOCERAS SORBIFOLIA**, a native of Central China, was first grown in Europe about 30 years ago. It flowers after reaching a height of about 18 inches. Adult specimens, it is said, reach a height of 20 feet. The flowers are arranged singly, on a central stalk, which is several inches long. The stalk is upright, the bottom flowers opening first. In general appearance the individual flowers have a striking resemblance to those of the *Shortia galacifolia*. They have the same crumpled appearance on first opening. The outward parts of the petals are pure white, and nearest the base the color is at first yellowish green, subsequently streaked with brownish-red and eventually changing to a brighter red. The flower stalks are produced on the ends of the previous season's wood; flowers and foliage expand together. In appearance the foliage somewhat resembles that of the Mountain Ash. The fruit is quite large, fully the size of a horse chestnut. The seeds are brownish black, three-quarters of an inch in diameter. They should be sown soon as ripe and kept cool so as not to force germination until the middle of April. To insure the best results each seed should be sown singly in a 3-inch pot. This does away with the possibility of injuring the tender roots in transferring to larger receptacles or to nursery rows. From some cause many of the seeds produce plants which are entirely white instead of green; these die when a few weeks old.

**YUCCA** (Adam's Needle)—The hardy species of this genus are all ornamental plants thriving in situations fully exposed to the sun. Almost any soil will suit them. Some of the most useful species are *Y. gloriosa* (of which there are numerous varieties, one of the best being *Y. g. recurvifolia*), *Y. angustifolia* and *Y. filamentosa*. They are increased by dividing the stems and replanting in a shaded spot until rooted; also, in some species, by seeds, and from root cuttings.

## General Directions.

### Propagation—Seeds, Grafting, Budding, and Layering— Hybridization, Potting Plants, Drainage, Soil, Mulching, Watering.

#### PROPAGATION.

All plants may be propagated by one or more of the following methods: Seeds, spores, bulbils, budding, grafting, layering, cuttings of the stems, twigs, leaves and roots, suckers, divisions of the crowns or by stolons or runners. Cuttings are usually made from dormant wood in the cases of shrubs and trees whether they be evergreen or deciduous; and in the case of soft wooded plants the growths most recently made are those selected. Cuttings of leaves sometimes root freely and produce young plants or tubers, as in *Begonia rex* and *Gloxinia*. There are many devices in which to root cuttings, such as double bell glasses placed over double pots, one of the pots being supplied with water, the other with sand; handlights, and so forth; but they are of little service and are seldom used. Deciduous shrubs are usually propagated out-of-doors. Hardy perennials, such as *Iberis*, *Dianthus* and *Onosma* are propagated in cold frames. Many of the evergreen shrubs do well in a propagating house from which frost is kept out, while the tender plants, both hard and soft wooded, are rooted in an open bed of a warm house the atmospheric temperature of which does not fall lower than 55 degrees during the coldest weather. For plants which need more heat a propagating frame is easily erected in the warmest part of the house; this, with a minimum bottom heat of 75 degrees, serves for *Nepenthes* and other plants slow to root under ordinary conditions. Propagation by suckers, division, stolons and runners is an easy matter, and each species so treated readily suggests the means to be employed. Many plants difficult to propagate by the usual methods of cuttings of the branches yield readily to cuttings made from the roots. The Moss Rose is a familiar example. *Clerodendrons*, *Fatsias*, *Paulownia imperialis*, *Raspberry*, *Blackberry* and *Xanthoceras* all come freely from roots. Among the herbaceous plants the roots of *Anemone japonica* and *Lychnis vespertina*, when cut up quite small, will give plants from every piece. Indoor plants, such as *Manettia cordifolia* and *Cephaelis ipecacuanha* will give plants more readily by this method than any other.

**Seeds**—The soil in which to sow seeds, especially that portion of it which is near the surface, and in which there are weed seeds, should be prepared beforehand so as to avoid the necessity of pulling up the weeds and the consequent danger attending the operation of dislodging the seeds which we wish to germinate, especially during the process of ger-

mination. The most natural method is to spread the soil out on a flat surface in a hothouse and encourage the weed seeds to germinate by the aid of heat and moisture. The soil should be spread out quite shallow, and in a few days' time the seeds that are likely to prove most troublesome will have germinated. The weeds that one finds most noxious are quick in germinating, and will be rendered harmless by this method. They are principally *Lamium*, *Plantago*, *Ragweed*, *Grasses*, *Draba*, *Anthemis*, *Rumex*, *Portulaca*, *Acalpyha*, *Oxalis* and *Trifolium*; but the list varies with different localities. Burning or steaming the soil is often resorted to, but for seed sowing I prefer the other method as more likely to rid the soil thoroughly of the common, troublesome weeds. Soil intended for use in connection with raising Ferns from spores should be treated even more carefully, in order to destroy every vestige of vegetable life. To do this thoroughly the soil should be boiled for a reasonable length of time, and afterward dried in the sun. Seedlings which from their nature require pricking off (that is putting around the outer edge of the soil in pots, or in rows, in boxes) shortly after the seed leaves are developed, should be raised in seed vessels which have at least half their depth devoted to drainage. Most of this should consist of pieces of broken pots, or cinders, covered over with some rough material, such as half-decayed leaves, to prevent the soil washing down. In very shallow seed vessels, whether pans or boxes, the bottom part should be covered with rough screenings, with finer soil above, and pressed moderately firm. In covering the seeds the old rule is to cover the seed with its own thickness in soil, and if followed out few mistakes will be made. The covering should not be of such a nature as to bake readily; finely screened sphagnum moss mixed with sand is a good substance with which to cover almost any medium-sized seeds that take a reasonably short time in germinating, as it retains moisture without imparting too much to the soil below. Very small seeds, such as those of *Begonias* and *Gloxinias*, do not need any covering; but to preserve a humid atmosphere around them, or to furnish the conditions necessary for germination, they must be covered with something which prevents a too rapid evaporation of moisture. This is supplied by a pane of glass, which should be kept on until the seed leaves appear. It need not fit tightly, so as to preclude the possibility of a slight circulation of air; where this is the case the seedlings are apt to dampen, even before the seed leaves are developed. Where glass is used as a covering for small seeds the soil ought to be moderately moist before sowing. Thickly sown seed is an evil to be guarded against, a crowded box or pan of seedlings, whether they be Ferns or flowering plants, is next to useless, because shortly after germinating the seedlings begin to get weak and never afterward make such healthy plants as those which get a chance to form short, stocky growth—enough at least to enable one to handle them easily during the operation of pricking or potting off. Seeds, as soon as germinated, as a rule, should not be kept in a shaded place, as then they are apt to get "drawn;" that is, too much length between the surface of the soil and the seed leaves. Most seedlings in the early part of the season will stand all the sun they can get. This especially applies to seedlings of such plants as *Phlox Drummondii*, *Madagascar*

**Vincas and Verbenas.** Among herbaceous perennials some of the Delphiniums and Rheums, also many of the umbelliferous plants have seedlings with the petioles of the seed leaves forming a long tube and looking as if they were very much "drawn," no matter whether grown in sun or shade. But this is their nature, as the plumule has to penetrate the tube near the base in order to reach the light, instead of between the blades of the seed leaves. A great many kinds of plants in the seedling stage, when pricking off becomes necessary, are not of sufficient size to go into small pots; in these they take up too much room and are apt to suffer from too much or too little water. One will get dry here and there, and the chances are that when water is given others in the neighborhood will get water when they do not need it. Putting several in a pot is just as unsatisfactory, as they must be divided up as soon as sufficient growth is made, and repotted. This applies especially to herbaceous plants which have a large number of fibry roots instead of a tap root. I find the plan of putting the seedlings in boxes, when large enough to handle, to be the most satisfactory method. Watering is then an easy matter, and the seedlings, when large enough, can be transferred to the open ground or potted up as required—it is a saving of space and a saving in labor, especially when the seedlings are transferred to frames and to their permanent quarters. The seeds of many plants may be safely sown at almost any time of the year. The majority of herbaceous plants should be sown during the late Summer, as they occupy comparatively little space throughout the Winter months, and numerous species will bloom the succeeding year, especially if the plants be put in their permanent positions in the Fall, which I have found a very advisable thing to do in this section. Seeds of herbaceous plants, sown early in Spring, especially by amateurs, do not help in making those plants popular, as the seedlings in the majority of cases do not flower the first year, and some of the species not even during the second season.

Grafting consists of placing together two separate parts of plants so that they will unite and grow as one. That part on which the graft is placed is usually a plant provided with roots, and is called the stock. The graft, or cion, is the part which is intended to develop into the future part of the tree, shrub, or vine, as the case may be, which bears leaves, flowers and fruits. When the union has taken place, both stock and cion continue developing as one plant, with, in most instances, very little to indicate that stock and cion, or roots and branches, belong to different species, varieties, or forms. Grafting is, however, frequently done upon the branches of trees, shrubs or even herbaceous plants, so that frequently we may see several varieties in flower together, or earlier or later as the case may be, with the flowers of the species, or variety, upon which the grafts are growing. Some of the reasons why grafting is resorted to as a means of propagating certain species, but principally varieties and forms, in preference to other methods of propagation, are as follows: In growing seedling fruit trees it often requires a long number of years to know whether these seedlings are worth perpetuating, as seedlings are apt to be a long time in fruiting, partly owing to their robust growth; but every species of plant raised from seed takes a cer-

tain time before the flowering and fruiting stage is reached. When old enough to give wood for cions, the seedlings which we will suppose to be the results of cross-fertilization, are grafted on older seedlings, or fruit-bearing stocks, with the result that flowering and fruiting are hastened very considerably. When it is desired to propagate a large number of any selected variety that has thus been flowered and fruited, the grafts are often used on one or two-year-old seedling stocks. It will thus be seen that a very large number of slow flowering and fruiting plants can be raised by this method, in a comparatively short time. But the uses to which it is put by no means end here. Some flowering shrubs have the same characteristics; they take quite a long while to flower from the seedling stage. Very often seedlings do not make floriferous plants, and many of the forms do not produce seeds at all. Therefore, recourse is had to grafting, not only to lessen as much as possible the time between the periods of propagation and flowering, but also to perpetuate certain peculiarities in species and varieties which can not be brought about by seeds or cuttings. Again, frequently the stock has beneficial influences upon the cion. One of them is that some things which are comparatively tender are rendered hardier by being grafted upon the stocks of hardy species, or their varieties. For outdoor grafting the usual time is in the Spring, just before the plants are in active growth, the actual time varying, of course, with different plants and in different parts of the country. The cions are cut in early Winter, and buried in the soil or sand, just out of the reach of frost. This keeps them fresh and plump, and in a condition to readily unite with the stock. The methods of grafting are numerous; some of them are quite complicated and have been originated merely to show the skill of some operator. The easiest way may be said to be the best, and the best methods are so easy that an intelligent child may be taught in a short time to perform the work successfully. Indoor grafting is practiced during August and September, and, with dormant wood, during the period from December to March. As a rule, the closer the relationship between stock and cion the greater the chances of a successful union between them. But plants are sometimes successfully grafted on stocks of different genera of the same order. The Syringa on the Ligustrum is a familiar example. Some of the most familiar methods of grafting are as follows:

**Saddle Grafting**—In this case that part of the stock on which the cion is to be placed is cut to a wedge shape. A neatly made notch is cut in the bottom part of the wood of the cion to fit closely over the wedge-shaped part of the stock. This method is used in grafting Rhododendrons.

**Crown grafting** is performed by heading back a large-sized stock, making an incision in the bark from the severed part downward. Raise the bark on each side of the perpendicular cut, as in budding; make a slanting cut on one side of the cion, and insert beneath the bark; bind together and cover with grafting wax.

**Veneer grafting** is principally practiced on coniferous plants and Rhododendrons. It consists of making a cross cut through the bark

and slightly into the wood. A short distance above this cross cut begin with a slanting cut downward until the first cut is reached; shape the cion so that it fits exactly; tie in position and cover with wax. The stock is headed back after the union has taken place.

**Tongue or whip grafting** is used with seedlings as stocks, the stock and cion being of the same thickness. A slanting cut is made on the two surfaces to be joined with a tongue in each, so made that the tongues will fit exactly in their places. A little practice will show where the tongues should be made.

**Inarching** consists of uniting the cion to the stock while it is still supported by the parent root. It is the simplest of all the methods. A slice of bark and cambium is cut from both stock and cion, the two brought together so as to fit exactly; they are then firmly tied. After the union is assured the cion is gradually severed from the parent to avoid a too sudden check.

**Root grafting** is a very simple operation, and is practiced with such plants as Clematis, Rose, Shrubby Paeony, and many other plants. When all other stock fails this may be tried, merely selecting roots of the same or allied species. The Shrubby Paeonies are grafted on the large tuber-looking roots of the herbaceous species. A notch is made in the side of the swollen tuber-like root, the lower part of the cion being made to fit this.

With Roses and Clematis splice grafting will answer; with Wistarias and Bignonias saddle grafting answers well.

In grafting a very sharp and clean knife should be used, to make a clean cut, so that the surfaces may go closely together. In all cases the bark of both stock and cion should come evenly together, at least on one side, and on both if possible.

**Budding** differs from grafting in that only a single bud is used on the stock instead of a piece of branch on which there are one or more buds. As in grafting a near relationship must exist between the plant from which the bud is selected and the plant which is to receive it. The operation is a trifle more delicate than that of grafting, but a little practice will render it an easy task. The best time for the work is after the plants have completed most of their growth, but before they approach the dormant stage. All that is necessary to accomplish the first season, when done during late Summer, is to secure a union. The bud remains dormant until the following Spring. There are several methods; that most commonly practiced consists of making a cross cut through the bark of the stem of the stock. It should never be greater than one-third of the circumference. From the center of the cross cut make a longitudinal cut downward; raise the bark sufficiently in the angles of the cut parts. The stock is now ready for the reception of the bud. This is taken usually from a branch smaller in circumference than the stock. It must necessarily be from the current year's wood, and the bud should be from the central part of the shoot. Cut the leaf away, but not too near the bud, and with a sharp, clean knife slice the bud from the shoot. It is immaterial if a little of the wood be taken with the bark, but the

length of bark should be greater below the bud than above. The top part should be cut off transversely one-third of an inch above the bud and double that distance below. After the bud has been placed in position, tie moderately firm with raffia, examining it from time to time to prevent the raffia from cutting into the bark. Budding is usually performed during the latter part of Summer.

**Layering**—This operation is on the same principle as that of mossing Rubber plants and Crotons, that is, producing roots on the branches while yet attached to the parent plant. It is exceedingly simple when done correctly, but some of the little details left out, or performed the wrong way, will render the operation unsuccessful. An expert, with shrubs amenable to this method of increase, will seldom lose a layer. Briefly stated, the operation consists of bending a branch low enough so that after it has been notched, tongued or ringed, as the case may be, the part so treated should be several inches beneath the surface of the soil, so as to throw out roots, while being at the same time supplied with nourishment from the parent plant. It is a convenient method of rooting large pieces of a bush, and should be practiced where small quantities of certain things are desired, especially those which are difficult to increase by other methods of propagation. In layering it is necessary to select branches near the ground, so that they can be bent down without breaking. To perform the operation by tongueing, with a sharp knife make an incision in the lower part of the branch at the place where it is desired to have the roots. The incision should vary in length and depth with the thickness of the branch; it should never be deeper than half the thickness of the wood, and should be made toward the end of the branch so that the tongue will eventually form the base of the stem after being separated from the parent plant. The layer, while undergoing the process of rooting, should be held in place with a peg, which must be strong enough to last several months in the ground. With few exceptions shrubs and vines are layered during Summer while the plants are in active growth. In layering, it should be kept in mind that the soil surrounding the part from which roots are desired should never be allowed to get dust dry; to prevent this a little sphagnum moss should be placed around the cut part, in cases where the rooting is a slow process; and a layer of moss, or other material, on the surface of the soil will prevent a too rapid evaporation of moisture. But, in any case, copious waterings during dry weather will be found beneficial. In the treatment of vines, such plants as *Glycine sinensis* and *Pueraria Thunbergiana* can be layered the entire length of the previous season's growth, thus giving a plant at every joint. The period at which the layer may be severed from the parent must be governed by the quantity of roots made. Better to keep it on the plant than to sever too early. After a season has elapsed the majority will have rooted, if attention has been given; but it will not hurt to let them stay for a longer period attached to the old plant. For furnishing suitable wood for layers, old plants are sometimes cut down quite close to the ground, in order to produce a quantity of young growth. Plants so treated are termed "stools." Some of the plants which layer easily are Rhododendrons, Enkianthus, Gordonias, Magnolias, especially the Asiatic species and

their hybrid variations, Syringas, Forsythias, Ligustrums and the Hybrid Perpetual Roses.

### HYBRIDIZATION.

Much has been accomplished by the union of species, and especially by the crossing of varieties; but the work is only in its infancy, because that which has already been done has been, to a large extent, chance work. We do not possess well-established rules for guidance in the selection of parents. Much labor has unwittingly been expended upon impossible subjects, through a desire on the part of the operator to produce some astonishing result all at once. Even from plants which readily cross, many seedlings are raised, which, because of poor judgment used in selection of parents, only result in discouraging the breeder. Beginners who are inclined to practice hybridizing should confine their attention toward improving types which are already well advanced, possibly using a desirable species as a seed parent, but fighting shy of crossing two species. To prosecute the actual work intelligently, the operator should have at least a slight knowledge of the relationship of one species to another as well as of the genera and natural orders. A knowledge of the different parts of a flower and the missions they are intended to fulfill are absolutely necessary. It may be briefly stated that most flowers have male and female organs in the same flower, such as we find in flowers of the Rose. Some plants have the male and female organs on separate flowers, but on the same plant as in Begonia. Others again have the male flowers on one plant, and the female flowers on another, as in Nepenthes and Willow. Artificial pollination consists simply in transferring the pollen from the anther of one flower to the stigma of another. To make sure that this pollen will have every opportunity to act, and pollen of the same or other plants, which is not wanted, excluded, the stamens or male organs of the flower to be pollinated should be removed before the anthers are in a condition to shed their pollen, and the flower afterward tied up in a very fine gauze, or paper bag, during the process of fertilization.

### POTTING PLANTS.

No rules can be laid down which would apply equally to all kinds of plants grown in pots, as different kinds of plants require different treatment in this respect. Some require that the soil be rammed quite firmly about the old ball. These, as a rule, are hard-wooded plants, with fine roots, such as Heaths and Azaleas. Palms thrive best in a moderately well-firmed soil. Soft-growing plants are less fastidious in this respect. Again, there are seasons when some plants should be potted. The hard-wooded kinds are usually potted in Spring before active growth commences. Ferns are given their annual shift before starting into growth; many of them, however, will stand shifting several times during a year. But for all plants it may be stated that the beginning of their resting season should find the ball of earth well supplied with roots, for if given a shift when growth is completed water will lodge in the fresh soil, and this will turn sour and almost certainly cause the plant to become

sickly. Plants with fine hair-like roots should only be given small shifts; rapid growing plants and those with large roots will take larger shifts. In every case the ball should be moderately moist when potting. Plants in the younger stages of their existence, whether seedlings or cuttings, require the soil to be of a finer nature than when older, when it may be rough and fibrous, and in the case of those which need it manure of some kind added. In potting ordinary plants in pots above the size of 4 or 5-inch, the firming of the soil should be done with the aid of a piece of wood about  $1\frac{1}{2}$  inches wide and  $\frac{1}{2}$ -inch thick, or larger, for very large plants. Enough space should always be left at the top of the pot, so that when the ball of earth is in need of water one application will be sufficient to wet it through. In potting cuttings it is the usual custom to put in soil to one-third the depth of the pot; the cutting is put in place, the remaining space filled up with soil, firmed with the thumbs, then the bottom of the pot is knocked several times on the bench. A better method is to have the knocking precede the firming with the thumbs, for this reason: When the cutting is placed in position, the soil added and thumb-firmed, the soil does not get well distributed among the rootlets nearly so well as when the pot is given one or two gentle knocks before the thumbs are used. For most plants in the cutting stage the thumbs should be used for evening the surface more than for firming. Another reason, just as weighty as the last, is that pressure from the thumb acts unevenly on the roots, pressing down opposite sections, while the intervening spaces containing the tender roots are stationary. This must necessarily result in twisting and wrenching, which dangers are done away with, or at least lessened, by first firming with the knocking process. Again, all the cuttings of a batch will not have the same quantity of roots, and therefore they should get different methods of treatment in potting. Those which have a satisfactory number of roots may be put in the middle of the pot, according to the usual custom; but those which have few roots, and which look as if they would benefit by being left in the cutting bed for a longer period, will, as a rule, come along all right if placed at the edge of the pot instead of at the middle. The roots in this position make progress rapidly, and the plantlets can easily be given a place in the middle of a pot during their next shift. Cuttings with very fine roots should always be treated in this way. Many cuttings, when ready for potting, will be found to have the roots pointing downward from the base of the cutting instead of radiating from it; these, if of a delicate and easily bruised nature, can be preserved by taking some soil in one hand, letting the fingers accompany it into the pot, and before withdrawing them press the soil against one side of the pot; place the roots against this and fill up with soil. In course of time practice will enable the operator to pot cuttings as rapidly by this as by the ordinary method. In potting cuttings during the Winter months very great care should be exercised in preventing a check through putting them in soil, which is of a lower temperature than the sand from which they have been taken. It should not vary more than two degrees at the time of potting.

**Clean Pots**—It is the common custom, and a bad one I think, to put plants in dirty pots with merely the rough of the soil remaining in them being removed with a stick or cloth before using. This operation takes more time than washing. A large number of pots submerged in a big tub of water and allowed to stand for a few days will have the material adhering to them softened so that with a piece of woolen cloth and a boy that knows how, a large number can be cleaned in a short time so that they will be as good as new. There is no doubt that dirty pots work to the injury of the plants in them. The inside soil adhering to the pot after use prevents a plant being easily knocked out and the green on the outside tends to make the pot less porous; besides, a plant looks better by far in a clean pot than in a dirty one. New pots or thoroughly dried, clean ones should not be used until they have been dipped in water immediately before using, as they are apt to absorb too much of the water meant for the plant after potting. Have divisions in the potting shed for each size; it saves both time and pots, and when potting is to be done everything goes along more smoothly when the various materials are ready at hand. There is usually more time wasted in gathering the necessary sizes from here, there and everywhere, wiping out a few at a time and punching a stick through the aperture at the bottom than would be spent over the work if it were properly done. System counts in this as in everything else.

**Drainage**—Crocking or arranging pieces of broken pots or other material over the hole in the bottom of the flower pot for drainage is an operation to which too little attention is apt to be given. For quick-growing soft-wooded plants in small pots, or for those which are intended to remain in the pot only for a short time, there is no necessity for an elaborate system of drainage. Especially is this the case where the ball of earth becomes so dry as to require watering at least once a day. With plants of this nature, in pots above the size of 3-inch, a little rough material thrown in the bottom will give compensatory results; but as usually done this work takes more time than if the pots were supplied in the regular way with potsherds. The rough pieces of the potting soil are gathered up by hand and put in the pots as potting proceeds. A better way will be secured as follows: Soil which is to be used for cuttings, and which is screened, will give excellent material in the rough pieces which do not pass through the meshes; this should be saved, mixed with thoroughly rotted cow manure, and put in a box conveniently situated for future use. This gives splendid material for drainage, especially for bedding plants, such as Geraniums in 4-inch pots, Cannas in 5-inch pots, and for young Chrysanthemums. It will be found that that part of the pot holding this mixture will have a great attraction for the roots. Where the pots are to serve for growing plants in for any length of time, potsherds should be used. With Palms, Ferns and such plants as Pandanus, Dracænas and Marantas a carefully crocked pot cuts quite a figure in their healthy root action. For Caladiums, Alocasias, Anthuriums and other plants which require an abundant supply of water, careful drainage is an absolute necessity. With fine-rooted plants, such as Heaths and Azaleas, drainage is equally important. It will be found good policy to have a supply of the differ-

ent sizes of crocks on hand all the time. The crocks should consist of three sizes, the largest size in pieces from two to three inches across; the next large enough to go through a No. 1 sieve, and the small size from one-quarter to one-half-inch in diameter. The quickest way to procure the different sizes is to break up the potsherds with a good-sized hammer, so that the largest pieces are from two to three inches across; put into a No. 4 or 6 sieve to screen out the dust and smaller particles, which may be thrown away. Next screen through a half-inch sieve and these will serve as the smallest-sized crocks. The pieces which the half-inch sieve retain put into an inch sieve. This will give the second size, and what is left will answer for pieces to put over the holes in the bottoms of the pots. All three sizes should be kept in separate boxes, or divisions on the potting bench, handy for use. In crocking, spread out a number of pots on the bench, take a piece of broken pot about twice the diameter of the hole in the bottom of the pot, place the concave side of the crock directly over the hole. If the pot is a small one, a few of the smaller-sized crocks over the larger pieces will be sufficient; but if a 6-inch pot, or larger, it is best to arrange a few large pieces around the first piece, finishing off with smaller ones. On top of the crocks, to prevent the soil from getting among them, either during the operation of potting or from being washed down afterward, sphagnum moss is often used, although this is not the best material for the purpose, as it is apt to retain moisture to a greater extent than the soil above it. Half decomposed leaves are preferable.

### SOIL.

Loam is the principal soil used for most plants. If containing much clay it is made lighter and more porous by adding peat, leaf mould and sand. Each grower of plants should have the loam he uses analyzed by a professional analyst, in order to be certain of what it contains, and to apply intelligently the constituents in which it is deficient for the different classes of plants. Two excellent books on this subject are: "The Soil," by Professor King, Wisconsin, and "Lectures on Some of the Physical Properties of Soil," by Professor R. Warington.

### MULCHING.

This consists of covering the surface of the soil with any loose material, such as well-rotted manure, cocoanut fiber, stable litter, or half-decayed leaves. It acts in retaining the moisture in the ground for the benefit of vegetation instead of being lost by rapid evaporation. The soil, especially after heavy rainstorms, gets a firm crust on the surface which ultimately cracks open, readily parting with the moisture to a good distance beneath the surface; thus the mulch acts as a layer between the drying influence of the atmosphere and the surface of the soil, preventing it from getting hard and keeping it open. A good mulch, besides preventing evaporation is, to a certain extent, similar in its action to a loose, silty surface soil, drawing up the moisture from several feet below the surface. Mulching is also beneficial, because if manure is

used in which there is any feeding substance it is washed down to the roots of the plants by heavy rains. Cultivating acts in a similar manner to mulching, as the soil which is loosened may be said to be a mulch of loose soil; but to be of the greatest service this operation should be performed after every shower of rain. Plants in pots need the surface stirred occasionally, partly for the same reason that plants in the open ground are benefited by frequent cultivating. The top layer of soil in the pots gets into a caked condition; this is indicated at times by the water standing on the surface longer than usual, and is caused by the particles of soil being reduced by the action of the water to a muddy state, forming a kind of puddle through which water takes a long while to percolate. When potting, a little rough sand scattered on the surface is an excellent preventive, keeping the whole mass porous and doing away with the necessity of frequent stirring.

### WATERING.

This is the most important work that falls to the lot of the plant grower. It cannot be learned by reading a paper or a book on the subject, and the man who wields the watering can, or hose, no matter how intelligent he may be, will water plants for years after a fashion, and yet have a great deal to learn. About all that can be said on the subject is to water a plant when it needs it. The trouble lies in knowing when it needs it. The operator should first know the plant, all about it, where it comes from, whether it inhabits a bog or a mountain top, whether it is rapid or slow growing, its natural periods of growth and rest, and the same under cultivation. Next he must know the condition of the roots, the kind of soil it is potted in and when potted. Among other things he should know will be the chemical composition of the water, and whether it is suitable for the plants he is watering. The temperatures of the soil and water during the operation is another important item. Next he should frequently go over different plants in different soils, knock one out of its pot here and there an hour or so after watering, to ascertain whether the ball has been wet an inch or two below the surface with the remainder dust dry, or if the happy medium has been struck. In short, it may be said that the successful cultivator understands how and when to water only after years of experience. Watering with the hose is often the cause of a good deal of harm, both to plants on benches, in the open ground, and in pots, owing to the manner in which water is applied. It is a favorite method with some to force the water out of a small nozzle to a distance of 20 feet, or a less distance, with the finger partly over the end of the hose. A better method than this could not be designed for the packing of the soil, washing it into cakes by breaking it up into fine particles and filling up the interstices with thick muddy water; and when the sun shines, if the ground be not gone over with the cultivator or loosened up in some other way, the surface soil gets as hard as a brick, and the roots near the surface are subjected to a temperature far above what is good for them. To do away with the necessity for this method of watering the hose should be short in length, and stop cocks more frequently placed.

For outside work lengths of temporary iron piping screwed into position wherever necessary should be provided so as to use the hose low down among the plants, never allowing the water to be squirted on the soil. A good plan is to use distributors, one of which can be made in a few minutes if the necessary material is at hand. Take a piece of zinc, about a foot long and 5 inches wide, bend the sides for half its length so as to clasp the end of the hose to hold it in position, and tie with wire. The other end should overlap the end of the hose by about 6 inches, and be turned up slightly so as to meet the water, distributing it in such a manner as will enable the soil to absorb it without being disturbed in the least. This will also prevent the foliage and flowers from being spattered with muddy water.

# INDEX.

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**A**

NAME	PAGE
<i>Abelia rupestris</i>	
(Rock Abelia).....	147
<i>Abutilon</i> .....	9
<i>Acacia</i> .....	9
<i>Acæna microphylla</i> .....	111
<i>Acalypha</i> .....	50
— <i>bispida</i> .....	9
<i>Acanthus</i> .....	111
<i>Acer</i> .....	147
— <i>palmatum japonicum</i> .....	147
<i>Achillea millefolium</i> .....	111
— <i>mongolica</i> .....	111
— <i>ptarmica flore-pleno</i> .....	111
— <i>tomentosa</i> .....	111
<i>Achimenes</i> .....	79
<i>Achyranthes</i> ( <i>Iresine</i> )	58
<i>Aciphylla Colensoi</i> .....	112
— <i>squarrosa</i> .....	112
<i>Aconitum</i> .....	112
<i>Acorus calamus variegatus</i> (variegated Sweet Flag).....	112
<i>Adam's Needle</i> ( <i>Yucca</i> )	175
<i>Adenocalymna comosum</i> .....	67
<i>Adiantum</i> (Maidenhair).....	101
— <i>Capillus-Veneris</i> .....	66
— <i>Farleyense</i> .....	101
—from spores.....	102
—propagation by division.....	102
<i>Adonis</i> .....	112
<i>Æthionema cordifolium</i> .....	112
<i>Agapanthus umbellatus</i> .....	9
<i>Agathaea cœlestis</i> .....	10
<i>Agave americana</i> .....	10
<i>Ageratum mexicanum</i>	50
<i>Agrostemma</i> ( <i>Lychnís</i> ) <i>coronaria</i>	113
— <i>flos-Jovis</i> .....	113
<i>Ajuga</i> .....	113
<i>Akebia quinata</i> .....	67
<i>Alabama Snow-wreath</i> ( <i>Neviusa alabamensis</i> ).....	163
<i>Allamandas</i> .....	10
<i>Alocasia</i> .....	10
<i>Aloysia citriodora</i> .....	11
<i>Alternanthera</i> .....	50

**NAME**

NAME	PAGE
<i>Althæa rosea</i> (Hollyhock) .....	113
<i>Althæa</i> , shrubby ( <i>Hibiscus syriacus</i> )	157
<i>Alum Root</i> (Heuchera).....	134
<i>Alyssum</i> ( <i>Madwort</i> ) .....	113
— <i>maritimum</i> ( <i>Keniga</i> ).....	50
<i>Amaranthus</i> .....	50
<i>Amaryllis</i> ( <i>Hippeastrum</i> ) ...11, 79	
—propagation by offsets.....	80
—raising plants from seeds .....	80
<i>Amorpha fruticosa</i> (Bastard Indigo) .....	147
<i>Amorphophallus</i> .....	80
<i>Ampelopsis Roylei</i> .....	67
— <i>Veitchii</i> .....	67
<i>Ananas</i> .....	11
<i>Andropogon Schænanthus</i> (Lemon Grass)	92
<i>Anemone</i> .....	80
— <i>alpina</i> .....	114
— <i>japonica</i> .....	114
—tuberous rooted .....	114
<i>Annual plants</i> .....	51
<i>Anthericum variegatum</i> .....	11
<i>Anthurium</i> .....	11
<i>Antigonon leptopus</i> .....	68
<i>Antirrhinum</i> (Snapdragon) .....	114
<i>Aponogeton distachyon</i> .....	12
<i>Aquilegia</i> ( <i>Columbine</i> )	115
<i>Arabis</i> (Rock Cress) .....	116
<i>Aralia</i> .....	12
— <i>Chabrierii</i> .....	12
—( <i>Fatsia</i> ) <i>japonica</i> .....	12
— <i>japonica</i> (Angelica Tree) .....	147
— — variegata .....	13
— <i>papyrifera</i> .....	116, 131
<i>Araucarias</i> .....	13
<i>Arauja</i> ( <i>Schubertia</i> ) <i>grandiflora</i> .....	68
<i>Ardisia</i> .....	13
<i>Argemone</i> ( <i>Devil's Fig</i> )	116
<i>Aristolochia elegans</i> .....	68
— <i>siphon</i> .....	68
— <i>Sturtevantii</i> .....	68
<i>Armeria</i> (Sea Pink) .....	117

**NAME**

NAME	PAGE
<i>Arundo donax</i> .....	92
— — <i>variegata</i> .....	92
<i>Asclepias Curassavica</i> .....	51
— <i>tuberosa</i> (Pleurisy Root) .....	117
<i>Asparagus</i> .....	14
— <i>plumosus</i> .....	14
— — <i>nanus</i> .....	69
— — as a pot plant .....	69
— — forshortsprays .....	69
— — raising from seed .....	69
— <i>Sprengerii</i> .....	14
— <i>tenuissimus</i> .....	14, 70
<i>Asperula adorata</i> (Sweet Woodruff) .....	117
<i>Aspidistra</i> .....	14
— <i>elatior</i> .....	66
— — <i>variegata</i> .....	66
— <i>punctata</i> .....	66
<i>Aspidium capense</i> .....	103
<i>Asplenium</i> .....	15, 103
<i>Aster</i> (Michaelmas Daisy) .....	117
<i>Asters</i> , Chinese ( <i>Calistephus chinensis</i> )	51
<i>Astilbe</i> ( <i>Spiræa</i> ) <i>japonica</i> .....	118
<i>Aubrieta deltoidea</i> .....	118
<i>Aucuba japonica</i> .....	148
<i>Azalea</i> .....	15, 148
—newly imported plants .....	15
—removing side growths .....	15
—treatment during summer .....	15
<b>B</b>	
<i>Balsams</i> .....	52
— <i>Zanzibar</i> (Im-patiens Sultani) .....	52
<i>Bamboo</i> .....	92
<i>Bambusa</i> .....	92
<i>Banana</i> ( <i>Musa</i> ) .....	51
— <i>M. ensete</i> .....	51
— — <i>superba</i> .....	52
<i>Baptisia perfoliata</i> .....	118
<i>Barberry</i> ( <i>Berberis Thunbergi</i> ) .....	149
<i>Bay tree</i> ( <i>Laurus nobilis</i> ) .....	161
<i>Begonia</i> .....	15, 53
—bedding varieties of .....	53

NAME	PAGE	NAME	PAGE	NAME	PAGE
Begonia corallina.....	16, 53	Camellia.....	20	Chrysanthemum coc-	
—Evansiana.....	118	Campanula.....	119	cineum.....	125
—Gloire de Lorraine..	16	Candytuft ( <i>Iberis</i> ).....	134	—insects .....	124
—Rex, leaf cuttings of	17	Cannas.....	53	—late-flowering	
—sowing seed.....	16	—for winter blooming	20	plants.....	122
—tuberous-rooted		—raising from seed....	54	—leucanthemum.....	125
section .....	16	—storing .....	54	—parthenifolium.....	125
—winter bloomers....	16	—varieties .....	53	—propagating for	
Bellflower		— with ornamental		general crop .....	122
( <i>Campanula</i> ).....	119	foliage.....	54	—raising new varie-	
—Chinese.....	141	Carludovica.....	20	ties.....	124
Bellis perennis.....	53	Carnation ( <i>Dianthus</i>		—selecting the bud .....	122
Berberis Thunbergi		<i>Caryophyllus</i> ).....	126	—soil.....	123
(Barberry).....	149	—cuttings.....	127	—specimen plants .....	123
—vulgaris.....	149	—material for.....	127	—stock plants .....	121
Bignonia venusta....	70	—disbudding .....	129	—types or races .....	124
Bird Cherry		—feeding .....	129	—uliginosum .....	125
( <i>Prunus padus</i> ).....	165	—lifting and plant-		—varieties .....	124
Bladder Nut		ing.....	128	—ventilation .....	123
( <i>Staphylea</i> ).....	173	—Marguerite .....	130	Cibotium (Dicksonia)	
Bleeding Heart.....	130	—planting in the field.....	128	Schiedei .....	103
Blood Root ( <i>Sanguinaria canadensis</i> ).....	141	—propagating house		Cineraria .....	21
Bocconia cordata		and benches.....	127	—candidissima .....	54
(Plume Poppy) ....	119	—sand .....	127	—maritima .....	54
Bougainvillea.....	17	—soil .....	129	Cinquefoil, shrubby	
—lateritia.....	70	—supports .....	129	( <i>Potentilla fruticosa</i> ).....	165
—spectabilis .....	70	—syringing .....	129	Cissus discolor.....	71
Bouncing Bet ( <i>Saponaria officinalis</i> ).....	142	—temperature .....	129	Cistus villosus.....	151
Boussingaultia baselloides(Madeira Vine) 70		—to follow chrysanthemums .....	130	Citrus trifoliata.....	151
Bouvardia.....	18	—treatment during		Clematis .....	71, 125
Browallia.....	18	rooting .....	128	—grafting large-	
—elata.....	53	—varieties .....	130	flowered varieties .....	71
—speciosa.....	53	—ventilation .....	129	—paniculata .....	71
Brunfelsia.....	18	Caryopteris masta-		Clerodendron specio-	
Bryonia laciniosa....	70	canthus .....	150	sum .....	72
Bulbous plants.....	80	Castor Bean ( <i>Ricinus</i> )	63	—Thomsonæ .....	72
Bulbs, forcing.....	84	Catanaechea cœrulea ..	120	—trichotonom .....	152
—outdoor .....	85	Catchfly ( <i>Silene</i> ).....	143	Clitoria ternatea .....	72
—spring .....	85	Cedar, Japan.....	153	Cobæa scandens .....	72
Burning Bush.....	130	Celandine Double.....	121	Codiæum	
		Centaurea.....	120	(Crotons).....	22, 23, 54
<b>C</b>		Centradenia.....	21	Columbine ( <i>Aquilegia</i> ).....	115
Cactus .....	18	Centropogon .....	21	Coneflower	
Caladium.....	18	Cerastium Bleber-		(Rudbeckia) .....	141
—argyrites .....	81	steinii .....	121	Convallaria majalis...	83
—fancy-leaved .....	81	Cerasus laurocerasus ..	150	Coleus .....	55
—odoratum (Colo-		Cercis japonica (Red		Convolvulus .....	21
<i>casia odorata</i> )....	82	Bud, Judas Tree) .....	151	Cordylines .....	22, 66
—preparations for lift-		Cestrum corymbosum ..	21	—ornamental leaved	
ing tubers .....	82	—Newell .....	21	kinds .....	22
—propagation .....	82	Chænóstoma hispida ..	54	Coreopsis .....	125
—starting tubers .....	81	Chaste Tree		Cornflower	
—storing “ .....	82	( <i>Vitex agnus-castus</i> ) ..	174	( <i>Centaurea</i> ) .....	120
Calathea.....	19	Cheiranthus Cheiri		Corneus florida (Flow-	
—propagation .....	19	(Wallflower) .....	121	ering Dogwood) .....	152
Calceolaria .....	19	Chelidonium majus		Cosmos bipinnatus .....	55
Calico Bush		flore-pleno		—supports for .....	55
( <i>Kalmia latifolia</i> ) ..	160	(Double Celandine) ..	121	Cotoneaster micro-	
Calla.....	90	Chimonanthus		phylla .....	152
Callicarpa.....	150	fragrans .....	151	Cotton Lavender	
Callirhoe.....	119	Chionanthus virginica		( <i>Santolina incana</i> ) ..	142
Callistemon speciosus 20		(Fringe Tree) .....	151	Cotyledon	
Calycanthus (Sweet-		Childsia (Hidalgoa)		( <i>Echeveria</i> ) .....	27, 56
Scented Shrub).....	150	Wercklei .....	70	Cowslip, American .....	131
—præcox .....	151	Christmas Rose		—Virginian .....	137
		( <i>Helleborus</i> ) .....	133	Crape Myrtle ( <i>Lager-</i>	
		Chrysanthemums .....	121	<i>stræmia indica</i> ) .....	161
				Cratægus (Hawthorn) ..	152

NAME	PAGE	NAME	PAGE	NAME	PAGE
<i>Crataegus pyracantha</i> .....	153	<i>Dracæna Godseffiana</i> .....	26	<i>Ficus</i> mossing, out-of-doors.....	31
<i>Crinum</i> .....	83	— <i>Goldieana</i> .....	26	—slow-rooting species.....	32
— <i>Powellii</i> .....	83	— <i>Lindenii</i> .....	26	Forcing bulbs .....	84
<i>Croton</i> .....	83	— <i>Massangeana</i> .....	26	Forget-me-not ( <i>Myosotis</i> ) .....	137
( <i>Codiaeum</i> ).....	22, 23, 54	— <i>Sanderiana</i> .....	26	<i>Forsythia</i> .....	156
<i>Crotoms</i> , ringing .....	23, 24	<i>Drosera binata</i> .....	27	Four O'Clock.....	59
<i>Cryptomeria japonica</i> .....				<i>Fragaria indica</i> (Rock Strawberry) .....	132
(Japan Cedar).....	153			<i>Freesias</i> .....	85
<i>Cuphea Llaveæ</i> .....	56	<i>Echeveria (Cotyledon) gibbiflora</i> .....		<i>Fringe Tree (Chionanthus virginica)</i> .....	151
— <i>platycentra</i> .....	56	— <i>metallica</i> .....	27	<i>Fuchsia</i> .....	32
<i>Cureuligo</i> .....	24	<i>Edelweiss (Leontopodium alpinum)</i> .....	136	<i>Funkia</i> (Plaintain Lily) .....	132
<i>Cycas</i> .....	24	<i>Eichornea</i> (Water Hyacinth) .....	28	— <i>ovata</i> .....	132
<i>Cyclamen</i> .....	25	— <i>azurea</i> .....	28	— <i>Sieboldiana</i> .....	132
<i>Cydonia japonica</i> .....		<i>Elymus glaucus</i> .....	93	— <i>sub-cordata</i> .....	132
(Japan Quince) .....	153	<i>Empress Tree (Paulownia imperialis)</i> .....	164	<i>Furcraea</i> .....	34
— <i>Maulei</i> .....	154	<i>Epiphyllums</i> .....	28	<i>Furze(Ulex europaeus)</i> .....	174
<i>Cyperus alternifolius</i> .....	92	<i>Eranthemum pulchellum</i> .....	29		
<i>Cyrtomium(aspidium) falcatum</i> .....	103	<i>Erianthus ravennæ</i> .....	93	<b>G</b>	
<i>Cytisus</i> .....	26	<i>Erica (Heath)</i> .....	155	<i>Gaillardia aristata</i> .....	132
		<i>Ericas</i> .....	29	<i>Galax aphylla</i> .....	132
<b>D</b>		<i>Erpetion (Viola) reniforme</i> .....	131	<i>Gardenias</i> .....	34
<i>Dactylis glomerata</i> .....		<i>Erythrinæ</i> .....	29, 57	<i>Gazanias</i> .....	57
— <i>variegata</i> .....	93	—propagation.....	29	<i>Gentiana (Gentian)</i> .....	133
<i>Dahlias</i> .....	56	<i>Eucharis amazonica</i> .....	84	<i>Geranium</i> .....	57
—propagation.....	56	<i>Eulalia (Miscanthus)</i> .....	93	— <i>sanguineum</i> .....	133
—soil .....	57	<i>Euonymus</i> (Spindle Tree) .....	155	<i>Gladiolus</i> .....	86
—varieties .....	56	— <i>radicans variegata</i> .....	156	<i>Gloriosa Plantiflora</i> .....	
<i>Daisy, Michaelmas</i> .....	117	<i>Eupatorium probum</i> .....	29	— <i>superba</i> .....	86
—Ox eye .....	125	<i>Euphorbia(Poinsettia) pulcherrima</i> .....	30	<i>Gloxinia</i> .....	34
—Paris .....	43	— <i>elegans</i> .....	31	—diseases of .....	35
<i>Dalechampia Roezliana</i> .....	26	<i>Eurya latifolia</i> — <i>variegata</i> .....	31	—soil for .....	35
<i>Daphne cneorum</i> .....	154	<i>Exacum affine</i> .....	31	<i>Goat's Beard(Spiraea)</i> .....	143
<i>Davallia</i> .....	103	<i>Exochorda grandiflora (Pearl Bush)</i> .....	156	<i>Golden Feather</i> .....	125
— <i>Mariesii</i> .....	103			<i>Gordonia</i> (Loblolly Bay) .....	156
— <i>Mooreana</i> .....	103			<i>Gorse (Whin, Furze, Ulex europaeus)</i> .....	174
<i>Delphinium</i> .....				<i>Grevillea robusta</i> .....	35
(Larkspur) .....	125			<i>Guelder Rose (Viburnum, Snowball)</i> .....	174
<i>Desmodium gyrans</i> .....	26			<i>Gynerium argenteum</i> (Pampas Grass) .....	93
<i>Deutzia scabra</i> .....	154			<i>Gypsophila</i> .....	133
<i>Dianthus (Carnation) Pink</i> .....	126				
— <i>Caryophyllus</i> .....	126			<b>H</b>	
<i>Dicentra eximia</i> .....	130			<i>Hæmanthus</i> .....	86
— <i>spectabilis</i> (Bleeding Heart) .....	130			<i>Halesia</i> (Snowdrop Tree) .....	156
<i>Dichorisandra thyrsiflora</i> .....	27			<i>Hamelia patens</i> .....	35
<i>Dicksonia antarctica</i> .....	104			<i>Hawthorn</i> ( <i>Crategus</i> ) .....	152
— <i>Barometz</i> .....	104			<i>Heath (Erica)</i> .....	155
<i>Dictamnus fraxinella</i> .....				<i>Hedera helix</i> (English Ivy) .....	72
( Burning Bush) .....	130			<i>Hedychium</i> .....	35
<i>Dieffenbachias</i> .....	27			<i>Heeria alba</i> .....	36
<i>Diervilla (Weigelia)</i> .....	155			— <i>rosea</i> .....	36
<i>Digitalis purpurea</i> .....				<i>Helianthus</i> (Sunflower) .....	133
(Fox Glove, Witches' Thimbles) .....	130			<i>Heliotrope</i> .....	57
<i>Dodecatheon</i> .....				<i>Helleborus</i> (Christmas Rose) .....	133
(American Cowslip) .....	131				
<i>Dogwood, Flowering</i> .....					
( <i>Cornus florida</i> ) .....	152				
<i>Doronicum</i> .....					
(Leopard's Bane) .....	131				
<i>Dracæna</i> .....	26				
— <i>fragrans</i> .....	26				

NAME	PAGE	NAME	PAGE	NAME	PAGE
Hemerocallis		Justicia (Schaueria)		Lysimachia nummu-	
(Day Lily).....	133	calytricha.....	37	laria (Moneywort) ..	66
Hepatica triloba.....	134	—(Jacobinia) carnea.	37	Lythrum salicaria	
Henchera(Arum Root).....	134	—rosea .....	37	(Purple Loosestrife).....	137
Hibiscus.....	36				
—syriacus		K		M	
(Shrubby Althaea).157		Kadsura japonica.....	74	Madeira Vine .....	70
Hippeastrum		Kalmia latifolia		Magnolia.....	162
(Amaryllis).....	79	(Calico Bush).....	160	Mahernia glabrata....	38
Holly (Ilex).....	158	Kerria japonica .....	160	Malvaviscus arboreus	38
Hollyhock .....	113	—white, (Rhodoty- pos kerrioides) ...	166	—mollis .....	38
Honeysuckle (Bush) Lonicera.....	162	Kniphofia aloides.....	136	Manettia bicolor .....	76
House Leek (Sempervivum) .....	143	Koelreuteria panicu- lata .....	161	—cordifolia.....	75
Horse Chestnut, smooth fruited (Aesculus macro- stachya).....	164			Maples (Japanese) .....	147
Hoya carnosa.....	73	L		Maranta.....	38
Humulus japonicus		Lachenalias.....	86	Marvel of Peru .....	59
variegatus.....	73	Lagerstroemia indica		Meadow Sweet (Spiraea).....	143
Hunemannia fuma- riæfolia .....	57	(Crape Myrtle) .....	161	Medinilla.....	38
Hyacinths, Roman... <td>84</td> <td>Lantana.....</td> <td>58</td> <td>Mertensia virginica (Virginian Cowslip).....</td> <td>137</td>	84	Lantana.....	58	Mertensia virginica (Virginian Cowslip).....	137
—forcing.....	84	Lapageria alba .....	74	Mesembryanthemum.	58
—In pans .....	85	—rosea .....	74	Metrosideros robusta	38
Hydrangeas for pots. 36		Larkspur (Delphinium) .....	125	—semperflorens .....	38
—forcing.....	36	Lastrea opaca.....	66	Microlepia (Davallia) hirta cristata .....	104
—Hortensis .....	157	—prolifica.....	66	Mignonette (Reseda). 58	
—paniculata grandi- flora .....	158	Lathyrus latifolius		—for early flowering ..	59
—quercifolia .....	157	albus .....	74	Mimulus moschatus..	59
Hypericum (St. John's Wort) .....	158	Laurus nobilis		Mint, Horse, (Monarda) .....	137
I		(Bay Tree) .....	161	Mirabilis jalapa.....	59
Iberis (Candytuft)....	134	Leontopodium alpi- num (Edelweiss) .....	136	Mock Orange (Philadelphus) .....	165
Ilex (Holly).....	158	Lespedeza bicolor.....	136	Monarda	
—cornuta .....	159	Libonia penrhosiensis	37	(Horse Mint).....	137
Imantophyllum.....	37	Ligustrum (Privet) .....	161	Monstera deliciosa....	38
Impatiens Sultani		Lilac (Syringa).....	173	Morina longifolia....	137
(Zanzibar Balsam). 52		Lilium .....	87	Mullein (Verbascum).145	
Inga pulcherrima .....	37	—auratum.....	89	Musa coccinea .....	38
Ipomæa.....	73	—Harrisii .....	89	Mussænda frondosa ..	38
—Briggsii .....	73	—longiflorum .....	89	—luteola .....	38
—grandiflora		—preparing bulbs for potting .....	88	Myosotis (Forget-me-not) .....	137
(Moonflower).....	74	—speciosum.....	88	N	
—tubiculata .....	66	Lily, Day.....	133	Narcissus .....	84
Iresine (Achyranthes) 58		Lily of the Valley .....	83	—poeticus.....	89
Iris .....	86, 135	—plaintain (Funkia).132		Nelumbium.....	96
—propagation.....	135	Limnocharis Hum- boldtii .....	96	—insect enemies.....	97
Isotoma longiflora ...	58	Lindelofia spectabilis.....	136	—raising plants from seed .....	96
Itea virginica .....	159	Lobelia.....	136	—starting dormant tubers .....	96
Ivy English .....	72	—erinus .....	58	Nepenthes.....	39
—German .....	65	Loblolly Bay (Gordonia) .....	156	Nephrolepis .....	105
Ixoras .....	37	Lomaria gibba.....	104	—acuta .....	105
J		Lonicera		—cordifolia .....	104
Jasminum grandi- florum .....	37	(Bush Honeysuckle).....	162	—pectinata .....	105
—nudiflorum		—sempervirens (Woodbine).....	75	—davallioides .....	105
(Chinese naked- flowered Jasmine).....	160	Lopezia racemosa		—furcans .....	104
Judas tree (Cercis japonica) .....	151	(Mosquito Plant) ...	37	—exaltata .....	104
Juniperus (Juniper).	160	Lychnis .....	136	—bostoniensis .....	104
		—(Agrostemma)coro- naria .....	113	—cristata .....	104
		Lycopods .....	101	—washingtoniensis ..	104
		Lysimachia		—pendula .....	104
		(Loosestrife).....	137	Nerium (Oleander) ..	39

NAME	PAGE
<i>Neviusa alabamensis</i> (Alabama Snow Wreath)	163
<i>Nierembergia frutescens</i>	59
— <i>gracilis</i>	59
<i>Nigella damascena</i>	59
<i>Niphobolus lingua corymbifera</i>	66
<i>Nymphaea</i>	97
—hardy sorts	98
— — raising from seeds	99
— — starting	98
—night-blooming section	97
—soil for	98
—starting tubers into growth	98
—summer quarters	98
—tender kinds. The	97
— —wintering	98

**O**

<i>Ochna multiflora</i>	39
<i>Onothera</i> (Evening Primrose)	138
<i>Ononis</i> (Restarrow)	138
<i>Onosma stellulatum</i> var. <i>tauricum</i>	138
<i>Onychium</i>	105
<i>Ophiopogon</i>	138
Orchids	40
— <i>Calanthe</i>	40
— <i>Cattleyas</i>	40
— <i>Celegyne cristata</i>	40
— <i>Cypripedium</i>	41
— <i>Dendrobium nobile</i>	41
— <i>Laelia anceps</i>	41
— <i>Odontoglossum</i>	41
— <i>Oncidium varicosum</i>	41
— —var. <i>Rogersii</i>	41
—potting material	41
Orbush (Lathyrus) <i>vernus</i> (Bitter Vetch)	138
<i>Osmanthus</i>	163
<i>Othonna crassifolia</i> (Little Pickles)	66
<i>Ouvirandra fenes-tralis</i>	100
<i>Oxalis</i>	59, 89

**P**

<i>Pachysandra</i>	138
<i>Pæderia fetida</i>	76
<i>Pæonia</i>	139
— <i>Moutan</i> (Shrubby Paeonia)	163
<i>Palms</i>	41
— <i>Areca</i> (Chrysalidocarpus) <i>lutescens</i>	42
— <i>Caryota sobolifera</i>	42
— <i>Ceroxylon andicola</i>	42
— <i>Cocos plumosa</i>	42
— <i>Weddellana</i>	42
— <i>Corypha australis</i>	42

NAME	PAGE
<i>Palms</i> , <i>Kentia</i> ( <i>Hovea</i> ) <i>Belmoreana</i>	42
— — <i>Forsteriana</i>	42
— <i>Latania</i> <i>borbonica</i>	42
— <i>Licuala</i> <i>grandis</i>	42
— <i>Livistona</i> <i>chinensis</i>	42
— <i>Jenkensii</i>	42
— <i>rotundifolia</i>	42
— <i>Phenix</i> <i>rupicola</i>	42
— <i>Rhipis</i> <i>flabelliformis</i>	42
— <i>Seaforthia elegans</i>	42
— <i>Stevensonia grandifolia</i>	42
<i>Pandanus</i>	60
— <i>utilis</i>	43
— <i>Veitchii</i>	43
<i>Panicum variegatum</i>	94
<i>Pansies</i> ( <i>Viola</i> )	60
— to flower in frames	60
— tufted	61
<i>Papaver</i> (Poppy)	139
— <i>nudicaule</i>	139
<i>Papyrus antiquorum</i>	94
<i>Paris Daisies</i>	43
<i>Passiflora cœrulea</i>	76
— <i>incarnata</i>	76
<i>Paullinia thalictrifolia</i>	43
<i>Paulownia imperialis</i> (Empress Tree)	164
<i>Pavia macrostachya</i> (Smooth-fruited Horse Chestnut)	164
<i>Peach</i> ( <i>Persica vulgaris</i> )	164
<i>Pearl Bush</i> ( <i>Exochorda grandiflora</i> )	155
<i>Pelargonium</i>	61
— fancy	62
— ivy-leaved section	62
<i>Pennisetum longistylum</i>	94
<i>Pentas carnea</i>	62
<i>Pentstemon</i>	140
<i>Pepéromias</i>	43
<i>Pereskias</i>	43
<i>Peristrophe angustifolia</i>	62
<i>Persica vulgaris</i> (Peach)	164
<i>Periwinkle</i> ( <i>Vinca</i> )	145
<i>Petrea volubilis</i>	76
<i>Petunias</i>	62
<i>Philadelphus</i> (Mock Orange, Syringa)	165
<i>Phlox Drummondii</i>	62
— <i>subulata</i> (Moss Pink)	140
<i>Phormium tenax</i>	43
<i>Phygellus capensis</i>	140
<i>Phyllagathis rotundifolia</i>	44
<i>Phyllanthus atropurpureus</i>	44
— <i>nivosus</i>	44
<i>Phylloctenium Lin-deni</i>	44
<i>Physalis Franchetti</i>	140
Pitcher Plant ( <i>Sarracenia</i> )	142
<i>Platycerium alcicorne</i>	105
— <i>grande</i>	105
<i>Platycodon grandiflorum</i> (Chinese Bellflower)	141
<i>Plumbago capensis</i>	63
Plume Poppy	119
<i>Plumerias</i> , The	45
<i>Polianthes tuberosa</i> (Tuberose)	89
<i>Polypodium</i>	106
— ( <i>Phlebodium</i> ) <i>aureum</i>	106
— <i>conjugatum</i>	106
— ( <i>Goniophlebium</i> ) <i>sub-auriculatum</i>	106
— <i>Heracleum</i>	106
— ( <i>Niphobolus</i> ) <i>lingua</i>	106
— <i>Phymatodes</i>	106
— <i>rigidulum</i>	106
Pomegranate, Dwarf ( <i>Punica granatum nana</i> )	165
Poppy (Popaver)	139
<i>Potentilla fruticosa</i> (Shrubby Cinquefoil)	165
Primrose	141
— Evening	138
<i>Primula</i>	45, 141
— fertilizing flowers	46
— <i>floribunda</i>	45
— <i>Forbesii</i>	45
— <i>Isabellina</i>	45
— <i>obconica</i>	45
— <i>sinensis</i>	45
Privet ( <i>Ligustrum</i> )	161
<i>Prunus padus</i> (Bird Cherry)	165
<i>Pteris</i>	107
— <i>cretica albo-lineata</i>	107
— <i>inequalifolia</i>	107
— <i>quadriaurita</i>	107
— <i>serrulata</i>	66
— <i>tremula</i>	107
— <i>Wallichii</i>	107
<i>Pueraria Thunbergiana</i>	76
<i>Punica granatum nana</i> (Dwarf Pomegranate)	165
<i>Pyrethrum roseum</i>	125
<i>Pyrus</i> (Crab Apple)	165
<b>Q</b>	
Quince, Japan ( <i>Cydonia japonica</i> )	153
<b>R</b>	
Rabbit Berry ( <i>Shepherdia argentea</i> )	173
Reinwardtia ( <i>Linum trigynum</i> )	46

NAME	PAGE
Reinwardtia tetragynum	46
Raphiolepis ovata	166
Rhododendron	166
Rhodotypos kerrioides	166
Rhus cotinus (Smoke Tree)	166
Richardia æthiopica (Calla)	90
Ricinus (Castor Bean)	63
Robina hispida	167
Rochea (Crassula) falcata	46
Rohdea japonica	66
Rosa (Rose)	167
—cultivation under glass	170
—for outdoor bloom	169
—forcing	168
—propagation	168
—by grafting	171
—by seeds	168
—summer	171
—teas and hybrid teas	169
Rudbeckia (Cone-flower)	141
Ruellia macrantha	47
Russelia	47

**S**

Saccharum officinarum	95
St. John's Wort (Hypericum)	158
Saintpaulia ionantha	47
Salvia leucantha	47
—patens	47
—pratensis	141
—splendens	47, 63
—Bonfire	47
Sanchezia nobilis	63
Sanguinaria canadensis	(Blood Root) 141
Santolina incana	63, 142
Saponaria officinalis	(Bouncing Bet) 142
Sarracenia	(Pitcher Plant) 142
Saxifraga sarmentosa	(Aaron's Beard) 65, 142
Scutellaria (Skull-cap)	142
Sea Pink (Armeria)	117
Sedum (Stonecrop)	142
Selagiaella	107
—cesia arborea	108
—Emmeliana	107
—erythropus	108
—Kraussiana	107
—lepidophylla	108
—Martensi	108
—viticulosa	108
Sempervivum	(House Leek) 143
Senecio scandens	(German Ivy) 65, 77

NAME	PAGE
Shepherdia argentea (Rabbit Berry)	173
Silene (Catchfly)	143
Smilax (Myrsiphyllum) asparagoides	77
Smoke Tree (Rhus cotinus)	166
Snapdragon	114
Snowball (Viburnum, Guelder Rose)	174
Snowberry (Symphoricarpos racemosus)	173
Snowdrop Tree (Hale-ia)	156
Solanum Wendlandii	77
Sphærogyne latifolia	48
Spindle Tree (Euonymus)	155
Spiræa (Meadow Sweet, Goat's Beard)	143
—(astilbe) japonica	118
—shrubby	173
Stachys lanata (Hedge Nettle)	144
—shrubby	173
Staphylea	(Bladder Nut) 173
Statice (Sea Lavender)	144
Stephanophyllum (Ruellia) longiflorum	49
Stephanotis floribunda	48
Stevias	48
Stigmaphyllon ciliatum	(Butterfly Vine) 77
Stipa pennata (Feather Grass)	95
Stonecrop (Sedum)	142
Strawberry, Rock (Fragaria indica)	132
Streptocarpus hybrids	48
Strobilanthes anisophyllus	49
—Dyerianus	63
—isophyllus	49
Sunflower (Helianthus)	133
Swainsona	63
Sweet Peas	74
—supports for	74
Symphoricarpos racemosus	(Snowberry) 173
Synadenium Grantii	49
Syringa (Lilac)	173
Syringa (Philadelphus), Mock Orange	165

**T**

Tagetes	63
Tamarix	174
Tanacetum vulgare (Tansy)	144
Tecoma grandiflora	77
Thunbergia	78
Thymus (Thyme)	144
Tiarella cordifolia (False Mitrewort)	144

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NAME	PAGE
Tinnea æthiopica	49
Torenia Fournieri	64
Tricyrtis hirta (Japanese Toad-Lily)	144
Tropæolum (Indian Cress)	64
Toxicophæla spectabilis	49
Trillium	90
Tritoma uvaria	136
Tuberose	89
Tulips	84
—forcing	84
—outdoor bulbs	85

**U**

Ulex europaeus (Whin, Gorse, Furze)	174
Uniola latifolia	95

**V**

Valloradia (Plumbago) plumbagineoides	144
Vallota purpurea	90
—propagation	90
Verbascum (Mullein)	145
Verbenas	64
—venosa	64
Veronica (Speedwell)	145
Viburnum (Snowball, Guelder Rose)	174
Victoria Regia, The	100
Vinca (Periwinkle)	145
—major var. elegans	tissima
—rosea	64
Violas (Violets)	145
—hardy	146
—leaf spot on	146
Vitex agnus-castus (Chaste Tree)	174
Vitis heterophylla	variegata
	78

**W**

Wallflower	121
Water Lilies, tender, wintering	98
Water Plants, labels for	100
Weigelia (Diervilla)	155
Wistaria chinensis	78

**X**

Xanthoceras sorbifolia	175
------------------------	-----

**Y**

Yucca	
—(Adam's Needle)	175

**Z**

Zinnias	64
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